

# Bureau of Air Quality

South Carolina Department of Health and Environmental Control

## State of South Carolina: Network Description and Ambient Air Network Monitoring Plan

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# Calendar Year 2014

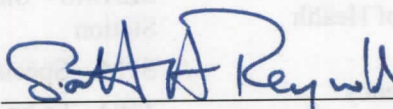


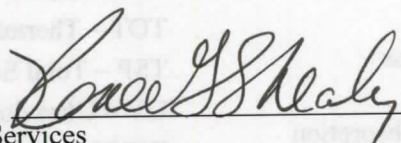
South Carolina Department of Health  
and Environmental Control

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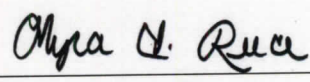
## CERTIFICATION

This document contains the planned changes and final description of the sites and monitors of the South Carolina Ambient Air Monitoring Network for criteria pollutants and related parameters for calendar year 2014. The South Carolina Department of Health and Environmental Control (DHEC) certifies that the network described herein meets or exceeds the minimum requirements needed to support the State Implementation Plan, national air quality assessments and policy decisions as required in 40 CFR Part 58, Ambient Air Quality Surveillance, at the time of submittal to the United States Environmental Protection Agency (EPA), Region 4. Due to circumstances that may arise during the implementation of the plan in 2013 and during the 2014 monitoring year, some elements of the network may require modification. A notification of modifications will be posted on the DHEC website and provided to EPA Region 4. Where necessary, a request for approval of deviations from this plan and supporting documentation will be submitted to EPA Region 4.

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## Acronyms

AQCR – Air Quality Control Region	NPAP – National Performance Audit Program
AQI – Air Quality Index	NWS – National Weather Service
AQS – Air Quality System	PEP – Performance Evaluation Program
BAQ – Bureau of Air Quality	PSD – Prevention of Significant Deterioration
BC – Black Carbon	PTFE - Polytetrafluoroethylene
CAAA – Clean Air Act Amendment	PUF – Polyurethane Foam
CBSA – Core-Based Statistical Area	QA – Quality Assurance
CFR – Code of Federal Regulation	QAPP – Quality Assurance Project Plan
CSA – Combined Statistical Area	QC – Quality Control
CSN – Chemical Speciation Network	SAMWG – Standing Air Monitoring Working Group
CMS – Continuous Monitoring Site	DHEC – South Carolina Department of Health and Environmental Control
DAQA – Division of Air Quality Analysis	SLAMS – State and Local Air Monitoring Station
DHEC- South Carolina Department of Health and Environmental Control	SPM – Special Purpose Monitor
EPA – Environmental Protection Agency	TBD - To be determined
FDMS – Filter Dynamics Measurement System	TEOM – Tapered Element Oscillating Microbalance
FEM – Federal Equivalent Method	TOT – Thermal Optical Transmittance
FRM – Federal Reference Method	TSP – Total Suspended Particulate
GC/MS – Gas Chromatography / Mass Spectroscopy	UV – Ultraviolet
GFAA – Graphite Furnace Atomic Absorption Spectrometry	WGS84 – World Geodetic System of 1984 revised in 2004
HPLC – High Performance Liquid Chromatography	XRF – X-ray Fluorescence Spectroscopy
IC – Ion Chromatography	
IMPROVE – Interagency Monitoring of Protected Visual Environments	
ICP/MS – Inductively Coupled Plasma Mass Spectroscopy	
LAC – Light-Absorbing Carbon	
MET – Meteorology	
MOA – Memorandum of Agreement	
MSA – Metropolitan Statistical Area	
μSA – Micropolitan Statistical Area	
NAAQS – National Ambient Air Quality Standards	
NATTS- National Air Toxics Trends Site	
NADP-MDN – National Atmospheric Deposition Program Mercury Deposition Network	
NATA – National Air Toxics Assessment	
NCore – National Core Monitoring Network	

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## Introduction

The South Carolina Department of Health and Environmental Control (DHEC) or its predecessors have operated an air quality monitoring network in South Carolina since 1959. During that time, the network has continually evolved to meet the requirements and needs of DHEC's Air Program and to comply with federal requirements. In 2014 the network will be comprised of 105 monitors and samplers at 33 sites.

In October, 2006, the United States Environmental Protection Agency (EPA) published revisions to the ambient monitoring regulations (71 FR 61236, October 17, 2006) requiring quality assurance (QA), monitor designations, minimum requirements for both number and distribution of monitors among metropolitan statistical areas (MSAs) and probe siting changes. The regulation also included the requirement for an annual monitoring network plan and periodic network assessments.

Monitor designations include the State and Local Air Monitoring Station (SLAMS), special purpose monitoring (SPM) and the National Core Monitoring Network (NCore). The SLAMS air monitoring network is specific for the criteria pollutants, those pollutants for which National Ambient Air Quality Standards (NAAQS) have been established. In addition to a SLAMS network, the air monitoring network includes SPM for air toxics, particulate, mercury, criteria pollutants, precipitation and meteorology. NCore is a national multi-pollutant network that utilizes advanced measurement systems for particles, pollutant gases and meteorology. It provides data to long-term trends of criteria and non-criteria pollutants and to support air quality model evaluation, scientific studies and ecosystem assessments.

This plan covers the eighteen month period from July 1, 2013 through December 31, 2014. This period includes a 6 month implementation period during which sites indicated as 'New' will be identified, secured and prepared for the installation of monitoring equipment. It is expected that any monitoring indicated as 'New' or 'To be established' will be installed,

calibrated and operating in 2014 with the exception of some ozone monitors which may begin operation at the start of the South Carolina Ozone Monitoring Season (April-October). Stakeholder groups have committed to assist in identifying and securing access to suitable locations. These efforts will continue in this and in subsequent monitoring plans as DHEC continues to identify new monitoring needs.

The annual Network Description and Ambient Air Monitoring Plan, as required and described in 40 CFR Part 58.10, Annual Monitoring Network Plan and Periodic Network Assessment, must contain the following information for each monitoring station in the network:

- The Air Quality System (AQS) site identification number for existing stations
- The location, including street address and geographical coordinates, for each monitoring station
- The sampling and analysis method used for each measured parameter
- The operating schedule for each monitor
- Any proposal to remove or relocate a monitoring station within a period of eighteen months following the plan submittal
- The monitoring objective and spatial scale of representativeness for each monitor
- The identification of any sites that are suitable for comparison against the PM<sub>2.5</sub> NAAQS
- The MSA, Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor

This document constitutes the South Carolina Air Monitoring Network Plan and is organized into two main parts:

- **Network Summaries:** A table which presents the total number of sites and monitors for the State, including a list of all proposed changes to the current network

- **Air Monitoring Station Description:** An outline of the designations, parameters, monitoring methods and the purpose for each monitor at the site

The South Carolina Ambient Air Monitoring Network (Monitoring Network) will be reviewed annually. Planned changes will be described in this Network Description and Ambient Air Monitoring Plan and provided for public review and comment prior to submission to the EPA Region 4 Administrator.

**2014 Network Description and Ambient Air Monitoring Plan: Public Participation Opportunities**

In anticipation of the need for an updated monitoring plan, heightened public interest and potential impact of the monitoring regulation changes, DHEC’s Air Program solicits involvement from both internal (to DHEC) and external workgroups.

Individuals that had expressed interest in the development of the ambient air monitoring network were notified of the availability of the plan and were invited to provide comments. This group consists of representatives from the business, environmental and health communities.

Other opportunities for public involvement include:

- A webpage maintained for publication and access to draft and reference documents and announcements<sup>1</sup>.
- Availability of the proposed 2014 Network Description and Ambient Air Network Monitoring Plan **for public review and comment ran from May 31, 2013 to June 29, 2013**. All recorded participants who registered in the outreach and discussion activities were notified when the plan became available for review.

DHEC is committed to continuing the involvement and participation opportunities in the development of the annual revisions of the Network Description and Ambient Air Network

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<sup>1</sup><http://www.scdhec.gov/environment/baq/AmbientAirMonitoring/>

Monitoring Plan and the periodic assessments of the air quality surveillance system.

**Network Operation**

The primary responsibility for the operation of the South Carolina Ambient Air Monitoring Network is assigned to the Division of Air Quality Analysis in the Bureau of Environmental Services (Division). The Division establishes, maintains and operates the sites and instruments that make up the network and performs the analysis of samples collected as part of routine monitoring or special projects. Data generated by the network for comparison to the NAAQS is verified to be accurate and reported by the Division and stored in the national AQS database.

Criteria pollutant monitoring for the purpose of comparison to the NAAQS is performed using EPA designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) to ensure the precision and accuracy of the measurements across the air quality surveillance system.

Regular calibration and audits of the measurement systems are performed to verify that the instruments are operating correctly and data being collected is accurate. The QA activities supporting the Monitoring Network meet or exceed the QA requirements defined in 40 CFR Part 58 Appendix A (Quality Assurance Requirements for SLAMS, SPMs and PSD Air Monitoring).

Raw data is collected hourly from sites across the state and provided to internal data users (forecasters and data analysts) and to the AIRNow database for presentation to the public. Before the data is submitted to AQS, it is verified to be accurate through review of the instrument Quality Control (QC) and QA performance documentation.

Instrument QA/QC alone is not sufficient to assure monitoring data quality. In addition to periodic site assessments, DHEC conducts additional visits of monitoring sites to enable comparison with applicable siting criteria.

It is DHEC’s intent that all criteria pollutant monitors and samplers be sited and operated in

accordance with the requirements of 40 CFR Part 58 and Appendices A (Quality Assurance), C (Methods), D (Network Design) and E (Probe Siting Criteria) and the data collected by these samplers and monitors is suitable for comparison to the NAAQS. DHEC further intends to assure that the samplers and monitors comply with as many of the recommendations contained within the regulations and applicable guidance documents as is possible.

An element of the Quality System<sup>2</sup> employed by the Division is periodic assessments of systems and monitor performance. As the primary QA organization for ambient air monitoring activities, the Division operates under the approved Environmental Quality Control Quality Assurance Management Plan, the Ambient Air Quality Monitoring Quality Assurance Project Plan and approved plans for specific projects. EPA Region 4 provides periodic Technical Systems Audits of sampling and analytical methods, network operation, data collection and reporting and QA activities at their discretion or at the request of DHEC's Air Program. EPA Region 4 may conduct audits of any component of the operation of the network or quality management system. The Division also participates in the National Performance Audit Program (NPAP) and the Performance Evaluation Program (PEP) administered by EPA to provide independent audits of criteria pollutant monitoring and performance.

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<sup>2</sup> The Quality System is the means by which DHEC implements the quality management process through the Quality Assurance Management Plan for SC DHEC, July, 2008.

## Station Description Content

Specific siting information for each site and monitor is stored in the EPA's Air Quality System (AQS), the national ambient air database. The AQS Site Description includes the exact location of the site, local and regional population and description of the site location, monitor types and monitoring objectives. This site and monitor information is routinely updated whenever there is a change in site characteristics or pollutants monitored.

The AQS is used as the primary repository for all South Carolina ambient air monitoring data including site descriptions. All ambient air monitoring data is stored in AQS, including non-NAAQS parameters, ambient air toxics, total suspended particulate and supporting QA data.

### Station Description

Each network station description contained in this document includes a Site Description and Monitor Details. These sections may include the following information:

#### *Site Description*

The header for each site includes:

- **Site Name**
- **Core Based Statistical Areas (CBSA)** as defined by the US Census. (February, 2013).<sup>3</sup>
- **AQS Site ID:** The unique site identification number used in AQS in the form of 45-cc-ssss where:
  - **45** is the federal identification code for SC,
  - **cc** is the county identification code; and
  - **ssss** is the site identification code within the county.
- **Location:** Typically the street address of the site where available.
- **County:** County in which the site is located.

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<sup>3</sup> The US Census Bureau periodically adjusts CBSA names and boundaries. This plan uses the latest available revision.

- **Coordinates:** Listed in decimal degrees, Latitude (N) then Longitude (W) using WGS84 projection.
- **Date Established:** The date when each existing monitoring station was established is shown in the description. For new stations proposed in this plan, a date is provided when it is expected for the station to be in operation. Individual monitors at a site may have differing start and stop dates.
- **Site Evaluation (most recent date visited):** Each monitoring station in the network is periodically visited to determine whether all required probe exposure criteria for monitors are met. If necessary, corrective action is scheduled to address deficiencies. If a monitoring site has not yet been evaluated, it will be denoted with the word "PENDING". Auditors may visit sites to provide an additional, independent QA check on the site evaluations. When an additional independent check has been conducted, the date of the visit will be noted next to the date of the latest site evaluation and contained within parentheses.

#### *Monitor Details*

In a table associated with each site, the parameters monitored at that site are listed along with descriptive information associated with that parameter.

- **Parameter**

Criteria (compounds for which a NAAQS has been established), non criteria and/or supporting parameters (primarily meteorological measurements) measured at the site are listed.

- **Scale**

Each monitor or sampler in the monitoring network is described in terms of the approximate physical dimensions of the air parcel nearest the monitoring station throughout which pollutant concentrations are expected to be reasonably similar. This is most often referred to as the *Scale* of the monitor. Different pollutants monitored at the same location may represent different scales depending on the characteristics of the pollutant.

Area dimensions or scales of representativeness used in the network description are:

(a) Microscale

Air volumes associated with area dimensions ranging from several meters up to about 100 meters.

(b) Middle scale

Areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers

(c) Neighborhood scale

Extended areas of a city that have relatively uniform land use with dimensions ranging from 0.5 to 4.0 kilometers

(d) Urban scale

Citywide or equivalent rural areas with dimensions ranging from 4 to 50 kilometers

(e) Regional scale

Areas ranging from 50 to hundreds of kilometers in diameter

The true representative area may best be described by an irregular shape of the approximate dimensions indicated above accounting for local sources and differing land use.

The representative scale of a monitor is closely associated with the objective of the monitoring.

**Objective**

The ambient air monitoring network is designed to meet three primary objectives:

1) Provide air pollution data to the public in a timely manner. Near real-time data is made available on the internet through AIRNow and Air Quality Index (AQI) reporting and forecasting in the major metropolitan areas.

2) Support compliance with ambient air quality standards and emissions strategy development. Monitors are operated to measure concentrations for comparison to NAAQS and to provide information to aid in the development of strategies to improve air quality.

3) Support air pollution research studies. Data from the monitoring network support greater

understanding of the impacts and effects of ambient air pollution.

Individual monitors within a monitoring network that support these basic objectives generally serve one or more of the following purposes:

- Determine highest concentrations of pollutants
- Determine representative concentrations in areas of high population density
- Determine impact on air quality of significant sources or source categories
- Determine general background concentrations
- Determine extent of regional pollutant transport
- Determine welfare-related impacts in more rural and remote areas (ex. visibility impairment and impacts to vegetation)

The design intent in siting stations is to correctly match the area represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the monitor. The relationship of appropriate scale to the six basic purposes are:

Monitoring Purpose	Siting Scale
Highest concentration	Micro, Middle, Neighborhood
Population	Neighborhood, Urban
Source impact	Micro, Middle, Neighborhood
General/background	Neighborhood, Urban, Regional
Regional transport	Urban, Regional
Welfare-related impacts	Urban, Regional

Monitor and sampler data is regularly reviewed to assure the assigned scale is correct and appropriate for the intended objective.

## Designation

**State and Local Air Monitoring Stations: (SLAMS)** The required and long term criteria pollutant monitors described in the air quality monitoring network are designated **SLAMS**. EPA requirements for air quality surveillance systems provide for the establishment of a network of monitoring stations designated **SLAMS** that measure ambient concentrations of those pollutants for which standards have been established. These stations must meet requirements that relate to four major areas: QA, monitoring methodology, sampling interval and siting of instruments and instrument probes.

**Special Purpose Monitors (SPM):** Monitors in the air quality surveillance network not designated **SLAMS** are **SPM**. The **SPM** support investigations addressing complaints, areas and pollutants of concern, network refinement, modeling verification and compliance. These monitors are committed to investigation and projects as described in the associated Quality Assurance Project Plan (QAPP). They may be located as separate monitoring stations or be included at existing monitoring locations. Monitoring data will be reported to AQS where possible. Siting and probe exposure will conform to all requirements for **SLAMS** monitors whenever possible.

Both **SLAMS** and **SPM** data may be used in the reporting of an area's Air Quality Index.

**Air Quality Index (AQI):** The **AQI** is a method of reporting that converts concentration levels of pollution to a simple number scale of 0-500. Index reporting is required for all urban areas with a population exceeding 350,000. Intervals on the **AQI** scale are related to potential health effects of the daily measured concentration of the measured pollutants. All stations in a metropolitan area provide data for daily index reporting. Data collected from continuous monitors for Ozone and  $PM_{2.5}$  monitors is collected hourly and reported as **AQI** maps on EPA's AIRNow website. A daily **AQI** is provided for the areas in and around Aiken, Charleston, Columbia, Florence/Darlington, Greenville-Spartanburg, and York/Chester/Lancaster.

## Probe Height

The monitor or sampler probe is the point where ambient air enters the analytical or sample collection system. Ideally, air would be sampled approximately at nose height, but due to operational, exposure and security considerations, air may be sampled further from ground level. Proper probe height is specified in the monitoring regulations (typically between 2 and 15 meters) and is checked as part of the periodic site evaluations.

## Analysis Methods

All sampling and analytical procedures used for comparison of ambient concentrations of criteria pollutants to the NAAQS will use designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM). Where appropriate for specific monitoring objectives, well characterized non-equivalent methods may be used.

- **Particulate Matter  $\leq 10$  microns ( $PM_{10}$ )**

$PM_{10}$  samplers operated by DHEC are designated as either FRM or FEM samplers and are operated according to the requirements set forth in 40 CFR Part 50 and 40 CFR Part 58. Intermittent samplers collect a 24-hour sample no less than every sixth day on a quartz filter. The filter is conditioned and weighed before and after the sample run. The gain in weight in relation to the volume of air sampled is calculated in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). The quartz filters are equilibrated before each weighing for a minimum of 24 hours at a 20-23°C mean temperature and a 30-40 percent mean relative humidity.

Continuous  $PM_{10}$  samplers provide 24-hour concentration measurements every day. During sampling, ambient air passes through an inlet designed to pass only particles smaller than 10 microns in diameter. After exiting the inlet, the sample stream is sent through a mass transducer to determine instantaneous and total flow. Particulate in the sample stream passes through a Teflon-coated glass fiber filter. This filter is weighed every two seconds. The difference between the current filter weight and the previous

weight gives the total mass of the collected particulate for that period. The mass concentration is computed by dividing the total mass gained by the flow rate. Data is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

- **Particulate Matter  $\leq 2.5$  microns (PM<sub>2.5</sub>)**

All PM<sub>2.5</sub> samplers operated by DHEC are designated FRM samplers. Manual samplers are operated per the requirements set forth in 40 CFR Part 50, Appendix L. Samples are collected on 46.2 millimeter Polytetrafluoroethylene (PTFE) filters over a 24-hour sampling period. Air flow through the filter is maintained at 16.7 liters per minute. The flow rate must not vary more than +/-5 percent for five minutes over a 24-hour sample period at actual ambient temperature and pressure. Samples are retrieved within 96 hours of the end of the sample run and are kept cool (4°C or cooler) during transit to meet the thirty-day limit for final weighing.

The PTFE filters are equilibrated and weighed before and after the sample run for a minimum of 24 hours at a controlled atmosphere of 20-23°C mean temperature and 30-40 percent mean relative humidity. Filters are used within thirty days of initial weighing. Filters must be re-weighed within thirty days of the end of the sample run if kept at 4°C or cooler. The gain in weight in relation to the volume of air sampled is calculated in  $\mu\text{g}/\text{m}^3$ .

Unless designated FEM, continuous PM<sub>2.5</sub> monitors provide hourly measurements for AQI reporting unless designated FEM, do not provide concentration data currently suitable for comparison to the NAAQS. During monitoring, ambient air passes through an inlet system designed to pass only particles smaller than 2.5 microns in diameter. After exiting the inlet, the sample stream is sent through a mass transducer to determine instantaneous and total flow. Particulate in the sample stream is captured by a Teflon-coated glass fiber filter. This filter is weighed every two seconds. The difference between the current filter weight and the previous weight gives the total mass of the collected particulate for that period. The mass concentration is computed by dividing the total

mass gained by the flow rate. Data is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

#### PM<sub>2.5</sub> Speciation sampling and analysis

In addition to operating PM<sub>2.5</sub> samplers that allow measurement of only PM<sub>2.5</sub> mass concentration, DHEC also operates PM<sub>2.5</sub> speciation samplers that collect samples that are analyzed to determine the chemical makeup of PM<sub>2.5</sub>. Samples are collected on a set of three cartridges over a 24-hour sampling period. The individual cartridges contain denuders and filters designed to efficiently capture the major components of PM<sub>2.5</sub>.

After collection, the samples are shipped in ice chests to the EPA contract laboratory for analysis. At the laboratory, the samples are analyzed using thermal optical analysis (for carbon), ion chromatography and x-ray fluorescence (for metals) to determine the presence and concentration of specific compounds. Sample results are stored in AQS.

- **Sulfur Dioxide (SO<sub>2</sub>)**

Instruments used to continuously monitor sulfur dioxide concentrations in the atmosphere employ the FEM Ultraviolet (UV) fluorescence method. The continuous data output from the instrument is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

Calibration of these instruments is done dynamically using EPA protocol gas mixtures containing a known concentration of sulfur dioxide in nitrogen. This gas is diluted to give varying known concentrations of sulfur dioxide. These known concentrations are supplied to the instrument, which is adjusted so that the instrument output corresponds with the specific concentrations. Calibration curves are prepared for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Carbon Monoxide (CO)**

Continuous monitoring for carbon monoxide is performed by use of the FRM non-dispersive infrared correlation method. Data is stored locally

on redundant data acquisition systems and recovered hourly by the Division's automated central data acquisition system.

Calibration of the instrument is done dynamically using EPA Protocol gas mixtures containing a known concentration of carbon monoxide in air. The gas is diluted to give varying known concentrations of carbon monoxide. These known concentrations are supplied to the instrument, which is adjusted so that the instrument output corresponds with the specific concentrations. Calibration curves are prepared for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Ozone (O<sub>3</sub>)**

Ozone is monitored using the FEM Ultraviolet (UV) photometry method. The continuous data output from the instrument is stored locally on redundant data acquisition systems and recovered hourly by the Division's automated central data acquisition system.

Monitors are routinely calibrated using portable ozone transfer standards. Calibration curves are prepared for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Nitrogen Dioxide (NO<sub>2</sub>)**

The FRM chemiluminescence and UV methods are used in monitoring the nitrogen dioxide concentration in the ambient air. The continuous data output from the instrument is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

Calibration of the instrument is done dynamically using EPA protocol gas mixtures containing a known concentration of nitric oxide in nitrogen. The gas is diluted to give varying known concentrations of nitric oxide. An ozone generator and converter are used to convert nitric oxide (NO) to nitrogen dioxide (NO<sub>2</sub>). These known concentrations are supplied to the instrument, which is adjusted so that the instrument output corresponds with the specific concentrations. Calibration curves are prepared

for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Lead**

Lead concentrations are determined from the analysis of total suspended particulate collected using high volume particulate samplers as described in 40 CFR Part 50 Appendix G. Particulate samples are acid extracted to dissolve the metals. The lead content is determined using Flameless (Graphite Furnace) Atomic Absorption spectrometry.

- **Sampling Frequency**

Measurements of the parameters related to air quality are performed using sampling and continuous monitoring. Sampling frequency is the indicator of how often a measurement is made and reported.

**Sampling** typically involves collection of a sample over a period (typically 24 hours, midnight to midnight) and delivery of the sample to the laboratory for preparation and analysis. Samples are collected every day (1:1), every third day (1:3), every sixth day (1:6) and, for some projects, every twelfth day (1:12) depending on the data quality objectives necessary for the project. Results of the analysis are reported as averages for the period. The EPA publishes 1:3 and 1:6 day sampling schedules used nationwide and by the Monitoring Network.<sup>4</sup>

**Monitoring** typically uses on-site analyzers that continuously sample the air and measure the pollutant of interest. Results of the analysis are reported as hourly averages.

#### *Changes for 2014*

Any planned changes in parameters monitored, the configuration, or operations at the site planned for 2014 are described herein and summarized in the Summary of 2014 Network Changes. Unless otherwise indicated, changes at a site including the beginning of new monitoring activity will be effective January 1, 2014. Ozone monitoring for 2014 at new or special project sites may start at the beginning of the ozone monitoring season (April-October).

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<sup>4</sup> <http://www.epa.gov/ttn/amtic/calendar.html>

**Network Summary: Calendar Year 2014 Air Monitoring Stations**

Region	Sites	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	TSP/Lead	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub> /NO/NO <sub>y</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOC	Mercury	Precip Chem.	Precip.	*MET
Augusta-Richmond County MSA	2	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Charleston-N. Charleston MSA	5	3	2	1	1	0	2	2	2	0	1	1	0	0	0	0	0	0	1
Charlotte-Concord-Gastonia MSA	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Columbia MSA	7	4	2	1	3	1	3	3	3	1	0	1	2	3	0	2	2	2	2
Florence MSA	5	1	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
Greenville-Anderson-Mauldin, SC MSA	5	3	1	1	1	0	4	1	1	0	1	1	0	0	0	0	0	0	1
Spartanburg MSA	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Rest of State	6	1	3	1	3	0	5	1	0	0	0	1	1	1	1	0	2	2	1
<b>TOTALS</b>	<b>33</b>	<b>14</b>	<b>11</b>	<b>4</b>	<b>8</b>	<b>4</b>	<b>19</b>	<b>8</b>	<b>6</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>6</b>

This summary table presents the elements of the South Carolina Network Description and Ambient Air Monitoring Plan after implementation of changes described in this plan.

\*MET data includes wind speed and wind direction.

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Site ID	County	Site Name	Ozone (ppm)	PM <sub>2.5</sub> Annual (µg/m <sup>3</sup> )	PM <sub>2.5</sub> 24-hour (µg/m <sup>3</sup> )	PM <sub>10</sub> (# Expected Exceedances)	SO <sub>2</sub> 1-hour (ppb)	NO <sub>2</sub> 1-hour (ppb)	NO <sub>2</sub> Annual (ppb)	CO 8-hour (ppm)	CO 1-hour (ppm)	Lead (µg/m <sup>3</sup> ) (2012 data not certified)
063-0008	Lexington	Irmo		11.1	23							
063-0009	Lexington	Cayce CMS				0.0						
063-0010	Lexington	Cayce City Hall				0.0						
073-0001	Oconee	Long Creek	0.064	8.6*	20*	55						
077-0002	Pickens	Clemson	0.071									
077-0003	Pickens	Wolf Creek	0.067*									
079-0007	Richland	Parklane	0.070*	10.1	20	0.0	15*				1.3	0.01
079-0019	Richland	Bates House		10.7*	23*	0.0						0.02
079-0021	Richland	Congaree Bluff	0.061						.8			
079-1001	Richland	Sandhill	0.073					39*	4.28			
083-0009	Spartanburg	North Spartanburg	0.075									
083-0011	Spartanburg	T.K. Gregg		10.7	21	21						
091-0006	York	York CMS	0.065				3*					

\* denotes design values that did not meet completeness requirements.

## Required Monitoring

The EPA requires that each State maintain a minimum number of monitors to properly characterize air quality and to meet any required objectives of the monitoring network<sup>5</sup>. In general, EPA establishes minimum monitoring requirements based on the population and current ambient air monitoring design values in each Core Based Statistical Area (CBSA). The term CBSA is a collective term for the defined Metropolitan and Micropolitan Statistical Areas (MSA and  $\mu$ SA). A MSA area contains a core urban area of 50,000 or more population, and a  $\mu$ SA contains an urban core of at least 10,000 (but less than 50,000) population. Each metropolitan or micropolitan area consists of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core<sup>6</sup>.

A metropolitan or micropolitan statistical area's geographic composition, or list of geographic components at a particular point in time, is referred to as its "delineation." Metropolitan and micropolitan statistical areas are delineated by the U.S. Office of Management and Budget (OMB) and are the result of the application of published standards to Census Bureau data. The standards for delineating the areas are reviewed and revised once every ten years, prior to each decennial census. Generally, the areas are delineated using the most recent set of standards following each decennial census. Between censuses, the delineations are updated annually to reflect the most recent Census Bureau population estimates. Areas based on the 2010 standards and Census Bureau data were delineated in February of 2013.<sup>7</sup>

While DHEC understands the need for establishing minimum monitoring requirements, EPA appropriately has mechanisms within the monitoring plan approval and network assessment process to allow states the flexibility to implement a monitoring network that meets the three basic monitoring objectives and addresses National and State needs. The recent changes in the MSA definitions is an example of the reason for the incorporation of flexibility in the regulations and illustrates necessity that EPA use the discretion available in the monitoring regulations to afford states flexibility and regulatory certainty.

Per 40 CFR Part 58 Appendix D paragraph 2 (e), minimum monitoring requirements in multi-state MSAs can be met through a cooperative agreement. In the absence of an agreement between states, the minimum monitoring requirements must be met independently in each portion of the MSA. South Carolina has established a memorandum of agreement with the States of Georgia and North Carolina and Mecklenburg County, NC to spell out the responsibilities of each party to develop a monitoring network that meets the appropriate monitoring objectives for the MSA.

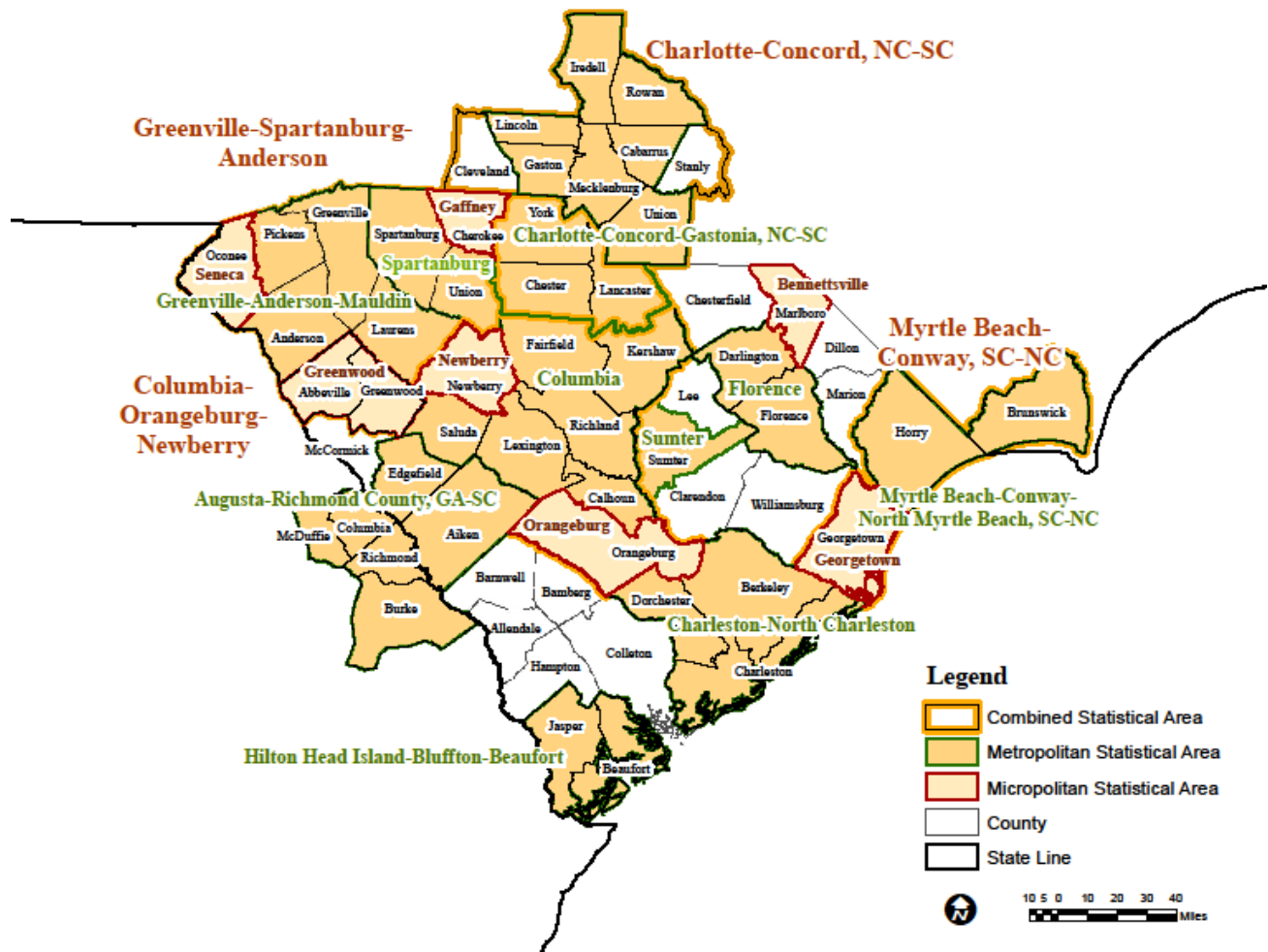
The map below presents South Carolina's CBSAs based on the new definitions published in February 2013. They include a new bi-state MSA with North Carolina containing Horry County, SC and Brunswick County, NC.

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<sup>5</sup> 40 CFR Part 58.11 paragraph (a)(3)(c) and Appendix D to 40 CFR Part 58.

<sup>6</sup> <http://www.census.gov/population/metro/>

<sup>7</sup> <http://www.census.gov/population/metro/data/>



## Population

The table below presents the \*2012 population estimates for each MSA in South Carolina and the total population of MSAs shared with North Carolina and Georgia.

Metropolitan Statistical Area	Population
Charlotte-Concord-Gastonia, NC-SC MSA	2,296,569
Greenville-Anderson-Mauldin, SC MSA	842,853
Columbia, SC MSA	784,745
Charleston-North Charleston, SC MSA	697,439
Augusta-Richmond County, GA-SC MSA	575,898
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	394,542
Spartanburg, SC MSA	316,997
Florence, SC MSA	206,087
Hilton Head Island-Bluffton-Beaufort, SC MSA	193,882
Sumter, SC MSA	108,052
*United States Census Bureau <a href="http://www.census.gov/population/metro/data/def.html">http://www.census.gov/population/metro/data/def.html</a> and CFR 40 Part 58 Table D	

2012 ambient air monitoring design values can be found on the table titled 2013 Criteria Pollutant Design Values on page 8. Based on the \*population and design values, the minimum monitoring requirements for each MSA are presented in the table below.

MSA	Ozone	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	PM <sub>10</sub>	Lead	SO <sub>2</sub>	NO <sub>2</sub>	CO
**Charlotte-Concord-Gastonia, NC-SC MSA	2	3	2	2-4	0	2	2	1
Columbia, SC MSA (NCore)	2	2	1	1-2	1	1	1	1
Greenville-Anderson-Mauldin, SC MSA	2	2	1	1-2	0	1	1	0
Charleston-North Charleston, SC MSA	2	1	1	1-2	0	1	1	0
**Augusta-Richmond County, GA-SC MSA	2	2	1	1-2	0	1	1	0
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	1	0	0	0-1	0	1	0	0
Spartanburg, SC MSA	1	1	1	0-1	0	0	0	0
Florence, SC MSA	1	1	1	0	0	0	0	0
Hilton Head Island-Bluffton-Beaufort, SC MSA	0	0	0	0	0	0	0	0
Sumter, SC MSA	0	0	0	0	0	0	0	0
*United States Census Bureau <a href="http://www.census.gov/population/metro/data/def.html">http://www.census.gov/population/metro/data/def.html</a> and CFR 40 Part 58 Table D.								
** Minimum ambient air monitoring requirements are met cooperatively with the States of Georgia and North Carolina.								

### Required Monitoring SO<sub>2</sub> – Population Weighted Emissions Index (PWEI)

On June 22, 2010, the EPA finalized revisions to the SO<sub>2</sub> NAAQS. As part of this rulemaking, the EPA set new minimum monitoring requirements for CBSAs based on population and SO<sub>2</sub> emissions. The following table presents each CBSA's population, SO<sub>2</sub> emissions, calculated index and minimum monitoring requirements. The process for calculating the index can be found at the bottom of the table.

CBSA	2012 CBSA Population	2010 CBSA SO <sub>2</sub> Emissions (Tons)	PWEI	SO <sub>2</sub> Minimum Monitors Required
*Charlotte-Concord-Gastonia, NC-SC MSA	2,296,569	90,125	206,978	2
Greenville-Anderson-Mauldin, SC MSA	842,853	11,496	9,690	1
Columbia, SC MSA	784,745	54,885	43,070	1
Charleston-North Charleston, SC MSA	697,439	60,859	42,446	1
*Augusta-Richmond County, GA-SC MSA	575,898	14,479	8,339	1
*Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	394,542	17,117	6,753	1
Spartanburg, SC MSA	316,997	559	177	0
Florence, SC MSA	206,087	14,927	3,076	0
Hilton Head Island-Bluffton-Beaufort, SC MSA	193,882	309	60	0
Sumter, SC MSA	108,052	111	12	0
<p>The PWEI is calculated using US Census population data and state emission inventory data at the CBSA level. The population for each CBSA (based on the most recent US Census or Census estimate) is multiplied by the CBSA total SO<sub>2</sub> emissions (reported in tons using the latest National Emissions Inventory data). This product is divided by 1,000,000 to derive the index.</p> <ul style="list-style-type: none"> <li>• CBSA with index greater than 1,000,000 will require 3 monitors.</li> <li>• CBSA with index less than 1,000,000 but greater than 100,000 will require 2 monitors.</li> <li>• CBSA with index less than 100,000 but greater than 5,000 will require 1 monitor.</li> <li>• CBSA with index less than 5,000 will require no monitors.</li> </ul> <p>*Monitors may be operated in the non-South Carolina portion of the CBSA.</p>				

### Required Monitoring for Lead Ambient Air – facilities with annual emissions greater than 0.5 tons per year (tpy)

On December 27, 2010, the EPA published revised minimum monitoring requirements for the Lead NAAQS. Any facility with annual lead emissions exceeding 0.5 tpy will be required to have a lead sampler. Based on the state-submitted 2011 National Emissions Inventory, there are no facilities in South Carolina with lead emissions greater than 0.5 tpy.

On May 7, 2010, DHEC issued an air synthetic minor construction permit to Johnson Controls Battery Group for the Florence Recycling Center (Permit No. 1040-0129-CA). Under a settlement agreement<sup>8</sup> with several petitioners, the Florence Recycling Center will support source-oriented ambient lead monitoring to be conducted by DHEC at several sites around the facility. Additional details of the monitoring of this facility can be found in the Florence MSA section of this plan under the site name “Johnson Controls.”

<sup>8</sup> [http://www.scdhec.gov/environment/JCI/docs/JCI-Settlement%20Agreement\\_07142010.pdf](http://www.scdhec.gov/environment/JCI/docs/JCI-Settlement%20Agreement_07142010.pdf)

## Near Road Monitoring

### *Nitrogen Dioxide*

On March 7, 2013, EPA issued a final rule to revise the deadlines by which the near-road monitors within the nitrogen dioxide monitoring network are to be operational. If the CBSA has 1,000,000 or more people, one near-road monitor shall be operational by January 1, 2014 (phase 1). In each CBSA required to have two near-road NO<sub>2</sub> monitors, the second monitor shall be operational by January 1, 2015 (phase 2). If the CBSA has at least 500,000 or more people, but less than 1,000,000, the monitor(s) shall be operational by January 1, 2017 (phase 3). All areas in South Carolina except the Charlotte-Concord-Gastonia, NC-SC MSA are part of the phase 3 deployment to be operational by 2017.

The Charlotte-Concord-Gastonia NC-SC MSA is a multi-state MSA with the largest percent of the population living in the Mecklenburg County, NC area. The *2013 Annual Monitoring Network Plan-Mecklenburg County Air Quality* document identifies two possible near-road NO<sub>2</sub> monitoring sites and estimates that implementation and establishment of the NO<sub>2</sub> near-road monitoring stations will occur in the timeframe of May 2014 to September 2015<sup>9</sup>.

Adequate funding is necessary to ensure operation of this network. To date EPA has not been able to guarantee that funding will necessarily be available for the third phase of the deployment. DHEC will review the Technical Assistance Document<sup>10</sup> and monitor progress of the deployment of near-road sites in other areas.

### *Carbon Monoxide*

EPA requires the collocation of one CO monitor with a “near-road” NO<sub>2</sub> monitor in urban areas having populations of 1 million or more. The Charlotte-Concord-Gastonia, NC-SC MSA is the only MSA in South Carolina that meets the population requirement for a collocated CO monitor. The *2013 Annual Monitoring Network Plan-Mecklenburg County Air Quality* document indicates that the North Carolina portion of the Charlotte-Concord-Gastonia, NC-SC MSA proposes to establish a CO monitor at their required NO<sub>2</sub> near-road monitoring site that will be operational by May, 2015<sup>9</sup>.

### *PM<sub>2.5</sub>*

EPA requires the collocation of one PM<sub>2.5</sub> monitor with a “near-road” NO<sub>2</sub> monitor in urban areas having populations of 1 million or more. The *2013 Annual Monitoring Network Plan-Mecklenburg County Air Quality* document proposes to establish PM<sub>2.5</sub> monitoring at the NO<sub>2</sub> near-road site in Mecklenburg County, NC<sup>9</sup>.

## **Exclusion of certain PM<sub>2.5</sub> continuous FEM data from comparison to the NAAQS**

### *Introduction*

DHEC’s monitoring program has historically operated PM<sub>2.5</sub> continuous monitors primarily to support reporting of the Air Quality Index (AQI). These monitors supply data every hour to update the AQI on the DHEC web site as well as on national web sites such as AIRNow ([www.airnow.gov](http://www.airnow.gov)). DHEC has been using these monitors since the early part of the last decade as we implemented the PM<sub>2.5</sub> monitoring program. Over the last few years, a number of PM<sub>2.5</sub> continuous monitors have been approved as Federal Equivalent Methods (FEMs). By utilizing an approved FEM, any subsequent data produced from the

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<sup>9</sup>

<http://charmeck.org/mecklenburg/county/airquality/airqualitydata/documents/2013%20mcaq%20annual%20monitoring%20network%20plan.pdf>

<sup>10</sup> <http://www.epa.gov/ttn/amtic/nearroad.html>

method may be eligible for comparison to EPA's health based standard known as the NAAQS. The primary advantage of operating a PM<sub>2.5</sub> continuous FEM is that it can support both the AQI, while also supplying data that are eligible for comparison to the NAAQS. Thus, a network utilizing PM<sub>2.5</sub> continuous FEM can minimize the number of filter-based FRMs operated in the network, which are primarily used for comparison to the NAAQS. These filter-based FRMs are resource intensive in that they require field operators as well as pre- and post-sampling laboratory analysis which results in data not being available for approximately 2-4 weeks after sample collection.

DHEC's monitoring program has been working with PM<sub>2.5</sub> continuous FEMs, including deployment, at a few sites to evaluate their performance. Although the PM<sub>2.5</sub> continuous FEMs are automated methods, these methods still require careful attention in their set-up, operation, and validation of data. Once DHEC was able to collect enough data, the agency began to evaluate the performance of these methods compared to collocated FRMs. That evaluation is explained further below and includes DHEC's recommendations on the use of the data from these methods.

*Request for exclusion of PM<sub>2.5</sub> continuous FEM data from comparison to the NAAQS*

In accordance with the PM NAAQS rule published on January 15, 2013 (78 FR 3086) and specific to the provisions detailed in §58.11 (e), DHEC is requesting that data from the following monitors be set aside for comparison to the NAAQS. DHEC is working to optimize the monitoring instrumentation we use to meet all of our monitoring objectives.

However, at this time, DHEC does not believe the comparability of the PM<sub>2.5</sub> continuous FEMs operated in our network as compared to collocated FRMs is sufficient to meet data quality objectives.

After addressing the comparability of the PM<sub>2.5</sub> FEMs to the FRMs for our network, DHEC has determined that the sites listed in the table below do not meet the comparability requirements. Detailed one-page assessments are included at the end of this section.

Request for Exclusion of PM<sub>2.5</sub> Continuous FEM Data

Site Name	City	Site ID	Cont POC	Method Description	PM <sub>2.5</sub> FEM. Begin Date	PM <sub>2.5</sub> FEM End Date	Continuous/FRM Sampler pairs per season		Slope (m)	Intercept (y)	Meets bias requirement	Correlation (r)
Greenville ESC	Greenville	45-045-0015	3	Thermo 1405 8500C FDMS w/VSCC-FDMS Gravimetric	1/1/2011	NA	Winter =	71	1.16	-2.23	No	0.87
							Spring =	77				
							Summer =	90				
							Fall =	31				
							Total =	269				
Long Creek	None	45-077-0001	3	Thermo 1405 8500C FDMS w/VSCC-FDMS Gravimetric	1/5/2011	NA						

#### *Period of exclusion of data from the PM<sub>2.5</sub> Continuous FEMs*

The above table details the period of available data by monitor for which DHEC is basing our recommendation to exclude PM<sub>2.5</sub> continuous data. Per EPA Regional Office approval, DHEC will load or move as necessary these data to EPA's AQS database in a manner where the data is only used for the appropriate monitoring objective(s) (i.e., use data for both the NAAQS and AQI, just the AQI, or neither the NAAQS or AQI). Additionally, DHEC will continue to load any new data generated for the next 18 months (intended to represent the period until December 31, 2014) in the same manner or until such time as DHEC requests and receives approval from the EPA Regional Office to change the monitoring objectives that the data from the PM<sub>2.5</sub> continuous FEMs can support.

#### *PM<sub>2.5</sub> continuous FEM data for reporting the AQI*

While DHEC is requesting the monitors above not be used for comparison to the NAAQS, DHEC does believe that the data is of sufficient comparability to collocated FRMs that they may be used in AQI reporting. Therefore, with EPA Regional Office approval, DHEC will report these data on our web site and to AirNow ([www.airnow.gov](http://www.airnow.gov)). Additionally, DHEC intends to store the data in EPA's AQS database that is used for "acceptable AQI" reporting (i.e., parameter code 88502) so data users will know that these data are appropriate for use in AQI calculations.

#### *Continued operation of PM<sub>2.5</sub> monitors to support NAAQS and AQI reporting*

While DHEC is requesting that data from the monitors listed above be set aside for comparison to the NAAQS, DHEC will continue to operate PM<sub>2.5</sub> FRMs to support the objective of comparison to the NAAQS. DHEC will also operate our PM<sub>2.5</sub> continuous monitors for use in AQI reporting. Each of these FRM and PM<sub>2.5</sub> continuous monitors will be operated at the locations previously described in this plan and at the locations that meet the objectives of the Network Design Criteria for Ambient Air Quality Monitoring described in Appendix D to Part 58.

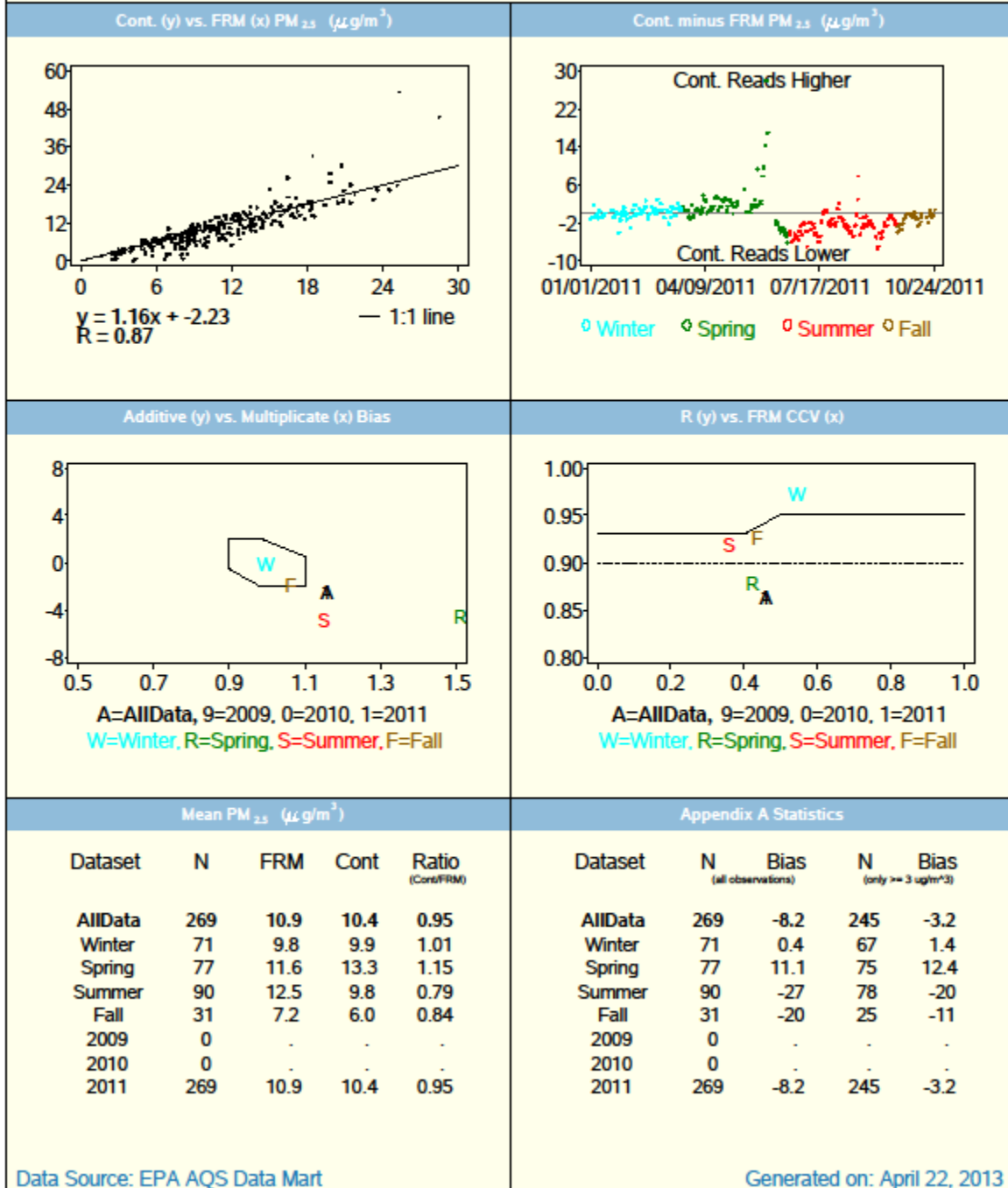
#### *Assessments*

The following one-page assessment is at the Greenville ESC (45-045-0015) site location where our agency has collocated PM<sub>2.5</sub> FRM and continuous FEM monitors. This assessment is represented in the "Request for Exclusion of PM<sub>2.5</sub> Continuous FEM Data" table above.

# PM<sub>2.5</sub> Continuous Monitor Comparability Assessment

## Site 45-045-0015: Greenville, SC

FRM: R & P Model 2025 PM<sub>2.5</sub> Sequential w/WINS-GRAVIMETRIC (118), PM<sub>2.5</sub> - Local Conditions (88101), POC=1  
 Cont: Thermo Scientific TEOM 1400 FDMS or 1405 8500C FDMS w/VSCC-FDMS Gravimetric (181), PM<sub>2.5</sub> - Local Conditions (88101), POC=3



*Interpreting the results*

In most cases determining whether the combination of the multiplicative (slope) and additive (intercept) bias is inside or outside the required test specification can be done simply by inspecting the Additive (y) vs. Multiplicative (x) Bias figure on the middle left side of the one-page assessment above. Use the “A” from the chart as it represents all of the data. In this case, “A” is clearly outside the box, which indicates that this bias does not meet the acceptance criteria.

However, in some cases, an agency may want to ensure that the combination of the multiplicative (slope) and additive (intercept) bias is outside the required test specifications. To accomplish this, the following questions below are answered solving for the allowable intercept.

From 40 CFR Part 53, Table C-4

Does the slope of regression relationship meet the test specification of  $1 \pm 0.10$ ?

No, the slope of the regression is 1.16, which is outside of  $1 \pm 0.10$

Does the intercept ( $\mu\text{g}/\text{m}^3$ ) of the regression relationship meet the test specification of between:  $15.05 - (17.32 * \text{slope})$ , but not less than -2.0; and  $15.05 - (13.20 * \text{slope})$ , but not more than +2.0?

$15.05 - (17.32 * 1.16) = -5.04$ , which is more negative than -2.0. Therefore use -2.0 as the most negative the intercept can be with a slope of 1.16.

$15.05 - (13.20 * 1.16) = -0.26$ , which is within the maximum +2.0. Therefore use -0.26 as the most positive the intercept can be with a slope of 1.16.

No, the intercept of -2.23 is outside the bounds of -2.0 to -0.26 that is allowed for a slope of 1.16 and therefore confirms that the overall bias has not been met.

## **Summary of 2014 Network Changes**

### **Augusta-Richmond County MSA (South Carolina portion includes Aiken and Edgefield Counties)**

No changes planned for 2014.

### **Charleston-North Charleston MSA**

An editorial addition of continuous PM<sub>2.5</sub> monitoring at Charleston Public Works (45-019-0049) was added back into the plan after it was incorrectly deleted from a previous plan. The monitor has been in continual operation since 2008.

### **Charlotte-Concord-Gastonia MSA**

York CMS (45-091-0006) SO<sub>2</sub> monitor designation was changed from SLAMS to SPM to reflect that the monitor is not required by Appendix D to 40 CFR Part 58 requirements.

### **Columbia MSA**

No changes planned for 2014.

### **Florence MSA**

No changes planned for 2014.

### **Greenville-Anderson-Mauldin MSA**

Greenville ESC (45-045-0015) Carbon Monoxide monitoring was terminated in July 2012.

Clemson CMS (45-077-0002) will be terminated.

### **Spartanburg MSA**

An editorial addition of continuous PM<sub>2.5</sub> monitoring at T.K. Gregg (45-083-0011) was added back into the plan after it was incorrectly deleted from a previous plan. The monitor has been in continual operation since late 12/29/2008.

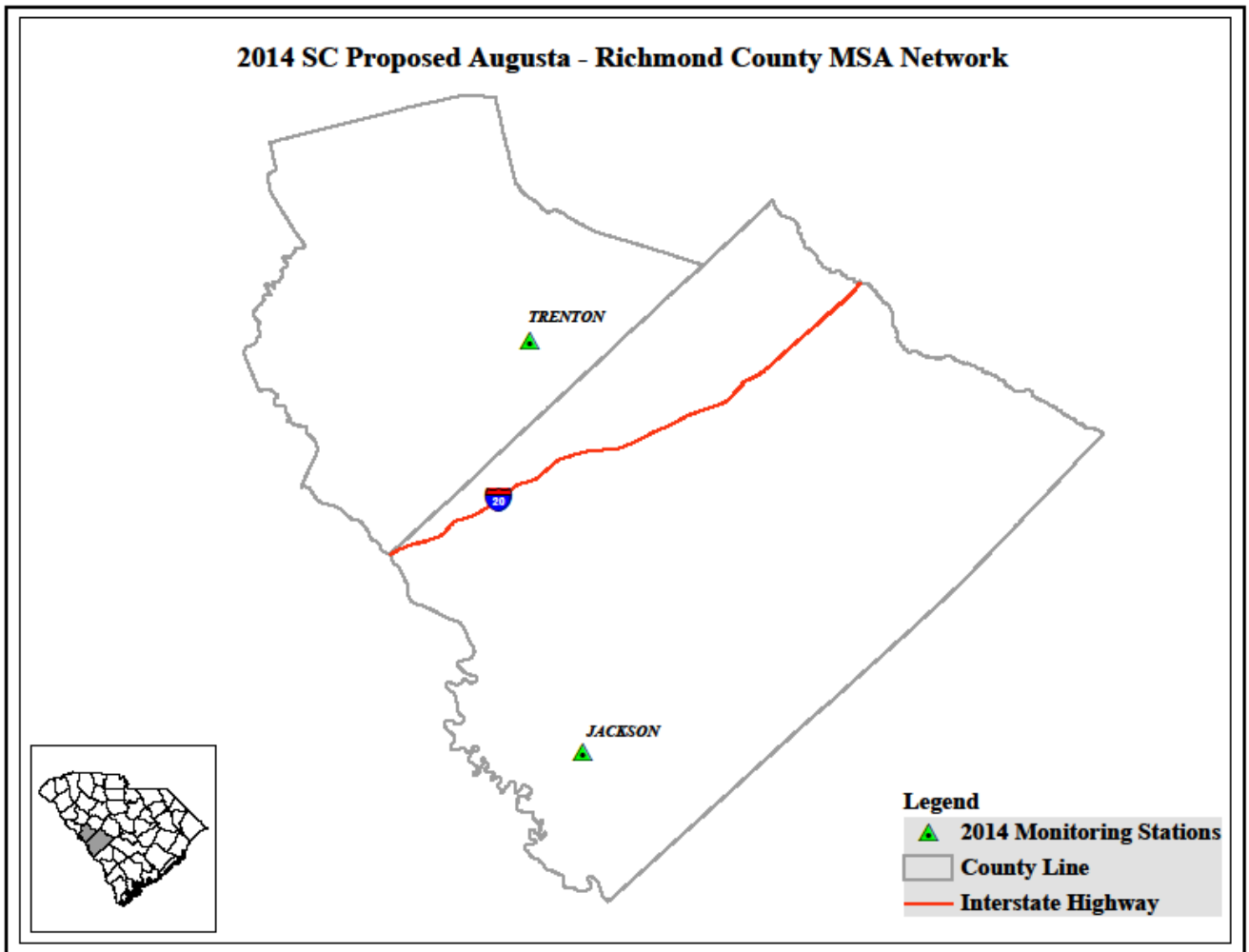
### **Remainder of State**

Ashton (45-029-0002) PM<sub>2.5</sub> monitor designation was changed from SPM to SLAMS to reflect its use as a required regional background site.

Long Creek (45-073-0001) PM<sub>2.5</sub> monitor designation was changed from SLAMS to SPM to due to inadequate performance of the FEM (which was replacing an FRM) at that location.

## Site Descriptions

### Augusta-Richmond County, GA-SC MSA (part)



### Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-003-0003	Jackson Middle School						●												
45-037-0001	Trenton	○	○				●												
	TOTAL	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0

○ SPM / Other  
 ● SLAMS  
 ●●/○○ indicates duplicate / QA monitors

**Jackson Middle School****CSA/MSA:** none/Augusta-Richmond County MSA**AQS Site ID:** 45-003-0003**Location:** 8217 Atomic Road**County:** Aiken**Coordinates:** +33.342226, -81.788731**Date Established:** October 24, 1985**Site Evaluation:** The most recent site evaluation was conducted on June 14, 2006 (QA Check: March 29, 2012).

The Jackson Middle School site is located in southwestern Aiken County at the Jackson Middle School. The Jackson site only monitors for ozone. Jackson is located in a suburban setting to monitor concentrations upwind of the Augusta urbanized area. The sample inlet is 138.8 meters from the nearest road.

**Changes for 2014:**

No changes are planned for 2014.

**Monitors:**

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Upwind Background	SLAMS	3.38	FEM Ultraviolet Photometry	Continuous

## Trenton

**CSA/MSA:** none/Augusta-Richmond County MSA

**AQS Site ID:** 45-037-0001

**Location:** 660 Woodyard Road (Hwy 121)

**County:** Edgefield

**Coordinates:** +33.739963, -81.853635

**Date Established:** March 28, 1980

**Site Evaluation:** The most recent site evaluation was conducted on March 18, 2003 (QA Check: March 29, 2012).



The Trenton site is located in southeastern Edgefield County. Trenton was originally established to monitor for ozone crossing into South Carolina from Georgia. The Trenton site has both FRM and continuous monitoring for PM<sub>2.5</sub>. The sample inlets are 39.4 meters from the nearest road.

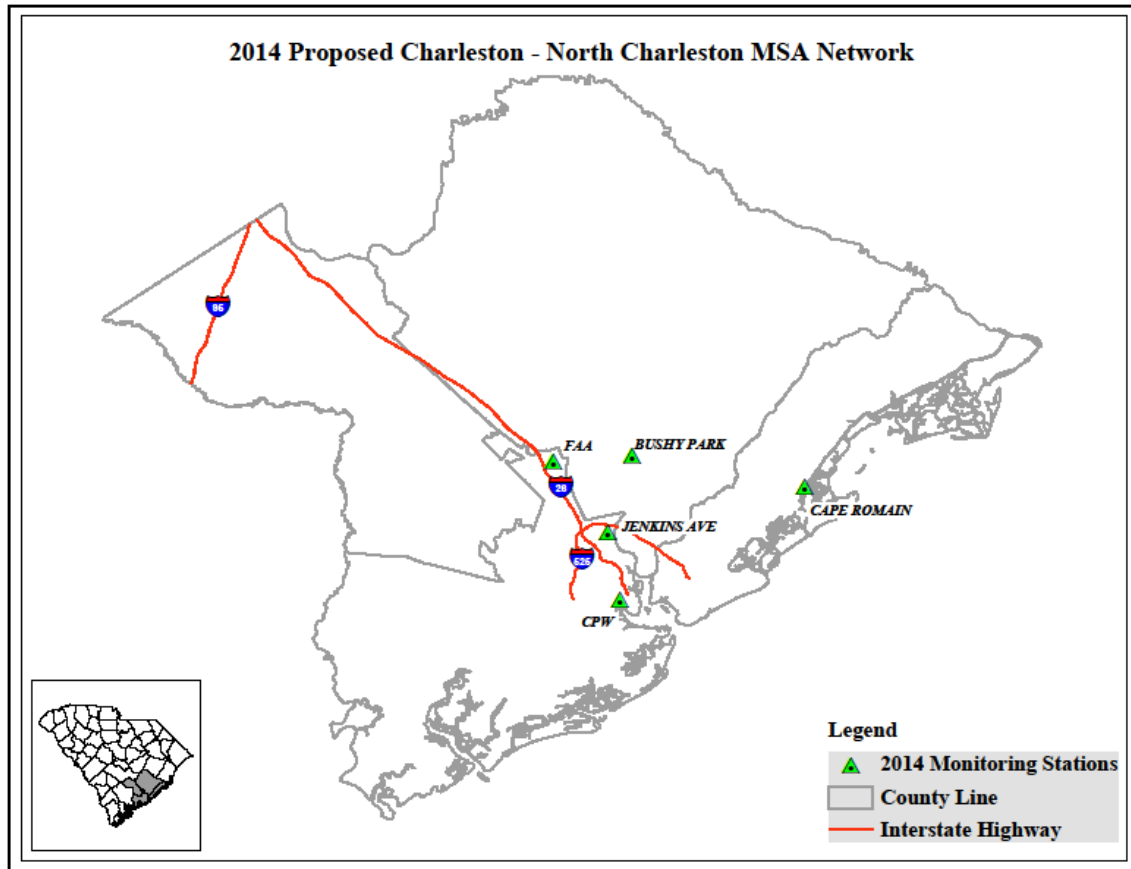
Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Urban	Extreme Downwind	SPM	4.5	Gravimetric	1:3
Continuous PM <sub>2.5</sub>	Urban	Extreme Downwind	SPM non-regulatory	4.5	TEOM 50°C	Continuous
Ozone	Urban	Maximum Ozone Concentration / Extreme Downwind	SLAMS	3.5	FEM Ultraviolet Photometry	Continuous

# Charleston-North Charleston MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-015-0002	Bushy Park Pump Station						●												
45-019-0003	Jenkins Ave. Fire Station				●			○	○										
45-019-0046	Cape Romain		○	○			●	○	○		○	○							○
45-019-0048	FAA	○○																	
45-019-0049	CPW	●	○																
	TOTAL	3	2	1	1	0	2	2	2	0	1	1	0	0	0	0	0	0	1

○ SPM / Other

● SLAMS

●●/○○ indicates duplicate / QA monitors

**Bushy Park Pump Station****CSA/MSA:** none/Charleston-North Charleston MSA**AQS Site ID:** 45-015-0002**Location:** River Oak Drive (Goose Creek)**County:** Berkeley**Coordinates:** +32.987252, -79.936700**Date Established:** June 20, 1978**Site Evaluation:** The most recent site evaluation was conducted on March 17, 2003 (QA Check: May 19, 2011).

The Bushy Park Pump Station site is located in southeastern Berkeley County downwind from the Charleston urban area. The monitoring objective is maximum ozone concentration. The sample inlets are 11.3 meters from the nearest road.

**Changes for 2014:**

No changes are planned for 2014.

**Monitors:**

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	3.12	FEM Ultraviolet Photometry	Continuous

**Jenkins Ave. Fire Station**

**CSA/MSA:** none/Charleston-North Charleston MSA

**AQS Site ID:** 45-019-0003

**Location:** 4830 Jenkins Ave.

**County:** Charleston

**Coordinates:** +32.882289, -79.977538

**Date Established:** February 14, 1969

**Site Evaluation:** The most recent site evaluation was conducted on March 2, 2005 (QA Check: June 2, 2011).



The Jenkins Ave. Fire Station site is located in the city of North Charleston. The site is located in an urban and central city setting. The Jenkins Ave. Fire Station site supports monitors for PM<sub>10</sub>, sulfur dioxide and nitrogen dioxide. The sample inlets are 9.6 meters from the nearest road.

Changes for 2014:

No changes planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>10</sub>	Neighborhood	Highest Concentration	SLAMS	3.84	FEM TEOM	Continuous
Sulfur Dioxide	Neighborhood	Population Exposure	SPM	4.18	FEM UV Fluorescence	Continuous
Nitrogen Dioxide	Neighborhood	Highest Concentration Source Oriented	SPM	4.18	FRM Chemiluminescence	Continuous

## Cape Romain

**CSA/MSA:** none/Charleston-North Charleston MSA

**AQS Site ID:** 45-019-0046

**Location:** 390 Bulls Island Road (Awendaw)

**County:** Charleston

**Coordinates:** +32.941023, -79.657187

**Date Established:** July 11, 1983

**Site Evaluation:** The most recent site evaluation was conducted on June 3, 2005 (QA Check: April 21, 2011).



The Cape Romain site is located in Charleston County at the Cape Romain National Wildlife Refuge (NWR) near Moore's Landing.

The Cape Romain NWR is a Class I area about 20 miles northeast of Charleston. The majority of the Refuge area is offshore extending from Bull Island 20 miles northeast to Cape Romain. The Refuge is bordered on the west by the Intracoastal Waterway. Inland are large tracts of forests with scattered residences. Several miles inland, a primary coastal route, US Highway 17, parallels the coast, with some development along the section of highway that is

closest to the Refuge.

The Cape Romain site has samplers for PM<sub>2.5</sub> speciation and continuous monitors for sulfur dioxide, nitrogen dioxide, ozone, black carbon, meteorological parameters and PM<sub>2.5</sub>. The sample inlets are 18 meters from the nearest road.

The Cape Roman site is collocated with the Interagency Monitoring of Protected Visual Environments (IMPROVE) sampling site and nearby monitoring performed by other agencies includes precipitation chemistry and mercury deposition. The site has been used for multiple interagency and regional air monitoring projects.

Changes for 2014:

No changes planned for 2014.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Urban	General Background	SPM non-regulatory	4.70	TEOM 30°C	Continuous
Speciated PM <sub>2.5</sub>	Urban	Visibility	IMPROVE	3.00	IMPROVE protocol	1:3
Ozone	Regional	General	SLAMS	4.51	FEM Ultraviolet	Continuous

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
		Background			Photometry	
Sulfur Dioxide	Regional	Source Oriented	SPM	4.51	FEM UV Fluorescence	Continuous
Nitrogen Dioxide	Regional	General Background	SPM	4.51	FRM Chemiluminescence	Continuous
Sulfate	Regional	General Background	non-regulatory	4.00	Catalytic thermal reduction / Pulsed fluorescence	Continuous
Black Carbon	Regional	General Background	non-regulatory	4.00	Optical absorption	Continuous
Wind Speed / Direction	Neighborhood	Local Conditions	non-regulatory	10.0	Instruments for wind speed and direction and precipitation	Continuous

**FAA**

**CSA/MSA:** none/Charleston-North Charleston MSA

**AQS Site ID:** 45-019-0048

**Location:** 2670 Elms Plantation Blvd

**County:** Charleston

**Coordinates:** +32.980254, -80.065010

**Date Established:** April 9, 1999

**Site Evaluation:** The most recent site evaluation was conducted on May 4, 2006 (QA Check: May 19, 2011).



The Charleston FAA Beacon site is located in Charleston County approximately five miles northwest of the Charleston International Airport near Charleston Southern University. This site has collocated PM<sub>2.5</sub> samplers. The sample inlets are 50 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Neighborhood	Population Exposure	SPM	2.35	FRM Gravimetric	1:1
Collocated PM <sub>2.5</sub>	Neighborhood	Population Exposure	QA Collocated	2.38	FRM Gravimetric	1:6

## Charleston Public Works

**CSA/MSA:** none/Charleston-North Charleston MSA

**AQS Site ID:** 45-019-0049

**Location:** 360 Fishburne Street

**County:** Charleston

**Coordinates:** +32.790984, -79.958694

**Date Established:** November 20, 1998

**Site Evaluation:** The most recent site evaluation was conducted on April 24, 2006. (QA Check: June 11, 2011).



The Charleston Public Works (CPW) site is located on the western side of the Charleston peninsula near downtown Charleston. The CPW site supports the required PM<sub>2.5</sub> monitor for the MSA. The sample inlets are 28 meters from the nearest road.

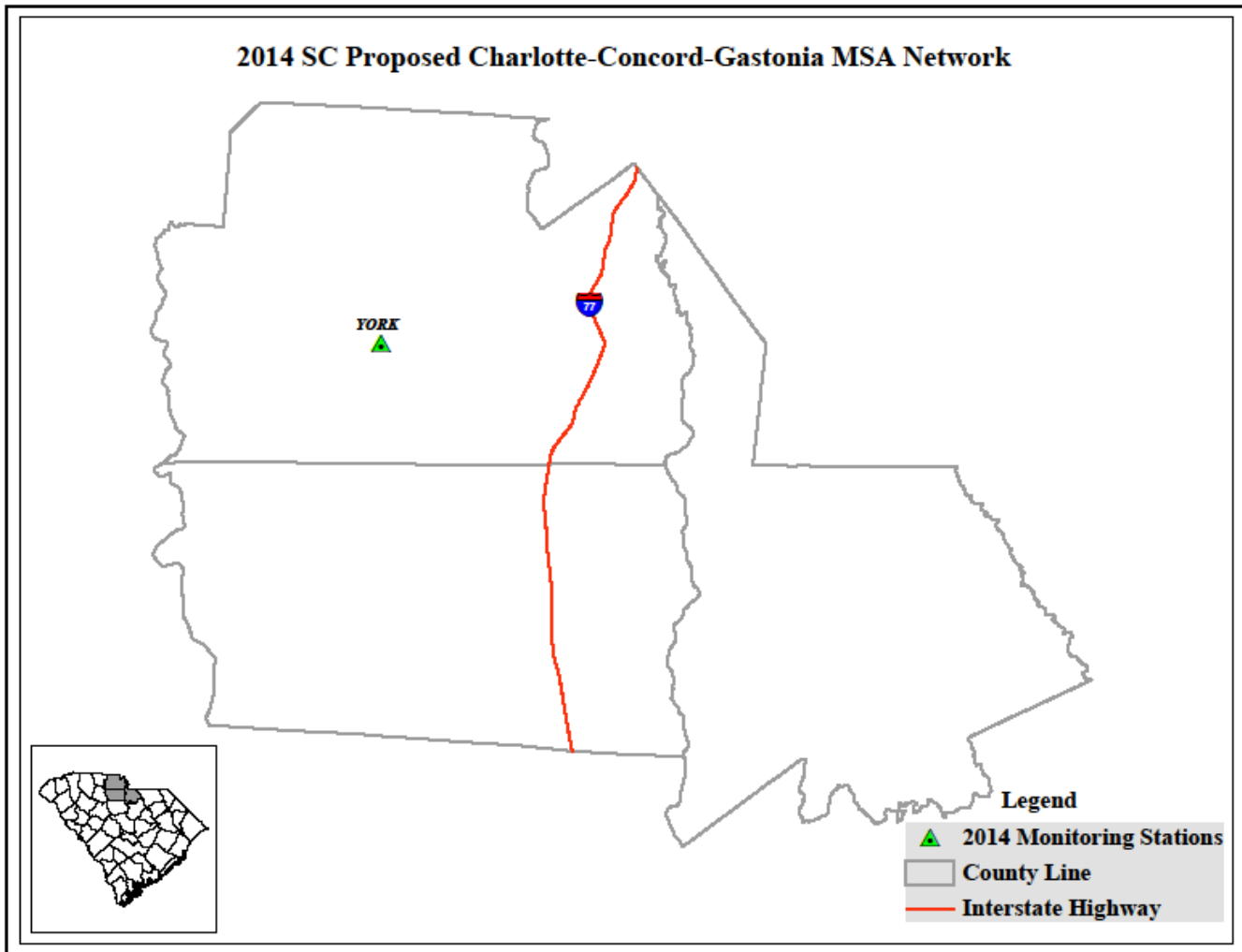
### Changes for 2014:

DHEC will continue to collaborate with local stakeholders to establish a site in the Charleston Neck/North Charleston area which accurately represents current and changing impacts to particulate concentrations. Once the new monitoring location has been established, DHEC will collect at least one year of concurrent monitoring data from both sites. The data will be evaluated and the most appropriate location chosen to meet area PM<sub>2.5</sub> monitoring objectives.

### Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Neighborhood	Population Exposure	SLAMS	2.25	Gravimetric	1:1
PM <sub>2.5</sub>	Neighborhood	Population Exposure	SPM non-regulatory	2.77	TEOM	Continuous

# Charlotte-Concord-Gastonia MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-091-0006	York CMS						●	●											○
	TOTAL	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
○ SPM / Other ● SLAMS ●●/○○ indicates duplicate / QA monitors																			

## York CMS

**CSA/MSA:** Charlotte-Concord CSA / Charlotte-Concord-Gastonia MSA

**AQS Site ID:** 45-091-0006

**Location:** 2316 Chester Highway (US 321)

**County:** York

**Coordinates:** +34.935817, -81.228409

**Date Established:** March 30, 1993

**Site Evaluation:** The most recent site evaluation was conducted on June 13, 2006 (QA Check: May 21, 2013).



The York CMS site is located in south-central York County. The site was established to represent background levels near the Charlotte urban area. York CMS has monitors for ozone and sulfur dioxide, as well as a wind tower. This monitor is located in a rural setting with sample inlets 171.4 meters from the nearest road.

In 2011, sulfur dioxide monitoring was added to meet minimum monitoring requirements for the Charlotte-Concord-Gastonia MSA in accordance with the North

Carolina Monitoring Memorandum of Agreement.

The long historical record and location of the site make the data useful to both North and South Carolina Air Programs.

Access to the property occupied by this site may be lost within the next few years. DHEC will begin looking into alternative locations for ozone monitoring within York County.

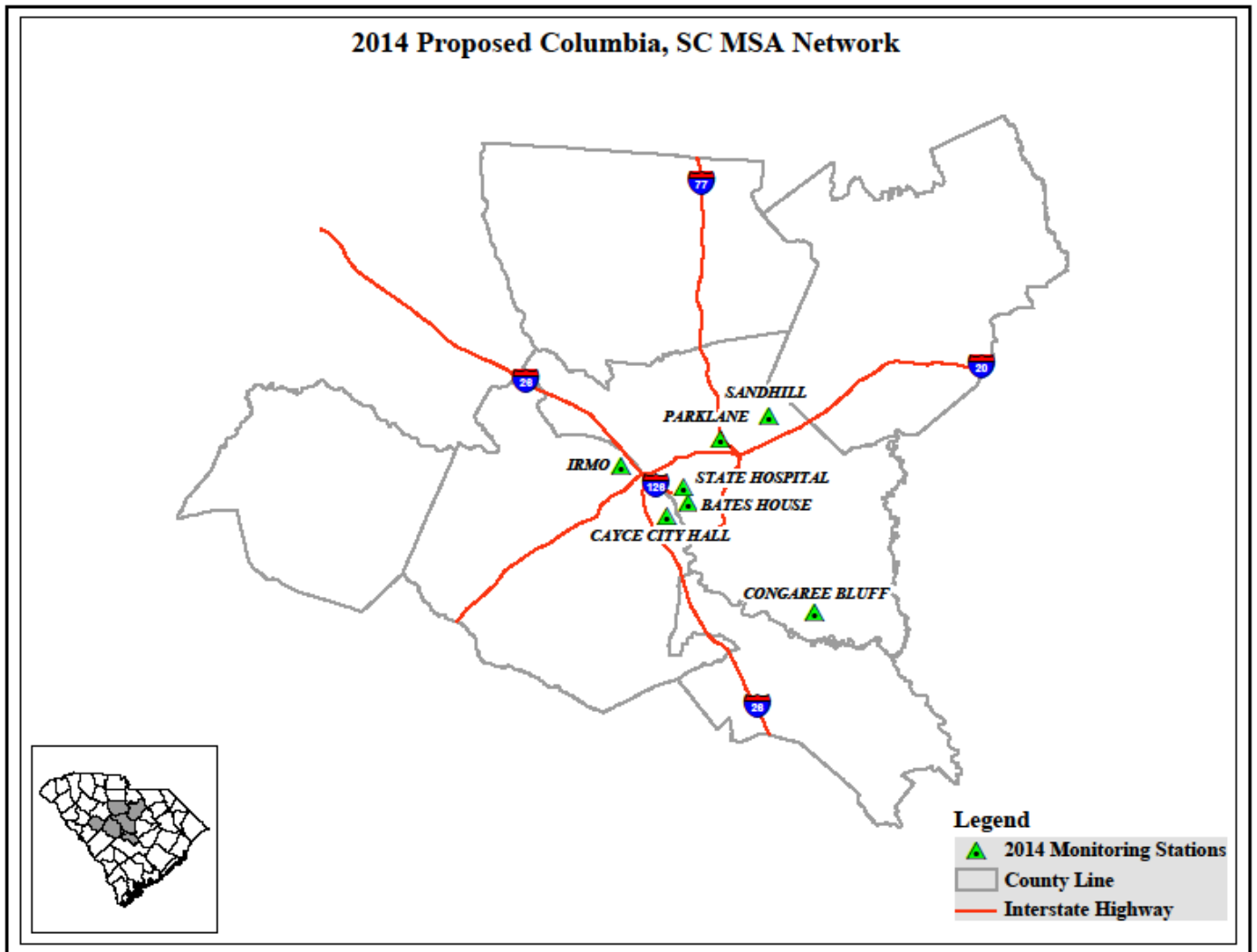
Changes for 2014:

SO<sub>2</sub> designation will be changed to SPM to reflect that this is not a required monitor.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Upwind Background	SLAMS	4.72	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Urban	Upwind Background	SPM	4.72	FEM UV fluorescence	Continuous
Wind Speed / Direction	Neighborhood	Local Conditions	non-regulatory	10.0	Instruments for wind speed, wind direction.	Continuous

Columbia MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead /TSP	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub> /NO/NO <sub>y</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOC	Mercury	Precip Chem.	Precip.	MET
45-063-0008	Irmo	●	○					○				○	○	○					
45-063-0010	Cayce City Hall				●														
45-079-0007	Parklane (NCore)	●	○	●	○	●	●	●	●*	●				○			○	○	○
45-079-0019	Bates House (USC)	●●			●														
45-079-0020	State Hospital												○	○					
45-079-0021	Congaree Bluff						○	○								○○	○	○	
45-079-1001	Sandhill						●		○										○
	TOTAL	4	2	1	3	1	3	3	3	1	0	1	2	3	0	2	2	2	2
<p>○ SPM / Other                  ●●/○○ indicates duplicate / QA samplers                  ● SLAMS/NCore *NO and NO<sub>y</sub> will be monitored</p>																			

**Irmo****CSA/MSA:** Columbia-Orangeburg-Newberry CSA / Columbia MSA**AQS Site ID:** 45-063-0008**Location:** 200 Leisure Lane**County:** Lexington**Coordinates:** +34.051017, -81.154950**Date Established:** April 7, 1989**Site Evaluation:** The most recent site evaluation was conducted on February 25, 2005 (QA Check: March 06, 2012).

The Irmo site is located in Lexington County near the Town of Irmo. This site has a sampler for PM<sub>2.5</sub> and continuous monitors for sulfur dioxide, black carbon and PM<sub>2.5</sub>. Additionally, this site has samplers collecting carbonyl and SVOC samples on a 1:6 schedule. The sample inlets are 43.4 meters from the nearest road. The Irmo site supports the required collocated PM<sub>2.5</sub> continuous monitor for the MSA.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Neighborhood	Population Exposure	SLAMS	4.95	FRM Gravimetric	1:1
PM <sub>2.5</sub>	Neighborhood	Population Exposure	SPM non-regulatory	4.55	TEOM 30°C	Continuous
Sulfur Dioxide	Neighborhood	Source-Oriented	SPM	3.23	FEM UV fluorescence	Continuous
Black Carbon	Urban	Population Exposure / General Background	non-regulatory	4.0	Optical absorption	Continuous
Carbonyls	Neighborhood	Population Exposure	non-regulatory	3.9	HPLC Ultraviolet Absorption	1:6
SVOC	Neighborhood	Population Exposure	non-regulatory	3.9	PUF/GCMS	1:6

## Cayce City Hall

**CSA/MSA:** Columbia-Orangeburg-Newberry CSA / Columbia MSA

**AQS Site ID:** 45-063-0010

**Location:** 1830 Morlaine Rd.

**County:** Lexington

**Coordinates:** +33.969145, -81.066290

**Date Established:** December 6, 2007

**Site Evaluation:** PENDING (QA Check: March 06, 2012).



Cayce City Hall was established to measure  $PM_{10}$  concentrations in populated areas and to determine the potential impact of occasional high concentrations on neighborhoods surrounding the industrialized area.

The sample inlet is 32.0 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{10}$	Neighborhood	Population Exposure	SLAMS	2.4	TEOM	Continuous

## Parklane (NCore)

CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA

AQS Site ID: 45-079-0007

Location: 8311 Parklane Road

County: Richland

Coordinates: +34.093959, -80.962304

Date Established: April 3, 1980

Site Evaluation: The most recent site evaluation was conducted on March 22, 2007 (QA Check: March 01, 2012).



The Parklane site is located in north central Richland County. This site supports the required suite of samplers and monitors for NCore, which includes a FRM PM<sub>2.5</sub> sampler, and a continuous PM<sub>2.5</sub> monitor. Other requirements for NCore are a lead sampler and continuous monitors for ozone, sulfur dioxide, carbon dioxide, nitric oxide, nitrogen oxides. A continuous PM<sub>2.5</sub> monitor and samplers for precipitation chemistry, precipitation and semi-volatile organic compounds are also located in this site. The sample inlets are 57.0 meters from the nearest road.

The site was originally placed to provide downwind population exposure measurements at the edge of the Columbia urban area population and has been expanded to support the full complement of NCore parameters. The site also provides support for demonstration, training and equipment evaluation convenient to DHEC's Columbia air laboratory.

Changes for 2014:

No changes are planned for 2014.

Monitors:

\***Bolded** parameters are a NCore requirement.

(Table continues on next page)

Parameter <b>*Required</b>	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
<b>PM<sub>2.5</sub></b>	Neighbor-hood	Population Exposure	NCore	4.82	FRM Gravimetric	1:3
<b>PM<sub>2.5</sub></b>	Neighbor-hood	Population Exposure	SPM non-regulatory	4.90	TEOM	Continuous
<b>Speciated PM<sub>2.5</sub></b>	Neighbor-hood	Population Exposure	NCore	2.50	Energy dispersive XRF, Ion chromatography, CSN TOT	1:3

Parameter <b>*Required</b>	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>10</sub>	Neighbor -hood	Population Exposure	NCore	4.4	TEOM	Continuous
PM <sub>10-2.5</sub>	Neighbor hood	Population Exposure	NCore	5	Gravimetric FRM Pair	1:3
<b>Lead</b>	Neighbor -hood	Population Exposure	NCore	2.5	GFAA	1:6
<b>Ozone</b>	Urban	Max Ozone Concentration	NCore	4.13	FEM Ultraviolet Photometry	Continuous
<b>Sulfur Dioxide</b>	Neighbor -hood	Population Exposure	NCore	4.13	UV Florescence	Continuous
<b>Nitric Oxide</b>	Neighbor -hood	Population Exposure	NCore	10	Chemi- luminescence	Continuous
NO <sub>y</sub>	Neighbor -hood	Population Exposure	NCore	10	Chemi- luminescence	Continuous
<b>Carbon Monoxide</b>	Urban	Population Exposure	NCore	4.13	Non- dispersive Infrared	Continuous
SVOC	Neighbor -hood	Population Exposure	SPM	2.5	PUF- GC/MS	1:6
Precipitation chemistry	Neighbor -hood	Local Conditions	Not applicable	1.4	Not applicable	Weekly sample
Precipitation	Neighbor -hood	Local Conditions	Not applicable	1.1	Not applicable	Continuous
<b>Wind Speed / Direction</b>	Neighbor -hood	Local Conditions	Not applicable	10.0	Not applicable	Continuous

**Bates House (USC)****CSA/MSA:** Columbia-Orangeburg-Newberry CSA / Columbia MSA**AQS Site ID:** 45-079-0019**Location:** 323 S. Bull Street**County:** Richland**Coordinates:** +33.991509, -81.024141**Date Established:** November 24, 1998**Site Evaluation:** The most recent site evaluation was conducted on March 17, 2003 (QA Check: March 01, 2012).

The Bates House (USC) site is located in Richland County on the University of South Carolina (USC)-Columbia campus. The Bates House site has a sampler for PM<sub>2.5</sub>. Additionally, this site has collocated precision sampling for PM<sub>2.5</sub>. The sample inlets are 28.8 meters from the nearest road.

The site has collocated wind measurement equipment (3m) operated by the USC Geography Department.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Neighborhood	Population Exposure	SLAMS	2.41	FRM Gravimetric	1:1
Collocated PM <sub>2.5</sub>	Neighborhood	Quality Assurance	QA Collocated	2.40	Gravimetric	1:6
PM <sub>10</sub>	Neighborhood	Population Exposure	SLAMS	2.22	TEOM	Continuous

## State Hospital

**CSA/MSA:** Columbia-Orangeburg-Newberry CSA / Columbia MSA

**AQS Site ID:** 45-079-0020

**Location:** 2100 Bull Street

**County:** Richland

**Coordinates:** +34.015494, -81.034179

**Date Established:** January 7, 1999

**Site Evaluation:** The most recent site evaluation was conducted on February 9, 2006 (QA Check: March 20, 2012).



The State Hospital site is located in Columbia near the intersection of Elmwood Avenue and Bull Street on the grounds of the South Carolina State Hospital. State Hospital has samplers for carbonyls and semi-volatile organic compounds. The sample inlets are 10.0 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014. Access to this site may be lost due to recent sale and planned use of the property.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Carbonyls	Middle Scale	Highest Concentration	non-regulatory	4.23	HPLC Ultraviolet Absorption	1:6
SVOC	Neighborhood	General / Background	non-regulatory	2.85	PUF-GC/MS	1:6

## Congaree Bluff

**CSA/MSA:** Columbia-Orangeburg-Newberry CSA / Columbia MSA

**AQS Site ID:** 45-079-0021

**Location:** 1850 South Cedar Creek Road

**County:** Richland

**Coordinates:** +33.814680, -80.781135

**Date Established:** December 27, 1999

**Site Evaluation:** The most recent site evaluation was conducted on April 11, 2005 (QA Check: March 20, 2012).



The Congaree Bluff site is located in southern Richland County. The site is located in a rural setting within the boundaries of the Congaree National Park. The Congaree Bluff site has monitors for ozone, sulfur dioxide, mercury vapor and precipitation. Congaree Bluff also has samplers for mercury deposition and precipitation chemistry. The sample inlets are 191.7 meters from the nearest road.

The Congaree Bluff monitoring continues a data record begun in 1981 with the establishment of the Congaree Swamp site (45-079-1006). The original site was established in cooperation with the Department of the Interior and the support of the General Assembly to provide long term monitoring in this unique area. The Congaree Swamp site was located in the flood plain and had to be relocated to the current Congaree Bluff site in 2001.

The National Park Service collects wind data on a collocated 30 meter wind tower.

Changes for 2014:

There are no changes planned for 2014.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General / Background	SPM	4.23	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Urban	General / Background	SPM	4.23	FEM UV Fluorescence	Continuous
Mercury (vapor)	Urban	Source Oriented	non-regulatory	4.23	Cold Vapor Atomic Fluorescence	Continuous
Mercury Deposition	Urban	Source Oriented	NADP-MDN	1.71	MDN protocol	Weekly samples
Precipitation	Regional	Regional	non-	1.73	IC	1 Week

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
chemistry		Transport	regulatory			Tue-Tue
Precipitation	Neighborhood	Local Conditions	non-regulatory	1.5	Tipping Bucket	Continuous

### Sandhill Experimental Station

**CSA/MSA:** Columbia-Orangeburg-Newberry CSA / Columbia MSA

**AQS Site ID:** 45-079-1001

**Location:** 900 Clemson Road

**County:** Richland

**Coordinates:** +34.131262, -80.868318

**Date Established:** January 1, 1959

**Site Evaluation:** The most recent site evaluation was conducted on July 1, 2002 (QA Check: March 01, 2012).



The Sandhill Experimental Station site is located in northeastern Richland County, downwind from the Columbia metropolitan area. This site is located in a rapidly urbanizing portion of the city of Columbia. The Sandhill site measures nitrogen dioxide, ozone, wind direction and wind speed.

The sample inlets are 33.5 meters from the nearest road.

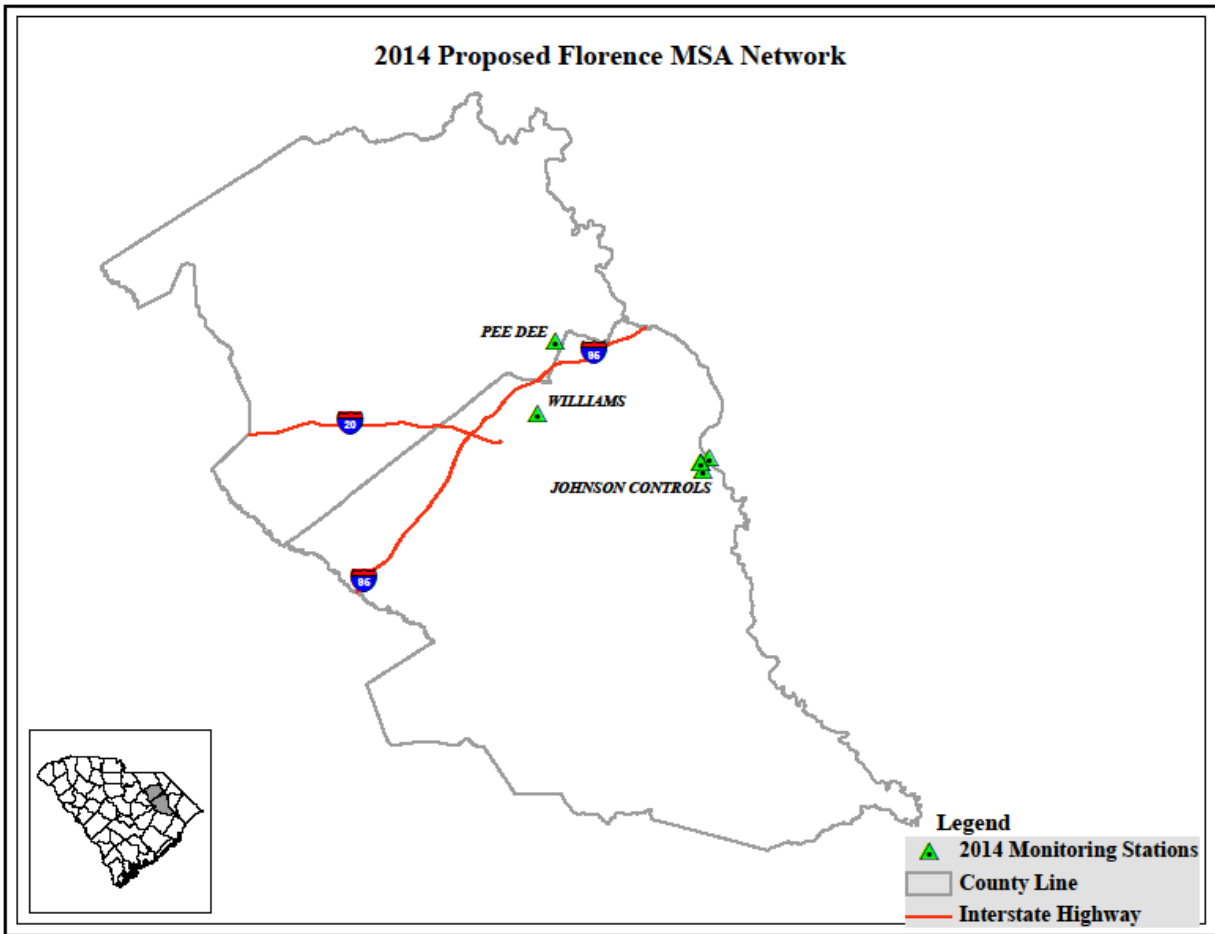
Changes for 2014:

There are no changes planned in 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	4.15	FEM Ultraviolet Photometry	Continuous
Nitrogen Dioxide	Urban	General / Background Max Precursor Emissions Impact	SPM	4.15	FRM Chemiluminescence	Continuous
Wind Speed / Direction	Neighborhood	Local Conditions	non-regulatory	10.0	Instruments for wind speed and wind direction	Continuous

# Florence MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip. Chem.	Precip.	MET
45-031-0003	Pee Dee Exp. Station						●												
45-041-0003	Williams Middle School	●	○																
45-041-8001, 8002, 8003	Johnson Controls					○*													
	<b>TOTAL</b>	1	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0

○ SPM / Other  
 ● SLAMS  
 ●●/○○ indicates duplicate / QA monitors  
 \* See details on page for number of samplers

**Pee Dee Experimental Station**

**CSA/MSA:** none/Florence MSA

**AQS Site ID:** 45-031-0003

**Location:** 2200 Pocket Road (Darlington)

**County:** Darlington

**Coordinates:** +34.285696, -79.744859

**Date Established:** February 25, 1993

**Site Evaluation:** The most recent site evaluation was conducted on March 14, 2006 (QA Check: May 5, 2011).



The Pee Dee Experimental Station site is located in northeastern Darlington County. This site serves as the required ozone monitor in the Florence MSA. The sample inlets are 91 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration/ General Background	SLAMS	3.92	FEM Ultraviolet Photometry	Continuous

**Williams Middle School**

**CSA/MSA:** none/Florence MSA

**AQS Site ID:** 45-041-0003

**Location:** 1119 N. Irby Street

**County:** Florence

**Coordinates:** +34.214263, -79.767347

**Date Established:** August 4, 2008

**Site Evaluation:** PENDING (QA Check: May 5, 2011).



DHEC established the Williams site to meet the 40 CFR Part 58 Appendix D requirements for objective and collocated continuous monitoring and reporting.

The Florence MSA requires one PM<sub>2.5</sub> sampler. A collocated continuous monitor is also required to provide timely reporting of concentrations to the public. The sample inlets are 56.4 meters from the nearest road.

Changes for 2014:

There are no changes planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Neighborhood	Population Exposure Highest Concentration	SLAMS	2.70	FRM Gravimetric	1:3
PM <sub>2.5</sub>	Neighborhood	Population Exposure Highest Concentration	SPM non-regulatory	3.04	TEOM	Continuous

**Johnson Controls (3 Sites-JCI Railroad, JCI Entrance, JCI River)**

**CSA/MSA:** none/Florence MSA

**AQS Site ID:** 45-041-8001, 8002, 8003

**Location:** Liberty Chapel @ Bethel Rd., Liberty Chapel @ Paper Mill Rd., Liberty Chapel @ Paper Mill Rd.

**County:** Florence

**Coordinates:** +34.155670, -79.569830; +34.164160, -79.572330; +34.167500, -79.562660

**Site Evaluation:** PENDING



On May 7, 2010, DHEC issued an air synthetic minor construction permit to Johnson Controls Battery Group for the Florence Recycling Center (Permit No. 1040-0129-CA). Under a settlement agreement<sup>7</sup> with several petitioners, the Florence Recycling Center will conduct source-oriented ambient lead monitoring at three locations around the facility.

Initial sampling will be conducted on a 1:3 schedule, reverting to 1:6 once the conditions of the MOA are met.

Changes for 2014:

There are no changes planned for 2014.

Monitors:

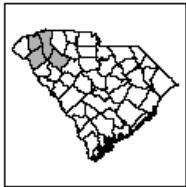
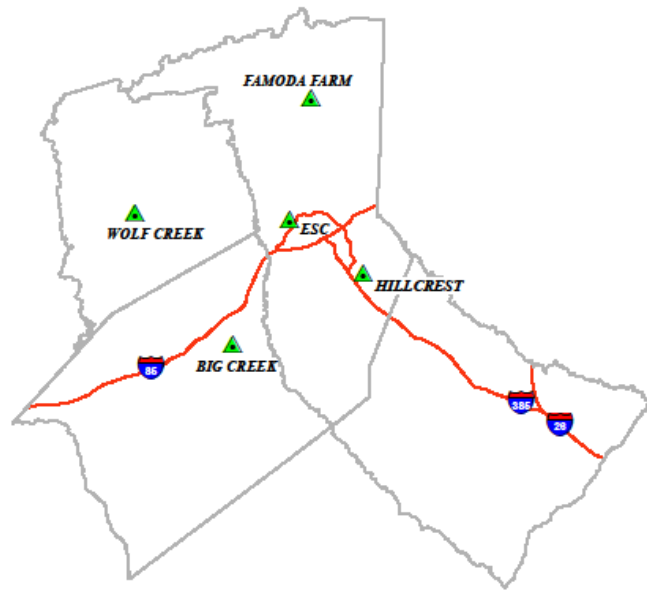
Site ID	Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency*
041-8001	Lead	Middle	Source oriented	SPM	2.4	GFAA	1:6
041-8002	Lead	Middle	Source oriented	SPM	2.5	GFAA	1:6
041-8003	Lead	Middle	Source oriented	SPM	2.5	GFAA	1:6

\*Sampling frequency no less than 1:6




<sup>7</sup> [http://www.scdhec.gov/environment/JCI/docs/JCI-Settlement%20Agreement\\_07142010.pdf](http://www.scdhec.gov/environment/JCI/docs/JCI-Settlement%20Agreement_07142010.pdf)

# Greenville-Anderson-Mauldin MSA

## 2014 Proposed Greenville-Anderson-Mauldin MSA Network



### Legend

-  2014 Monitoring Stations
-  Counties
-  Interstate Highway

Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead /TSP	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-007-0005	Big Creek						●												
45-045-0015	Greenville ESC	●	○	○	●			○	○		○	○							○
45-045-0016	Hillcrest	●●					●												
45-045-1003	Famoda Farm						●												
45-077-0003	Wolf Creek						○												
	TOTAL	3	1	1	1	0	4	1	1	0	1	1	0	0	0	0	0	0	1
○ SPM / Other ● SLAMS ●●/○○ indicates duplicate / QA samplers																			

**Big Creek****CSA/MSA:** Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA**AQS Site ID:** 45-007-0005**Location:** 215 McAlister Road**County:** Anderson**Coordinates:** +34.623236, -82.532059**Date Established:** June 4, 2008**Site Evaluation:** PENDING (QA Check: December 4, 2012).

The Big Creek site is located northeast of the City of Anderson. The site was established to represent maximum ozone concentrations in the Anderson MSA downwind of Anderson and upwind background for the Greenville MSA. In February 2013, the MSA definitions were changed and this site is now contained within the Greenville-Anderson-Mauldin MSA.

Initiated in 2008, this site was part of the Greenville MSA Ozone study.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration / Upwind Background	SLAMS	4.24	FEM Ultraviolet Photometry	Continuous

**Greenville Employment Security Commission (ESC)**

**CSA/MSA:** Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA

**AQS Site ID:** 45-045-0015

**Location:** 133 Perry Avenue

**County:** Greenville

**Coordinates:** +34.84389511, -82.4145845

**Date Established:** April 11, 2008

**Site Evaluation:** PENDING (QA Check: April 30, 2013).



The Greenville Employment Security Commission (ESC) site was established on April 11, 2008. This site supports a FRM PM<sub>2.5</sub> sampler and a continuous FEM TEOM monitoring for PM<sub>2.5</sub>. It also supports speciated PM<sub>2.5</sub>, PM<sub>10</sub>, sulfur dioxide, nitrogen dioxide, sulfate, black carbon and measurements for wind speed and wind direction. The sample inlets are 15.0 meters from the nearest road.

The USEPA Region 4 Administrator has selected this site as one of the Regional Administrator selected NO<sub>2</sub> sites required by 40 CFR, Part 58, Appendix D, Section 4.3.4.

Changes for 2014:

Carbon monoxide monitoring was discontinued in July, 2012.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Neighborhood	Population Exposure / Welfare Related Impacts	SLAMS	3.39	FRM Gravimetric	1:1
PM <sub>2.5</sub>	Neighborhood	Population Exposure Welfare Related Impacts Required FEM Collocation	SPM non-regulatory	4.40	FEM TEOM	Continuous
Speciated PM <sub>2.5</sub>	Neighborhood	Population Exposure	Supplementary speciation	3.34	CSN Protocol	1:6
PM <sub>10</sub>	Neighborhood	Population	SLAMS	4.35	FEM TEOM	Continuous

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
	hood	Exposure				
Sulfur Dioxide	Neighborhood	Population Exposure	SPM	4.51	FEM UV fluorescence	Continuous
Nitrogen Dioxide	Neighborhood	Population Exposure	SPM	4.51	FRM Chemiluminescence	Continuous
Sulfate	Neighborhood	Population Exposure / General Background	non-regulatory	4.44	Catalytic thermal reduction / Pulsed fluorescence	Continuous
Black Carbon	Neighborhood	Population Exposure / General Background	non-regulatory	4.44	Optical absorption	Continuous
Wind Speed / Direction	Neighborhood	Local Conditions	Not applicable	10.00	Instruments for wind speed and wind direction	Continuous

**Hillcrest Middle School**

CSA/MSA: Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA

AQS Site ID: 45-045-0016

Location: 510 Garrison Road

County: Greenville

Coordinates: +34.751848, -82.256701

Date Established: February 17, 2009

Site Evaluation: PENDING (QA Check: April 30, 2013).



This site was selected as a monitoring location based on results of the Greenville MSA Ozone study. Initiated in 2008, this site represents suburban areas near the interstate corridors in the Greenville MSA. This site also supports a FRM PM<sub>2.5</sub> sampler and a collocated PM<sub>2.5</sub> sampler.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Urban	Population Exposure	SLAMS	3.48	FRM Gravimetric	1:1
Collocated PM <sub>2.5</sub>	Urban	Population Exposure	QA Collocated	3.48	FRM Gravimetric	1:6
Ozone	Urban	Population Exposure	SLAMS	3.81	FEM Ultraviolet Photometry	Continuous

**Famoda Farm****CSA/MSA:** Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA**AQS Site ID:** 45-045-1003**Location:** 7401 Mountain View Road**County:** Greenville**Coordinates:** +35.057395, -82.372881**Date Established:** October 24, 1969**Site Evaluation:** PENDING (QA Check: April 30, 2013).

The Famoda Farm site was originally established in 1969 and operated until 1982. In 2008, this site was reactivated as part of the Greenville MSA Ozone study, which was designed to investigate ozone concentration variability across the Upstate by providing information to help refine the monitoring network to better meet monitoring objectives. The site has been retained to represent rural ozone impacts downwind of the Anderson and Greenville urbanized areas.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	3.47	FEM Ultraviolet Photometry	Continuous

**Wolf Creek****CSA/MSA:** Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA**AQS Site ID:** 45-077-0003**Location:** 901 Allgood Bridge Road**County:** Pickens**Coordinates:** +34.851537, -82.744576**Date Established:** August 10, 2010**Site Evaluation:** QA Check: October 23, 2012

The Wolf Creek site is located in central Pickens County and was established to gain an understanding of ambient ozone concentrations in central Pickens County.

Data from the Wolf Creek site has been collected and compared to Clemson CMS site (45-077-0002) to determine the more appropriate location to represent ozone concentrations in this area of the CSA. At that time, DHEC chose to retain the Wolf Creek site as an element of the area monitoring network. In 2013, Anderson County was reincorporated into a Greenville-Anderson- Mauldin MSA, which changed the required number of ozone monitors for the area. DHEC will continue to evaluate the Greenville-Spartanburg-Anderson CSA network to determine the configuration of ozone monitors that most appropriately represents ozone concentrations in the area.

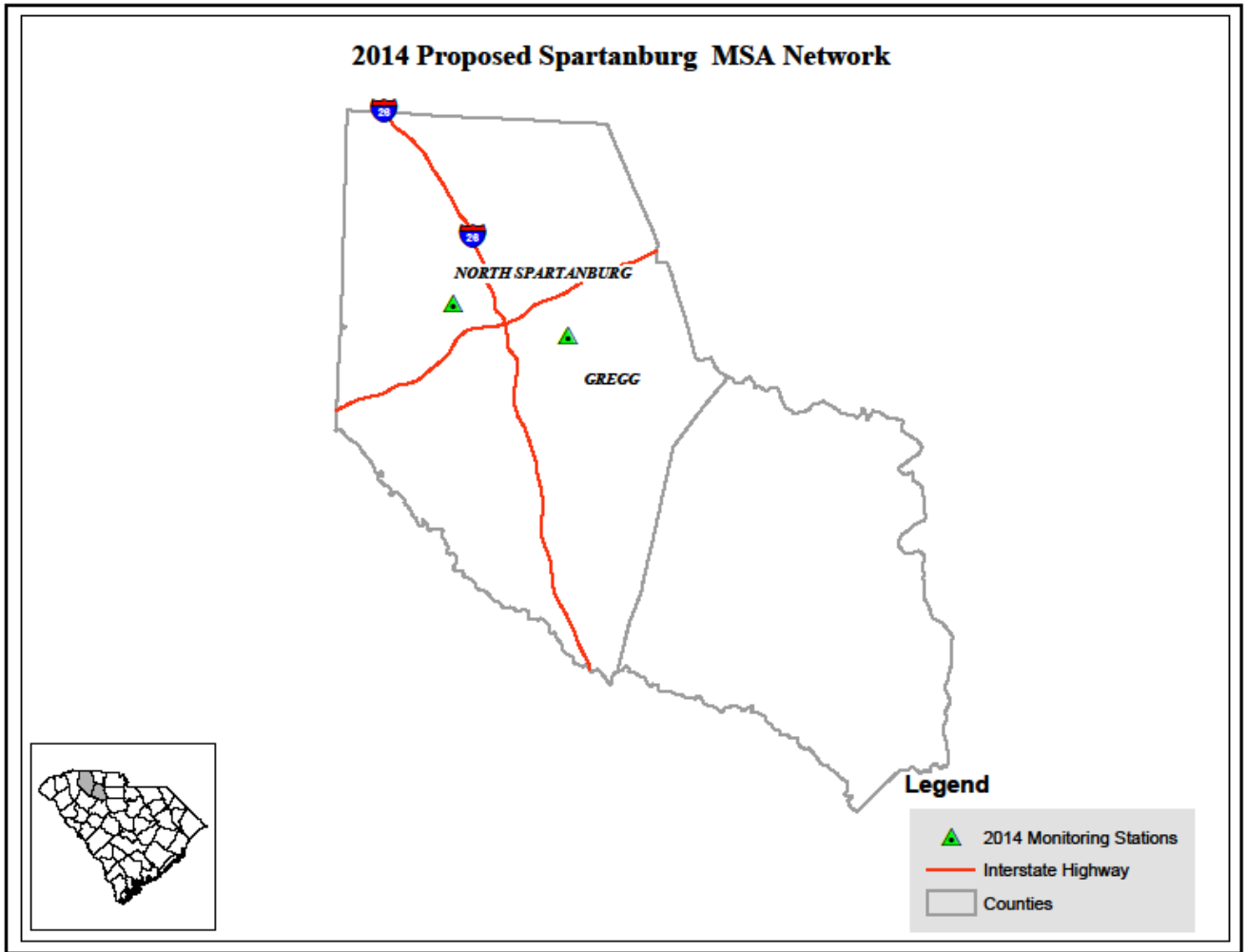
**Changes for 2014:**

No changes for 2014. DHEC continues to evaluate the Greenville MSA ozone network to determine the configuration of ozone monitors that most appropriately represent ozone concentrations across the area.

**Monitors:**

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General / Background	SPM	2.77	FEM Ultraviolet Photometry	Continuous

# Spartanburg MSA



## Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead/TSP	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip. Chem.	Precip.	MET
45-083-0009	North Spartanburg Fire Station #2						●												
45-083-0011	T.K. Gregg	●	○																
	TOTAL	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

○ SPM / Other  
 ● SLAMS  
 ●●/○○ indicates duplicate / QA samplers

**North Spartanburg Fire Station #2**

**CSA/MSA:** Greenville-Spartanburg-Anderson CSA / Spartanburg MSA

**AQS Site ID:** 45-083-0009

**Location:** 1556 John Dodd Road

**County:** Spartanburg

**Coordinates:** +34.988706, -82.075802

**Date Established:** April 4, 1990

**Site Evaluation:** The most recent site evaluation was conducted on June 8, 2006 (QA Check: May 14, 2013).



This monitoring site is located in rural Spartanburg County, northwest of the City of Spartanburg. This site was established as a maximum ozone concentration monitor for the Greenville-Spartanburg-Anderson urban area on April 4, 1990. This monitor is designated SLAMS and fulfills the requirement for a maximum concentration site for the Spartanburg MSA.

The sample inlets are 85.0 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	3.9	FEM Ultraviolet Photometry	Continuous

**T.K. Gregg Recreation Center**

**CSA/MSA:** Greenville-Spartanburg-Anderson CSA / Spartanburg MSA

**AQS Site ID:** 45-083-0011

**Location:** 267 Northview Street

**County:** Spartanburg

**Coordinates:** +34.95556, -81.924797

**Date Established:** December 29, 2008

**Site Evaluation:** PENDING (QA Check: May 14, 2013).



With the cooperation of local government and stakeholders, DHEC established this PM<sub>2.5</sub> site in the downtown Spartanburg area to meet the 40 CFR Part 58 Appendix D requirements for monitoring objective and collocated continuous monitoring and reporting. This site also supports the required collocated PM<sub>2.5</sub> continuous monitor for the Spartanburg MSA.

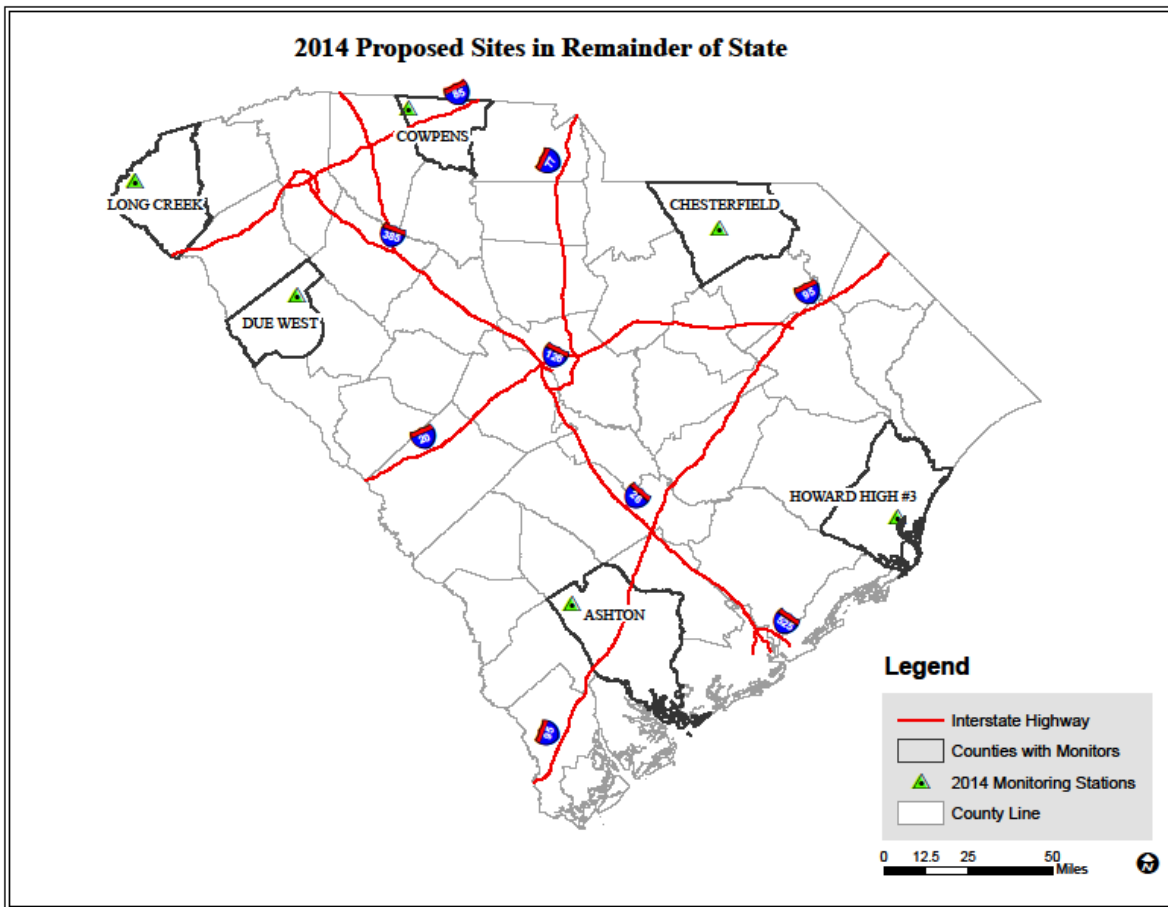
Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Neighborhood	Highest Concentration	SLAMS	2.5	FRM Gravimetric	1:1
PM <sub>2.5</sub>	Neighborhood	Highest Concentration	SPM non-regulatory	2.5	TEOM	Continuous

## Remainder of State



## Classification of Monitoring Type by Site

AIRS ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip. Chem.	Precip.	MET
45-001-0001	Due West						●										○	○	
45-021-0002	Cowpens						○										○		
45-025-0001	Chesterfield	●	○	○	○○		○					○	○	○	○				○
45-029-0002	Ashton		●				○												
45-043-0011	Howard High School #3				○														
45-073-0001	Long Creek		○				○	○										○	
	TOTAL	1	3	1	3	0	5	1	0	0	0	1	1	1	1	0	2	2	1
○ SPM / Other ● SLAMS ●●/○○ indicates duplicate QA monitors																			

**Due West**

**CSA/MSA:** Greenville-Spartanburg-Anderson CSA/ None

**AQS Site ID:** 45-001-0001

**Location:** 59 Jim Scott Lane

**County:** Abbeville

**Coordinates:** +34.325318, -82.386376

**Date Established:** April 2, 1991

**Site Evaluation:** The most recent site evaluation was conducted on June 27, 2006 (QA Check: May 7, 2013).



The Due West site is located in northeastern Abbeville County. In addition to monitoring for ozone, Due West has a gauge for precipitation and a sampler for precipitation chemistry.

The sample inlets are 76 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General / Background	SLAMS	4.2	FEM Ultraviolet Photometry	Continuous
Precipitation Chemistry	Regional	Trends	non-regulatory	1.5	IC	Weekly
Precipitation	Neighborhood	Local Conditions	non-regulatory	3.0	Tipping bucket	Continuous

## Cowpens

**CSA/MSA:** Greenville-Spartanburg-Anderson CSA/ None

**AQS Site ID:** 45-021-0002

**Location:** McGinnis Road (Old SC 110)

**County:** Cherokee

**Coordinates:** +35.130396, -81.816567

**Date Established:** March 25, 1988

**Site Evaluation:** The most recent site evaluation was conducted on June 26, 2006 (QA Check: May 14, 2013).



The Cowpens site is located in northwestern Cherokee County at the Cowpens National Battlefield. Cowpens is sited to represent ozone concentrations between the Greenville-Spartanburg-Anderson CSA and the Charlotte-Concord CSA. The operation of the ozone monitor fulfills the ambient monitoring commitment in the Cherokee County Maintenance Plan.<sup>11</sup> In addition to ozone, the Cowpens site also supports a precipitation chemistry sampler. The sample inlets are 23.0 meters from the nearest road.

The monitor will be operated through the 2014 ozone season to fulfill the Cherokee County Maintenance Plan commitments.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Upwind / Background	SPM	3.05	FEM Ultraviolet Photometry	Continuous
Precipitation Chemistry	Regional	Regional Transport	SPM	1.5	IC	Weekly

<sup>11</sup> 110(a)(1) Maintenance Plan: 8-hour Ozone National Ambient Air Quality Standard, Cherokee County, South Carolina, December, 2007.

## Chesterfield (NATTS)

CSA/MSA: none/none

AQS Site ID: 45-025-0001

Location: SC145, McBee (Rt 2 Box 100)

County: Chesterfield

Coordinates: +34.615367, -80.198787

Date Established: January 6, 2000

Site Evaluation: The most recent site evaluation was conducted on April 21, 2003 (QA Check: June 9, 2011).



The Chesterfield site is located in central Chesterfield County. The Chesterfield site has continuous monitors for black carbon, PM<sub>2.5</sub>, ozone and meteorological parameters. Sampling is done for PM<sub>2.5</sub>, speciated PM<sub>2.5</sub> and PM<sub>10</sub>. This site also serves as the required regional transport site for PM<sub>2.5</sub>. In addition to the CSN protocol PM<sub>2.5</sub> speciation sampling, this site is a precision site with collocated FRM samplers for PM<sub>2.5</sub> and PM<sub>10</sub>. The sample inlets are 45 meters from the nearest road. The Chesterfield site is a rural National Air Toxics Trends Site (NATTS) which includes carbonyls, VOC, SVOC and metals sampling.

Changes for 2014:

There are no changes planned for 2014.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Regional	Regional Transport	SLAMS	4.83	FRM Gravimetric	1:3
PM <sub>2.5</sub>	Regional	Regional Transport	SPM non-regulatory	3.86	TEOM – 50° C	Continuous
Speciated PM <sub>2.5</sub>	Regional	Regional Transport	CSN	3.96	Energy dispersive XRF, Ion chromatography, CSN TOT	1:6
PM <sub>10</sub>	Regional	General / Background	SPM	2.43	Gravimetric ICP/MS	1:6
Collocated PM <sub>10</sub>	Regional	General / Background	QA Collocated	2.43	Gravimetric	1:6

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Regional	General / Background	SPM	4.64	FEM Ultraviolet Photometry	Continuous
Black Carbon	Neighborhood	General / Background	non-regulatory	3.92	Optical absorption	Continuous
Carbonyls	Regional	NATTS	non-regulatory	3.0	DNPH/IC	1:6
SVOC	Regional	NATTS	non-regulatory	3.0	PUF/GCMS	1:6
Volatile Organic Compounds	Regional	NATTS	non-regulatory	3.0	Canister/GCMS	1:6
Wind speed / direction	Neighborhood	Local Conditions	non-regulatory	10.0	Instruments for wind speed and direction	Continuous

**Ashton****CSA/MSA:** none/none**AQS Site ID:** 45-029-0002**Location:** Ashton Road (S-13-18) Islandton**County:** Colleton**Coordinates:** +33.007866 -80.965038**Date Established:** March 7, 1990**Site Evaluation:** The most recent site evaluation was conducted on April 18, 2005 (QA Check: May 19, 2011).

The Ashton site is located in northwestern Colleton County and was established on March 7, 1990. The site serves as a required regional background for PM<sub>2.5</sub>, representing one of two major and different physiographic regions in South Carolina. In 2014, the PM<sub>2.5</sub> monitor designation was changed from SPM to SLAMS. It also monitors ozone concentrations. The sample inlets are 8 meters from the nearest road.

Changes for 2014:

Designation type for PM<sub>2.5</sub> will be changed to SLAMS to reflect status of being the required regional background site.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Regional	General / Background	SLAMS	4.40	TEOM 50°C	Continuous
Ozone	Urban	General / Background	SPM	4.70	FEM Ultraviolet Photometry	Continuous

**Howard High School #3**

**CSA/MSA:** Myrtle Beach-Conway SC,NC CSA/none

**AQS Site ID:** 45-043-0011

**Location:** 594 Gilbert Street

**County:** Georgetown

**Coordinates:** +33.368916,-79.296617

**Date Established:** July, 15 2008

**Site Evaluation:** PENDING (QA Check: April 21, 2011).



This site represents a continuation of PM<sub>10</sub> monitoring in this area of Georgetown that has been ongoing since 1970 and the establishment of the original Howard High site.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>10</sub>	Neighborhood	Population Exposure Highest Concentration	SPM	2.23	TEOM	Continuous

## Long Creek

**CSA/MSA:** Greenville-Spartanburg-Anderson CSA/ none

**AQS Site ID:** 45-073-0001

**Location:** Round Mt. Tower Rd.

**County:** Oconee

**Coordinates:** +34.805261, -83.237700

**Date Established:** August 1, 1983

**Site Evaluation:** The most recent site evaluation was conducted on February 18, 2005 (QA Check: December 4, 2012).



The Long Creek monitoring site is located on Round Mountain in northwest Oconee County. The Long Creek site was also established as part of the Southern Oxidant Study. It provides a unique vantage for monitoring the impacts of transported pollutants. Long Creek has continuous monitors for ozone, PM<sub>2.5</sub>, sulfur dioxide and precipitation. The sample inlets are 11.0 meters from the nearest road.

Due to the importance of measuring region-wide sulfur dioxide, PM<sub>2.5</sub> and ozone concentrations, the unique location and collocated monitoring activity, DHEC has determined that current monitoring at this site should be continued.

Changes for 2014:

DHEC intends to continue to work with the land-owner to improve site exposure due to recent tree growth around the site. The designation for the PM<sub>2.5</sub> monitor was changed from SLAMS to SPM due to inadequate performance of the FEM at this location.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Urban	General / Background	SPM non-regulatory	4.14	FEM TEOM	Continuous
Ozone	Regional	General / Background	SPM	4.22	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Regional	Regional Transport	SPM	4.22	FEM UV fluorescence	Continuous
Precipitation	Neighborhood	Local Conditions	non-regulatory	1.5	Tipping bucket	Continuous

## Discontinued Sites

### Clemson CMS

**CSA/MSA:** Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA

**AQS Site ID:** 45-077-0002

**Location:** 106 Hope Well Road

**County:** Pickens

**Coordinates:** +34.653606, -82.838659

**Date Established:** July 14, 1979

**Site Evaluation:** The most recent site evaluation was conducted on March 18, 2003 (QA Check: October 23, 2012).



The Clemson Continuous Monitoring Site (CMS) site was located on the grounds of Clemson University near the western border of Pickens County. This monitor measured ozone concentrations upwind of the Greenville-Spartanburg urbanized area. The sample inlets are 27.4 meters from the nearest road.

This site was part of the Greenville MSA Ozone study, initiated in 2008 and designed to investigate ozone concentration variability across the Upstate and provide information to help refine the monitoring network to better

meet monitoring objectives.

#### Changes for 2014:

DHEC collected sufficient data at the Clemson CMS, Big Creek and Wolf Creek sites to demonstrate the adequacy of the monitoring network, without the Clemson data, to represent the area. After evaluating the data, DHEC determined that the Wolf Creek site was the more appropriate location to represent ozone concentrations for this portion of the MSA. Appendix B provides detailed justification for monitoring termination.

#### Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General background	SLAMS	4.59	FEM Ultraviolet Photometry	Continuous

## Network Development

The Monitoring Network provides data to support an array of decisions ranging from development of emissions strategies to protect and improve air quality to the level of activity appropriate for individuals in sensitive populations. To support these varied data users, the network must provide both stable, long term measures to document trends and rapid reporting of conditions to the public. In response to land use, population and urban areas growth, the network must be evaluated and adjusted to meet the changing conditions and needs.

The Monitoring Network described in this plan continues to build upon a significant transition from the network that has evolved over the last thirty-five years. It reflects the successes in reducing ambient concentrations of Total Suspended Particulate, lead, carbon monoxide, nitrogen oxides and sulfur dioxide and the increasing concern about the impact of fine particles and ozone on public health and the environment.

A series of studies are planned for the major urban areas, as resources permit, to gain better understanding of the air quality and provide information to improve the monitoring network. In addition to the intensive studies that provide a detailed ‘snapshot,’ it is intended that SPM sites be established and monitored in rotation to provide regular checks and long term tracking of the trends in air quality in all areas of the state including smaller cities, towns and rural areas. The implementation of this long term strategy is contingent on sufficient federal funding to support the core required monitoring and will be developed and evaluated as resources become available. Project plans will be developed for the monitoring and data analysis activity to better define the scope of these strategies prior to implementation. These studies are long term needs DHEC has identified and are important tools for evaluating and improving the representativeness of the ambient air monitoring network and our knowledge of air quality in the State.

Areas where long term strategies are being considered include:

- Columbia MSA Ozone Study - addition of supplementary SPM ozone sites to investigate variability and refine the monitoring network to meet monitoring objectives.
- Columbia MSA Particulate Surveillance - rotation of SPM PM<sub>2.5</sub> sites through areas with higher rates of growth and changes in land use to determine trends and understand spatial variability of concentrations (Parklane, Sandhill and potentially Lower Richland, Lexington and Chapin).
- Aiken County portion of the Augusta-Richmond County MSA Ozone Study - addition of supplementary SPM ozone site to investigate proper size of the network appropriate to represent the South Carolina portion of the MSA.
- Aiken County portion of the Augusta-Richmond County MSA Particulate Study – investigation of PM<sub>2.5</sub> concentrations in North Augusta and Aiken along with existing rural data to determine population exposure and possible need for monitoring of mass or the components of particulate to assist in area air quality improvement efforts.
- York County Ozone Study - limited investigation of ozone population exposure, spatial variability and transport to supplement existing North and South Carolina monitoring. Study began in the Summer, 2012 and includes two additional ozone monitoring sites within York County. This study is expected to be conducted through the 2013 ozone monitoring season.
- Near road NO<sub>2</sub> Monitoring Network Implementation-the 2010 Primary National Ambient Air Quality Standards for Nitrogen Dioxide and the 2013 Revision to Ambient Nitrogen Dioxide Monitoring Requirements requires each CBSA having 1,000,000 or more persons to have one near-road NO<sub>2</sub> monitor operational by January 1, 2014 and each CBSA having 500,000 or more persons (but less than 1,000,000), to have one near-road NO<sub>2</sub> monitor operational by January 1, 2017. DHEC, in conjunction with local stakeholders, will apply the methodology found in The

Near Road NO<sub>2</sub> Monitoring Technical Assistance Document, identify an appropriate list of road segments, and propose these sites to EPA.

- Myrtle Beach-Conway-North Myrtle Beach SC, NC MSA Ozone and SO<sub>2</sub> monitoring-in February, 2013, OMB added Brunswick County, North Carolina to the Myrtle Beach-Conway-North Myrtle Beach SC, NC MSA, which resulted in this MSA being required to have one Ozone monitor and one SO<sub>2</sub> monitor. DHEC, in conjunction with North Carolina, will work with internal and external partners to identify and propose appropriate sites to EPA.
- Charleston Port Monitoring-the Charleston Port Expansion project has a projected completion data of 2017-2019. At that time, DHEC will work with local stakeholders to identify and establish an appropriate PM<sub>2.5</sub> site.
- Charleston MSA Ozone study - Investigation of alternative ozone monitoring sites to better represent ambient ozone concentrations in the Charleston – North Charleston MSA potentially replacing Bushy Park (45-015-0002).

## APPENDIX A: Errata

This section will list corrections to the 2014 Monitoring Plan that may arise after submittal to the EPA. The updated plan along with this errata sheet will be posted to DHEC's webpage.

Date	Item

## **APPENDIX B: Justification for terminating Clemson CMS**

### **Introduction**

In order to support the refinement of the ozone monitoring network in the Upstate of South Carolina (encompassing the current Greenville-Anderson-Mauldin and Spartanburg Metropolitan Statistical Areas) the Department of Health and Environmental Control (DHEC) added additional monitors to improve the spatial coverage and has conducted an analysis of all ozone monitoring data collected from the existing and additional monitors (Figure 1). Table 1 lists the site name, site ID, county, page in the 2013 Monitoring Plan that contains the purpose of the site and date ozone monitor was established for those monitors in the Greenville MSA Ozone Study identified in the 2013 Plan.

Recognizing that maintenance of large monitoring networks in the face of ever increasing budget cuts is no longer possible or practical, the SC Air Program conducted a significant review of the Ambient Monitoring network in 2007. DHEC has made it a priority to eliminate redundant or low value monitors, even at the cost of ending long-term monitoring records, in order to have sufficient resources to meet the mandatory monitoring requirements and data collection needed to adequately operate the program. While DHEC understands the importance of maintaining a long term monitoring record, ensuring that an area is appropriately monitored in the most efficient manner is the priority for our monitoring program.

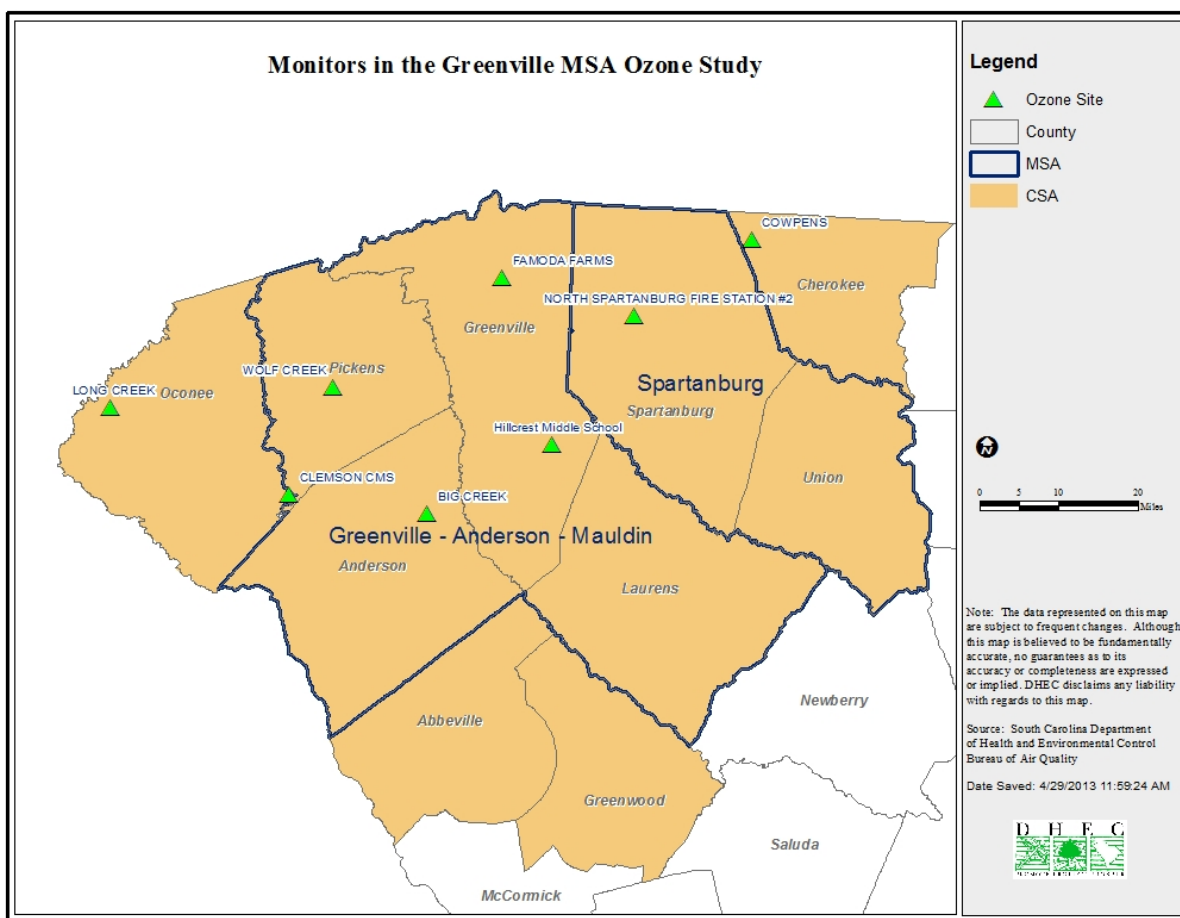
**DHEC seeks concurrence to terminate monitoring at Clemson CMS (45-077-0002) as requested in the 2014 Network Description and Ambient Air Network Monitoring Plan in order to eliminate duplicative monitoring in the Greenville-Anderson-Mauldin Metropolitan Statistical Area (MSA).** The Clemson CMS (45-077-0002) monitoring site no longer has the highest ozone design value site in the MSA. DHEC may propose further modifications to the ozone network in the Upstate in subsequent Plans to best use resources and ensure that an efficient, adequate monitoring network is maintained.

DHEC recognizes that the explicit requirements of 40 CFR 58.14, paragraph c (System Modification) for discontinuation of a State/Local Air Monitoring Station (SLAMS) are not met for the Clemson CMS monitor. However, the System Modification requirement states “Other requests for discontinuation may be approved on a case-by-case basis if discontinuance does not compromise data collection needed for implementation of a NAAQS and if the requirements of Appendix D to this part, if any, continue to be met.” DHEC provides evidence below that the continued operation of existing monitors in the Greenville-Anderson-Mauldin MSA provide the appropriate data collection needed for implementation of the Ozone NAAQS. The minimum monitoring requirements specified in Appendix D will continue to be met or exceeded for the MSAs. Table 1 lists how the area monitors, as proposed, meet or exceed the minimum monitoring requirements found in Appendix D to 40 CFR Part 58. The Monitoring rule repeatedly reinforces that the Regional Administrator and the responsible monitoring agency must work together to design and maintain the most appropriate network to meet the data needs of the area.

**Table 1: Listing of monitors used in this analysis**

Site Name	Site ID	County	2012 Ozone Design Value (ppb)	Fulfills or exceeds Appendix D requirements (MSA)	Date Established	Page in 2013 Monitoring Plan
Long Creek	45-073-0001	Oconee	64	Exceeds Not in MSA <350,000 pop.	5/4/1989	66
Wolf Creek	45-077-0003	Pickens	67*	Exceeds Greenville-Anderson-Mauldin MSA	8/10/2010	55
Clemson CMS	45-077-0002	Pickens	71	----	7/20/1979	67
Famoda Farm	45-045-1003	Greenville	66	Meets Greenville-Anderson-Mauldin-MSA	8/7/2008	54
Hillcrest	45-045-0016	Greenville	69	Meets Greenville-Anderson-Mauldin MSA	3/4/2009	53
Big Creek	45-007-0005	Anderson	73	Exceeds Greenville-Anderson-Mauldin MSA	6/6/2008	50
North Spartanburg	45-083-0009	Spartanburg	75	Meets Spartanburg MSA	4/10/1990	57
Cowpens	45-021-0002	Cherokee	70	Meets Gaffney Ozone Maintenance	4/21/1988	61
*Denotes monitor did not meet minimum monitoring completeness criteria.						

**Figure 1: Map of monitors in the Greenville MSA Ozone Study**



### Background on Monitoring Configuration in the Upstate

The monitoring configuration of the ‘legacy’ monitoring sites operating in 2007 in the Upstate of South Carolina (west to east: Long Creek Clemson, North Spartanburg and Cowpens) predates the Greenville MSA Ozone study referenced below. Prior to the study, the Greenville - Spartanburg - Anderson MSA consisted of Greenville, Spartanburg, Anderson, Pickens and Cherokee Counties<sup>12</sup>. The configuration of monitors at that time included Clemson (45-077-0002: Pickens County), Long Creek (45-073-0001: Oconee County) and Powdersville (45-007-0003: Anderson County discontinued Nov 2006) sites as monitors representing upwind concentrations for the MSA. North Spartanburg (45-083-0009: Spartanburg County) and to some extent Cowpens (45-021-0002: Cherokee County) represented expected maximum downwind concentrations for the then current MSA configuration.

In October, 2006, the United States Environmental Protection Agency (EPA) published ambient air monitoring regulations<sup>13</sup> containing revisions to quality assurance (QA), monitor designations, minimum requirements for both number and distribution of monitors among MSAs and probe siting. The regulation also included the requirement for an annual monitoring network plan and periodic network assessments.

<sup>12</sup> <http://www.census.gov/population/metro/files/lists/historical/99mfips.txt>

<sup>13</sup> 71 FR 61236, October 17, 2006

In June 2003<sup>14</sup>, the Office of Management and Budget (OMB) redefined the MSA definitions for the Upstate of South Carolina, separating the former single Greenville-Spartanburg-Anderson MSA into three distinct MSAs. The breakup of the original MSA into three distinct areas and the 2006 revision to the regulations triggered new minimum monitoring requirements for each independent MSA based on the Chapter 40, Appendix D to Part 58 of the Code of Federal Regulations. Despite this change in the monitoring requirements driven not by air quality planning needs, but in large part by arbitrary and dynamic boundaries delineated by the Office of Management and Budget (OMB) for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics, DHEC believes that a monitoring network based on the original configuration is most appropriate to capture the evolution and transport of ozone in the area and indicate population exposure across the upstate during typical elevated ozone episodes. The generally east to west configuration of the network mirrors the airflow along the foot of the Appalachians, the successive inputs of precursor emissions from the urbanized areas, and provides data useful for the public notification for the citizens in the Upstate and the development of appropriate air management policy.

Monitoring was added in Anderson County (Big Creek) to address the regulatory requirement for the newly designated Anderson MSA, but it was done in the context of the concern about the Clemson site location being very close to the MSA boundary, the historical knowledge of the development and movement of ozone in the Upstate and the constellation of monitors being installed to support development of the most appropriate monitoring configuration for the region.

In February 2013, the Office of Management and Budget released new Metropolitan Statistical Area (MSA) definitions<sup>15</sup>. The new definitions recombined the Anderson MSA with the Greenville-Mauldin-Easley MSA forming the Greenville-Anderson-Mauldin MSA. Using the minimum monitoring requirements, this area has significantly more than the minimum number of monitors required. Also, the Clemson CMS (45-007-0002) site no longer has the highest ozone design value in the MSA. DHEC believes that the Greenville-Anderson-Mauldin MSA is adequately represented by the other existing monitoring sites in Greenville and Anderson counties.

OMB cautions users that “OMB establishes and maintains the definitions of Metropolitan and Micropolitan Statistical Areas ... solely for statistical purposes. This classification is intended to provide nationally consistent definitions for collecting, tabulating, and publishing Federal statistics for a set of geographic areas.”<sup>16</sup> Nowhere in the OMB bulletin does it suggest that the MSA definitions are appropriate for, or include important data elements applicable to, the definition of an ambient air monitoring network. While DHEC understands the need for establishing minimum monitoring requirements, EPA appropriately has mechanisms within the monitoring plan approval and network assessment process to allow states the flexibility to implement a monitoring network that meets the three basic monitoring objectives and addresses National and State needs. The recent changes in the MSA definitions is an example of the reason for the incorporation of flexibility in the regulations and illustrates necessity that EPA use the discretion available in the monitoring regulations to afford states flexibility and regulatory certainty.

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<sup>14</sup> Office of Management and Budget Bulletin No. 03-04, announcing metropolitan and micropolitan statistical areas as of June 6, 2003, based on application of the 2000 OMB standards to Census 2000 data, [http://www.whitehouse.gov/omb/bulletins\\_b03-04](http://www.whitehouse.gov/omb/bulletins_b03-04).

<sup>15</sup> <http://www.census.gov/population/metro/>

<sup>16</sup> Office of Management and Budget Bulletin No. 03-04, announcing metropolitan and micropolitan statistical areas as of June 6, 2003, based on application of the 2000 OMB standards to Census 2000 data, [http://www.whitehouse.gov/omb/bulletins\\_b03-04](http://www.whitehouse.gov/omb/bulletins_b03-04), paragraph 4.

## Clemson CMS Termination Request Background

In July 2007, DHEC submitted their first annually required<sup>17</sup> Network Description and Ambient Air Monitoring Plan (2008 Plan). In the 2008 Plan, DHEC stated that monitoring at the Clemson CMS site (45-077-0002)<sup>18</sup> would be maintained through the 2008 ozone season as part of the Greenville MSA Ozone Study<sup>19</sup>. On October 24, 2007, EPA conditionally approved the establishment of two ozone monitoring sites as part of the Greenville MSA Ozone Study.

In 2008, DHEC designed and initiated the Greenville MSA Ozone study to investigate ozone concentration variability across the Upstate and provide information to help refine the monitoring network to better meet monitoring objectives. The study sites proposed to improve the spatial distribution of available data were not established as quickly as desired but monitoring has been maintained at the additional sites for several years beyond the expected duration of the study. DHEC has evaluated data from all of the previously existing and the supplementary monitors to arrive at a configuration of monitors and locations that best represents air quality and meets area monitoring objectives.

In July 2008, based on ozone data collected from 2005 – 2007, DHEC determined that it would terminate all monitoring at the Clemson CMS site (45-077-0002)<sup>20</sup>, establish the Famoda Farm site (45-045-1003)<sup>21</sup> and establish a site in Southeastern Greenville County<sup>22</sup> in execution of the 2008 Plan. In their October 27, 2008 response, the US Environmental Protection Agency (EPA) denied the request to discontinue ozone monitoring at the Clemson site because “The sites above that are currently violating the NAAQS<sup>23</sup>, cannot be terminated at this time. The monitor types for these sites must be changed back to SLAMS in AQS and they must operate for at least one additional calendar year to compare with new sites that SC DHEC is proposing to establish.” On March 25, 2009 EPA submitted a follow-up letter as a confirmation of discussions between DHEC and EPA staff that listed the Clemson CMS ozone monitor as a site that is “eligible to be shutdown dependent on the establishment of new sites and the data comparisons.”

On February 1, 2011, DHEC submitted an amendment to the 2011 Monitoring Plan establishing the Wolf Creek monitoring site. In the cover letter to the amendment, DHEC stated “We wish to add the Wolf Creek monitoring site (45-077-0003), near the town of Pickens, in central Pickens County, to the 2011 Annual Air Network Monitoring Plan. Stakeholders in Pickens County have voiced concerns that the data being collected at the Clemson CMS monitoring site (45-077-0002 SLAMS) is not representative of ozone concentrations in Pickens County. The Wolf Creek site is expected to be better representative of both Pickens County and the Greenville-Mauldin-Easley MSA ambient ozone concentrations. Ozone data from the Wolf Creek monitoring site will be collected concurrently with, and compared to data collected at the Clemson CMS site to allow an evaluation to determine if revision of the local ozone monitoring network is appropriate. The network revisions may include redesignation of Wolf Creek as one of the two required [Greenville-Mauldin-Easley] MSA SLAMS Ozone monitors and discontinuation of the Clemson site.” The EPA subsequently approved this amendment to the 2011 Monitoring Plan in a letter dated March 14, 2011.

On June 4, 2012, DHEC submitted an amendment to the 2012 Monitoring Plan requesting approval to terminate the Clemson CMS (45-077-0002) monitoring site in Pickens County. Appendix D to 40 CFR Part 58 requires only two ozone monitors for the MSA based on current population and design values. At

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<sup>17</sup> 40 CFR 58.10 (a)(1)

<sup>18</sup> State of South Carolina: Network Description and Ambient Air Network Monitoring Plan for Calendar Year 2008 (2008 Plan) at page 21

<sup>19</sup> *Id.*, at page 32

<sup>20</sup> State of South Carolina: Network Description and Ambient Air Network Monitoring Plan for Calendar Year 2009 (2009 Plan) at page 65

<sup>21</sup> *Id.*, at page 23

<sup>22</sup> *Id.*, at page 24

<sup>23</sup> On March 27, 2008, EPA finalized a revised Ozone NAAQS set at 0.075 ppm, 73 FR 16435.

that time, the Greenville-Mauldin-Easley Metropolitan Statistical Area (MSA) had four ozone monitoring stations in operation. Additional monitoring in the MSA established in 2008 and 2009 at Hillcrest (45-045-0016) and Famoda Farm (45-045-1003) provided what DHEC contends is representative data and ozone design values for the MSA. Termination of monitoring at Clemson CMS would have allowed DHEC to redirect limited resources to program priorities. EPA disapproved this request until there was enough data collected at each of the four Greenville-Mauldin-Easley MSA sites to calculate a design value.

We are not aware of any regulatory language that requires calculation of a Design Value at a replacement site prior to termination of an existing monitor. The regulations allow termination "...if discontinuance does not compromise data collection needed for implementation of the NAAQS and if requirements of Appendix D of this part, if any, continue to be met<sup>24</sup>."

Before and after the recent MSA definition changes, the Greenville-Anderson-Mauldin MSA continues to have more monitoring than is necessary to meet National and State Monitoring objectives. DHEC still believes that it is appropriate to discontinue ozone monitoring at the Clemson CMS (45-077-0002) site. As stated elsewhere, due to the definition changes, the highest MSA design value site is now located at the the Big Creek (45-007-0005) site and EPA's original concern that DHEC is requesting termination of the MSA's design value site is now moot. As demonstrated below, DHEC believes that the Big Creek (45-007-0005) site is a more appropriate site than Clemson to represent ozone concentrations in this part of the Greenville-Anderson-Mauldin MSA.

#### Data Evaluation

Daily maximum 8-hour average ozone concentrations for 2010 – 2012 were analyzed for monitors in the Greenville-Spartanburg CSA. Correlation coefficients (Table 2) indicate a high level of relationship between all monitors. The Clemson CMS site showed a very high level of correlation with Big Creek (45-007-0005) and Wolf Creek (45-077-0003) likely due to the proximity of the monitors to each other.

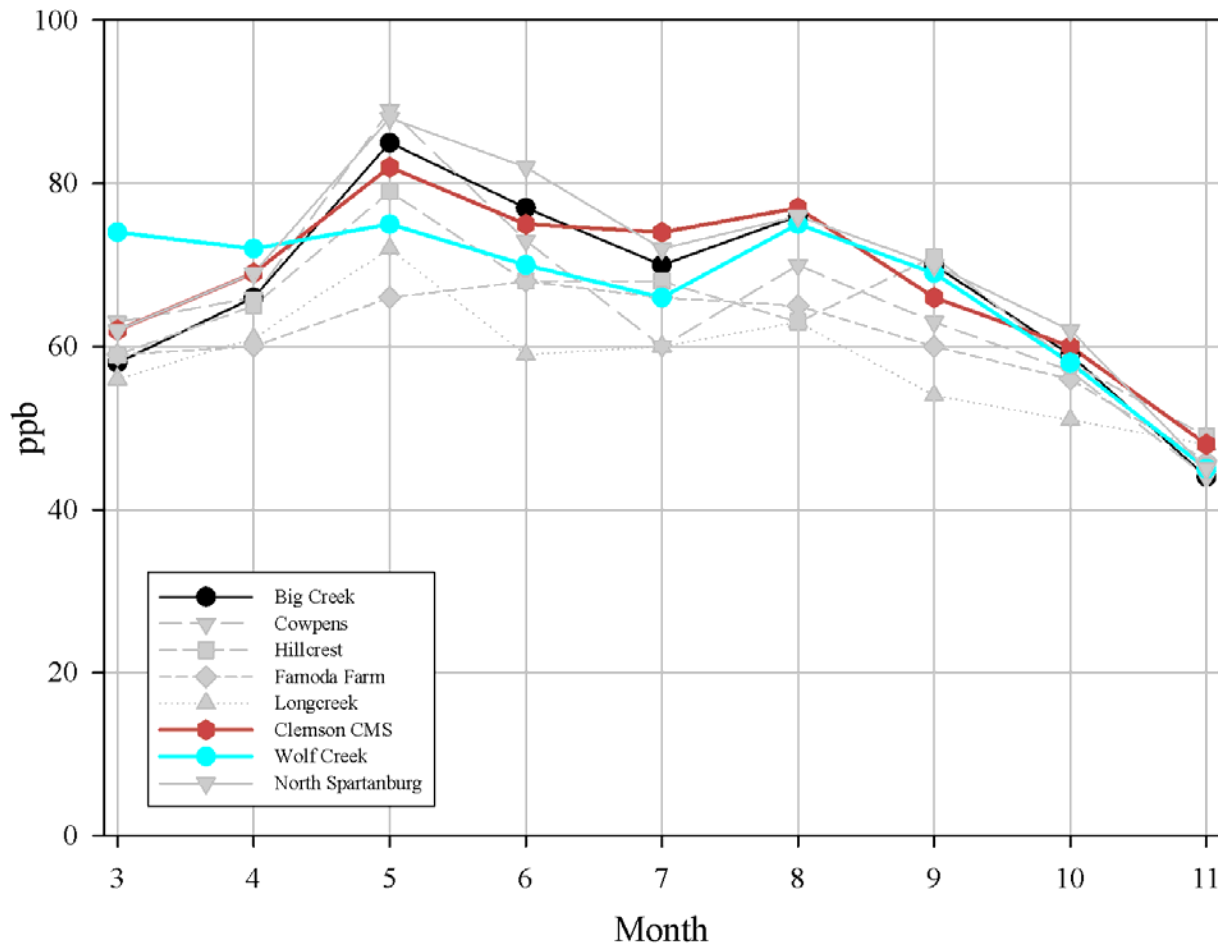
**Table 2: Correlation coefficients for daily maximum 8-hour average ozone concentrations 2010 - 2012**

	Big Creek	Cowpens	Hillcrest	Famoda Farm	Long Creek	Clemson	Wolf Creek	North Spartanburg
Big Creek	1							
Cowpens	0.882	1						
Hillcrest	0.890	0.845	1					
Famoda Farm	0.844	0.833	0.861	1				
Long Creek	0.722	0.757	0.712	0.813	1			
Clemson	0.925	0.853	0.871	0.890	0.799	1		
Wolf Creek	0.856	0.817	0.805	0.872	0.774	0.928	1	
North Spartanburg	0.898	0.907	0.874	0.856	0.732	0.886	0.837	1

<sup>24</sup> 40CFR §58.14 (c)

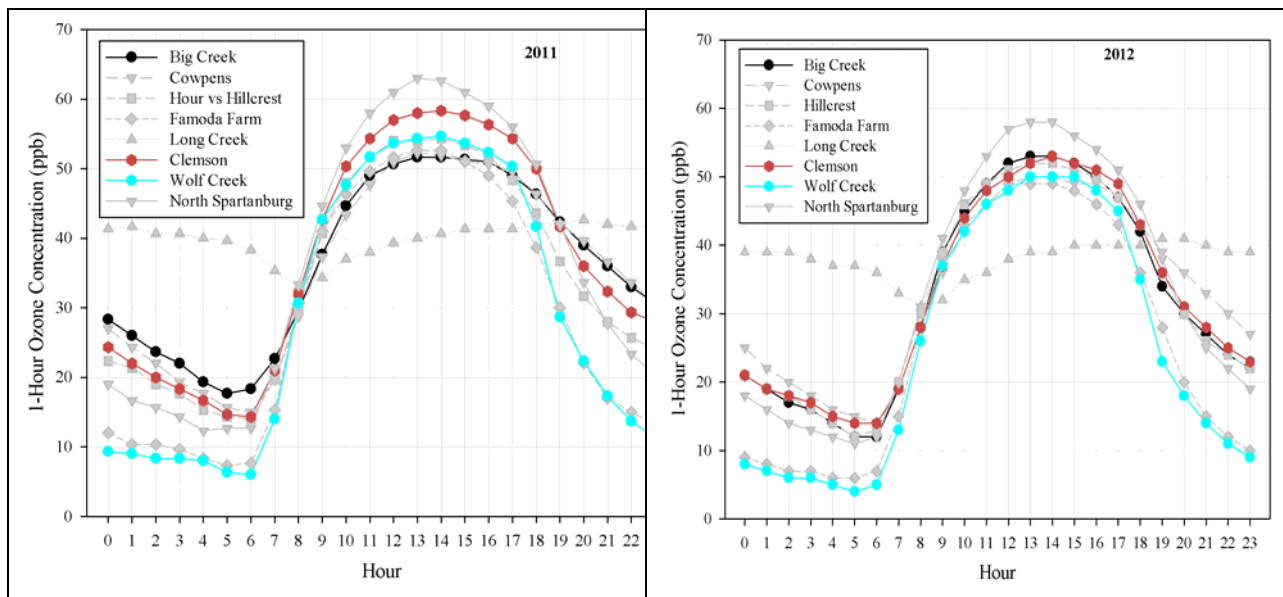
The highest daily maximum 8-hour ozone average concentrations during 2009 – 2011 were examined in order to ensure that the monitors exhibited similar behaviors in the highest values measured (Figure 2). As can be seen below the same general pattern occurred for all monitors except for the Long Creek site, which is a high elevation site and represents background/regional transport. The Big Creek, Clemson and Wolf Creek sites exhibited similar highest monthly daily maximums throughout the study period providing evidence that the monitors on the western edge of the CSA are measuring similar peak concentrations and that one or more of the monitors are redundant.

**Figure 2: Upstate Highest Daily Maximum 8-Hour Average Concentrations by Month (2010 – 2012)**



Since the analysis in Figure 2 indicated elevated peak ozone concentrations during the summer months, DHEC examined the summer months of 2011 (June – August) when all monitors in the study area were operating to see if all of the monitors exhibited similar average diurnal patterns in 1-hour concentrations. As can be seen in Figure 3, diurnal patterns are very similar for all monitors in the populated areas. The atypical Long Creek daily ozone variability is expected due to the relatively high elevation at that location. During the peak in the curve in Figure 3 (approximately hours 10 -19), it is evident that Big Creek and Clemson CMS are reading almost identical average concentrations suggesting that the Clemson CMS site does not provide unique data or information critical to implementation of the NAAQS in the MSA. A comparison of the previous summer’s graph reveals that this pattern is consistent throughout the Upstate.

**Figure 3: Comparison of Average Diurnal Pattern in 1-Hour Ozone Concentrations 6/1/2011 – 8/31/2011 (left graph) and 6/1/2012 – 8/31/2012 (right graph)**

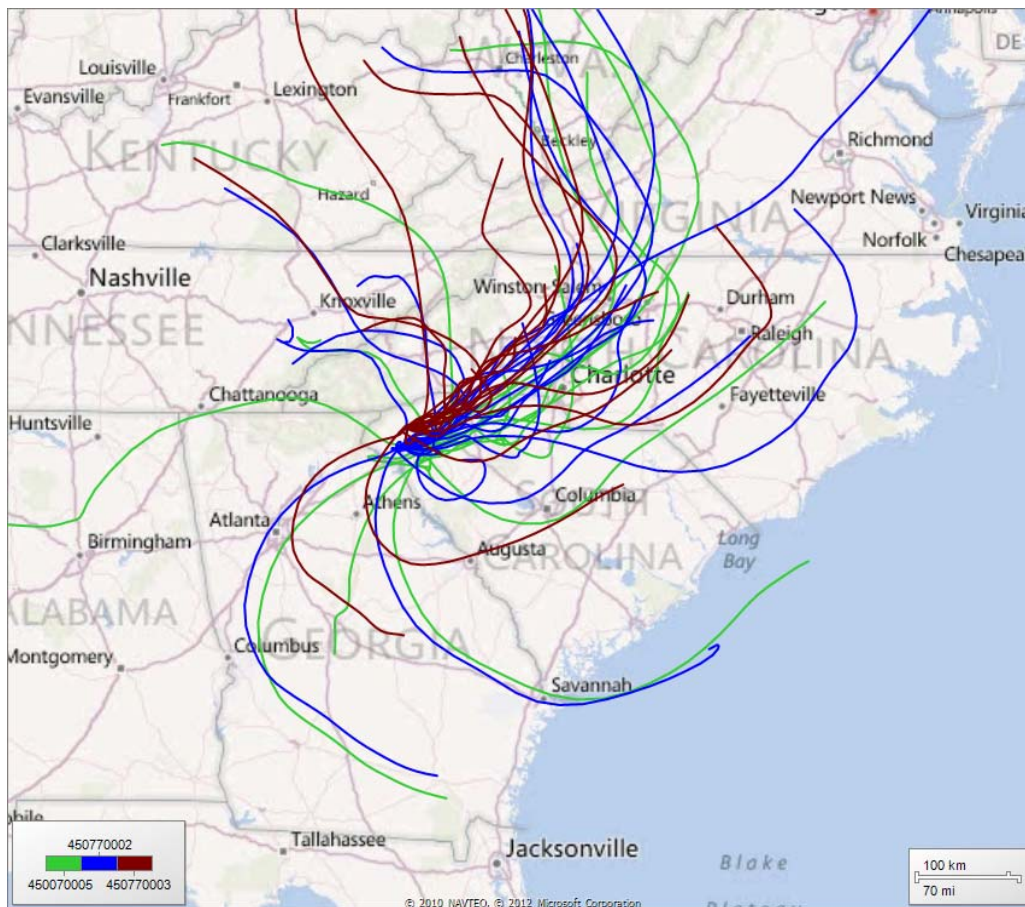


## Trajectory Analysis

A trajectory analysis was conducted on all days during the summer of 2011 with daily maximum 8-hour ozone averages greater than 85% of the 2010 Ozone National Ambient Air Quality Standard (NAAQS) (Figure 4). Thirty-six hour back trajectories were run using the HYSPLIT (Hybrid Lagrangian Integrated Trajectory) model for Big Creek, Wolf Creek and Clemson CMS when the monitors exceeded 85% of the Ozone NAAQS. The backtrajectories were run using the North American Mesoscale Model (NAM) Data Assimilation System (EDAS) 40 kilometer grid at 300 meters beginning at 20 Coordinated Universal Time (UTC). A back trajectory allows the viewer to see where an air mass originated and where it travels before ending up at the impact location.

This analysis (Figure 4 presents the composite image of all trajectories examined) suggests that concentrations greater than 85% of the Ozone NAAQS exhibit similar transport regimes for the three monitors, supporting DHEC's position that all monitoring in this area of the CSA measures similar concentrations of ozone and that there are redundant monitors that can be terminated to conserve resources.

**Figure 4: 36-Hour Backtrajectory Analysis for Big Creek (45-007-0005), Clemson (45-077-0002) and Wolf Creek (45-077-0003) on days that exceed 85% of the Ozone NAAQS 6/1/2011 – 8/31/2011**



## **Conclusions**

An analysis of daily maximum ozone concentrations, 1-hour ozone concentrations and 36-hour back trajectories on days with daily maximum concentrations greater than 85% of the Ozone NAAQS all show that the ozone monitors in current network configuration in and around the Greenville MSA are exposed to similar levels of pollution. Specifically, daily maximum 8-hour ozone concentrations at Big Creek and Clemson CMS and Wolf Creek are highly correlated, have similar temporal patterns in monthly maximum concentrations and exhibit very similar 1-hour peak concentrations during the summer months. Furthermore, on days that approach or exceed the level of the Ozone NAAQS, trajectory analysis suggests that three monitors are measuring concentrations in the same air mass, suggesting that there is redundant monitoring in this portion of Upstate of South Carolina. In light of this evidence and the current monitoring requirements, DHEC respectfully requests EPA concurrence to terminate ozone monitoring at the Clemson CMS (45-077-0002) site. Based on the data collected and data needs for the air program and area, DHEC may propose further refinements to the Upstate ozone monitoring network in future monitoring plans and or amendments to approved plans to better meet the monitoring objectives.

## APPENDIX C: Summary of Public comments received

Below is a summary of the comments received and DHEC's response. A copy of the comments received will be submitted with this Plan.

### *Catawba Indian Nation*

The Catawba Indian Nation in their comment letter state that the 2014 plan calls for the discontinuation of the Catawba ozone monitor. They are concerned that the York CMS monitor is not representative of their air shed. The commenter lists several bullet points linking the increase in traffic, population, temperatures as reasons not to terminate ozone monitoring at the Catawba site.

DHEC response: The Catawba ozone monitoring site referenced part of the York County Ozone Study referenced on page 68 of the 2014 Monitoring Plan. The scope of the study was to conduct a short-term study of ozone concentrations within York County. This study is scheduled to end at the conclusion of the 2013 ozone monitoring season (October 31, 2013). The data collected from the study sites and the existing network monitors (in both North and South Carolina) will be used to evaluate the representativeness of the existing network and inform the continued refinement of a monitoring network that represents ozone concentrations York County, including the Catawba Indian Nation. As stated in the comment letter, there are no geographical or topographical barriers significantly limiting air pollution transport within the air shed containing the urbanized Charlotte area and the nation.

Although DHEC will terminate monitoring at the York County Ozone Study sites at the conclusion of this year's ozone monitoring season, we encourage the Nation to join in collaboration with the agencies that have ambient monitoring responsibilities in the MSA to improve and operate a network that best meets the regions needs.

### *Natural Resources Defense Council*

The Natural Resources Defense Council (NRDC) submitted comments on behalf of themselves and the Southern Environmental Law Center, Upstate Forever and the Catawba Indian Nation. The NRDC describes the minimum monitoring requirements which can be found in Appendix D to 40 CFR Part 58. Furthermore, the NRDC comments can be summarized by three points:

1. South Carolina is required to establish a near-road NO<sub>2</sub> site this year.
  - NRDC states that "Since the Charlotte-Gastonia-Rock Hill, NC-SC has a population greater than 1,000,000; South Carolina is part of the *first phase* of the deployment schedule. Thus, DHEC must plan to establish the near-road NO<sub>2</sub> monitor by July 1, 2013, and operate the monitor by January 1, 2014."
2. DHEC should monitor ozone levels in northeastern York County or the Catawba Indian Reservation.
  - NRDC states that "The York CMS (AQS Site ID: 45-091-0006) should be relocated to the northeastern area of York County in the Charlotte-Concord CSA/Charlotte-Concord-Gastonia MSA ozone nonattainment area to provide the public with better air quality data and for comparison with NAAQS."
  - NRDC further states that "DHEC must demonstrate that there are currently two or more O<sub>3</sub> monitors in the MSA that provide sufficient data in accordance with 40 C.F.R. § 58 or it must install additional monitors to support basic monitoring objectives."
3. DHEC needs an additional PM<sub>2.5</sub> monitor in the Charlotte-Concord-Gastonia MSA.
  - NRDC states that South Carolina does not have a sufficient number of PM<sub>2.5</sub> monitors for the MSA. They list three sites in North Carolina which have annual design values above 10.2 µg/m<sup>3</sup> (which is 85% of the 2012 PM<sub>2.5</sub> annual NAAQS of 12.0 µg/m<sup>3</sup>). NRDC states that if

the three monitors in North Carolina are part of the monitoring network, DHEC should say so. Otherwise, they suggest that we establish additional sites to meet the minimum monitoring requirements.

DHEC response: As to NRDC's first point, they are correct that the Charlotte-Concord-Gastonia MSA is required to plan for a near-road NO<sub>2</sub> monitoring site in the monitoring plan due to EPA by July 1, 2013. However, DHEC is not required to establish a near-road site within the South Carolina portion of the MSA. 40 CFR 58 Appendix D, Section 2, (e) states (in part):

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

Mecklenburg County along with the States of North Carolina and South Carolina entered into a Memorandum of Agreement on air quality monitoring for criteria pollutants for the Charlotte-Gastonia-Concord MSA in 2007. This agreement fulfills the Section 2 (e) requirements and allows for shared responsibility between the states to meet the minimum monitoring requirements. Mecklenburg County has addressed several candidate near-road NO<sub>2</sub> sites in their most recent draft of their monitoring plan<sup>25</sup>.

The NRDC's second and third points also can be addressed through the Memorandum of Agreement referenced in the previous paragraph. However, DHEC disagrees that “The York CMS (AQS Site ID: 45-091-0006) should be relocated to the northeastern area of York County in the Charlotte-Concord CSA/Charlotte-Concord-Gastonia MSA ozone nonattainment area to provide the public with better air quality data and for comparison with NAAQS.” The advantage of sharing responsibility of meeting the minimum monitoring requirements with North Carolina is that it allows monitoring organizations to design a network to meet all of the intended monitoring objectives collectively. The purpose of the York CMS ozone monitor is to measure upwind background concentrations, an objective that is fulfilled by the site and allows both states to know what ozone conditions are like before entering the core of the MSA. DHEC believes that the Charlotte-Concord-Gastonia MSA is adequately monitored with its current network of eight ozone monitors which is substantially larger than the minimum number of sites required by 40 CFR Part 58.

DHEC does not believe that there is any benefit to relocating the York CMS ozone monitor to inside the existing nonattainment boundary for South Carolina. DHEC is in the process of conducting a study of ozone concentrations throughout York County as referenced in the Network Development section of the monitoring plan located on page 68. DHEC will analyze the results of the study after the conclusion of the 2013 ozone monitoring season and make a determination in collaboration with the other agencies with monitoring responsibilities in the MSA about the best configuration of monitoring sites able to meet the appropriate monitoring objectives in the South Carolina portion of the MSA. DHEC still believes that the York CMS site is representative of ozone concentrations in York County in its entirety. A portion of York County was designated as nonattainment because of EPA's contention that the area contributed to

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<sup>25</sup> [http://daq.state.nc.us/monitor/monitoring\\_plan/MCAQ\\_Annual\\_Monitoring\\_Network\\_Plan\\_2013.pdf](http://daq.state.nc.us/monitor/monitoring_plan/MCAQ_Annual_Monitoring_Network_Plan_2013.pdf) (accessed July 1, 2013).

ozone violations within Mecklenburg County, not because any portion of York County had been demonstrated to have violated the standard<sup>26</sup>.

It appears that based on the comments presented by NRDC, our monitoring plan can do a better job clarifying where the minimum monitoring requirements are met through collaboration with adjacent states. Subsequently, we have made an update to page 10 of our plan to reflect the Memorandum of Agreements in effect with other monitoring organizations and the importance of flexibility in the design and implementation of an appropriate monitoring network based on the actual needs of an area and not arbitrary political boundaries established to meet objectives other than Air Quality management.

*National Park Service – Cowpens National Battlefield*

Thanked DHEC for continuing to include the Cowpens monitoring site in the current monitoring plan.

DHEC Response: We acknowledge the comment.

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[http://www.epa.gov/airquality/ozonepollution/designations/2008standards/documents/R4\\_Charlotte\\_TSD\\_Final.pdf](http://www.epa.gov/airquality/ozonepollution/designations/2008standards/documents/R4_Charlotte_TSD_Final.pdf)  
(accessed July 1, 2013).