



August 1, 2016

Ms. Carol Kemker,  
Deputy Director, U.S. EPA, Region 4  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street, SW  
Atlanta, GA 30303-8960

RE: Annual Air Network Monitoring Plan for 2017

Dear Ms. Kemker:

In accordance with the requirements of 40 Code of Federal Regulations Part 58, Subpart B, the South Carolina Department of Health and Environmental Control (DHEC) respectfully submits the Annual Air Network Monitoring Plan for calendar year 2017. The DHEC is required by 40 CFR 58.10 to adopt and submit to the Regional Administrator an Annual Monitoring Network Plan which provides for the establishment and maintenance of an air quality surveillance system. This system is a network of State and Local Air Monitoring Stations (SLAMS) including Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors that are part of SLAMS, National Core Monitoring Network (NCore) stations, Speciation Trends Network (STN) stations, and Special Purpose Monitor (SPM) monitoring stations. This plan is required to include a statement of purpose for each monitor and evidence that siting and operation of each monitor meets the requirements of 40 CFR 58, Appendices A, C, D and E.

The DHEC received 22 comments during the public comment period, which was held from May 11, 2016 through June 09, 2016. A complete package, including the Department's response to comments received is being sent to Gregg Worley of your office. Should you have any questions or need additional information regarding this matter, please contact Robert Brown of my staff at (803) 898-4105.

Sincerely,

Rhonda Banks Thompson, Bureau Chief  
Bureau of Air Quality

cc: Gregg Worley, US EPA Region 4 (w/attachments)  
ec: Ryan Brown, US EPA Region 4 (w/attachments)

Todd Rinck, USEPA Region 4 (w/o attachments)  
Robert J. Brown, Jr., BAQ (w/o attachments)  
Renee' Shealy, BEHS (w/o attachments)  
Scott Reynolds, BEHS (w/o attachments)  
Micheal Mattocks, BEHS (w/o attachments)

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

## Calendar Year 2017

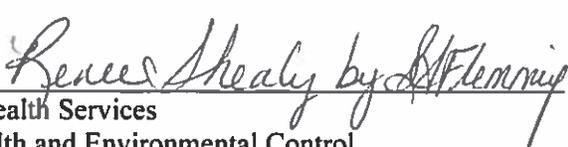


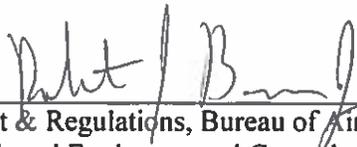
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**Certification**

This document contains the planned changes and final description of the sites and monitors of the South Carolina Ambient Air Monitoring Network (Monitoring Network) for criteria pollutants and related parameters for calendar year 2017. 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 Code of Federal Regulations (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 2016 and during the 2017 monitoring year, some elements of the network may require modification. A notification of modifications will be posted on the DHEC website and provided to the EPA Region 4 office. Where necessary, a request for approval of deviations from this plan and supporting documentation will be submitted to the EPA Region 4 office.

Micheal Mattocks      Signature       Date: 08/01/16  
Interim Director, Division of Air Quality Analysis, Bureau of Environmental Health Services  
South Carolina Department of Health and Environmental Control

Renee G. Shealy      Signature       Date: 08/01/16  
Chief, Bureau of Environmental Health Services  
South Carolina Department of Health and Environmental Control

Robert J. Brown, Jr.      Signature       Date: 8/1/16  
Director, Division of Air Assessment & Regulations, Bureau of Air Quality  
South Carolina Department of Health and Environmental Control

Rhonda B. Thompson      Signature       Date: 8-1-2016  
Bureau Chief, Bureau of Air Quality  
South Carolina Department of Health and Environmental Control

## **Acronyms**

AQI – Air Quality Index	NO <sub>x</sub> – Nitrogen Oxides
AQS – Air Quality System	NO <sub>y</sub> – NO <sub>x</sub> and other oxidized species
BAQ – Bureau of Air Quality	NPAP – National Performance Audit Program
BC – Black Carbon	OMB – Office of Management and Budget
CBSA – Core-Based Statistical Area	PEP – Performance Evaluation Program
CFR – Code of Federal Regulation	PM <sub>2.5</sub> – Particulate Matter < 2.5 microns
CO – Carbon Monoxide	PM <sub>10</sub> – Particulate Matter < 10 microns
CSA – Combined Statistical Area	PPB – Parts Per Billion
CSN – Chemical Speciation Network	PPM – Parts Per Million
CMS – Continuous Monitoring Site	PSD – Prevention of Significant Deterioration
DAQA – Division of Air Quality Analysis	PTFE – Polytetrafluoroethylene
DHEC – South Carolina Department of Health and Environmental Control	PUF – Polyurethane Foam
DNPH – Analysis method using 2,4-dinitrophenylhydrazine	QA – Quality Assurance
EPA – Environmental Protection Agency	QAPP – Quality Assurance Project Plan
FEM – Federal Equivalent Method	QC – Quality Control
FRM – Federal Reference Method	SLAMS – State and Local Air Monitoring Station
GC/MS – Gas Chromatography / Mass Spectroscopy	SO <sub>2</sub> – Sulfur Dioxide
GFAA – Graphite Furnace Atomic Absorption Spectrometry	SPM – Special Purpose Monitor
HPLC – High Performance Liquid Chromatography	STN – Speciation Trends Network
IC – Ion Chromatography	SVOC – Semi-volatile Organic Compound
IMPROVE – Interagency Monitoring of Protected Visual Environments	TEOM – Tapered Element Oscillating Microbalance
ICP/MS – Inductively Coupled Plasma Mass Spectroscopy	TPY – Tons Per Year
MET – Meteorology	TSP – Total Suspended Particulate
MOA – Memorandum of Agreement	UV – Ultraviolet
MSA – Metropolitan Statistical Area	VOC – Volatile Organic Compound
mSA – Micropolitan Statistical Area	WGS84 – World Geodetic System of 1984 revised in 2004
µg/m <sup>3</sup> – Micrograms per cubic meter	
NAAQS – National Ambient Air Quality Standards	
NATTS – National Air Toxics Trends Site	
NADP-MDN – National Atmospheric Deposition Program Mercury Deposition Network	
NCore – National Core Monitoring Network	
NO – Nitric oxide	
NO <sub>2</sub> – Nitrogen Dioxide	

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## **Introduction**

The 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 the DHEC's Air Program and to comply with federal requirements. In 2017, the network will be comprised of 94 monitors and samplers at 30 sites.

In October, 2006, the 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.

This plan covers the eighteen month period from July 1, 2016 through December 31, 2017. 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 2017 with the exception of some Ozone monitors which may begin operation at the start of the South Carolina Ozone Monitoring Season (March 1-October 31). The annual Network Description and Ambient Air Monitoring Plan, as required and described in 40 CFR Part 58.10, and Periodic Network Assessment, must contain the following information for each monitoring station in the network:

- The Air Quality System (AQS) site identification number (ID) 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 Particulate Matter < 2.5 microns (PM<sub>2.5</sub>) National Ambient Air Quality Standard (NAAQS), and
- The MSA, Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA), or other area represented by the monitor

This document constitutes the 2017 South Carolina Air Monitoring Network Plan. The site pages are organized into two main parts:

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

The Monitoring Network is reviewed annually. Planned changes are described in this 2017 Monitoring Plan and provided for public review and comment prior to submission to the EPA Region 4 Administrator.

## **Public Participation Opportunities**

In response to public interest and the potential impact of the monitoring regulation changes, the DHEC's Air Program solicits involvement from both internal (to the DHEC) and external workgroups.

Individuals who had expressed interest in the development of the ambient air monitoring network were notified of the availability of the 2017 Monitoring Plan and were invited to provide comments. This group consists of representatives from the business, environmental, and health communities, and concerned citizens.

Other opportunities for public involvement include:

- A webpage maintained for publication and access to current and draft monitoring plan reference documents and announcements<sup>1</sup>.
- Availability of the proposed 2017 Monitoring Plan for public review and comment ran from May 11, 2016 through June 9, 2016. All recorded participants who registered in the outreach and discussion activities were notified when the 2017 Monitoring Plan became available for review. All public comments received will be summarized and addressed in Appendix A before submitting the final plan to the EPA.

The DHEC is committed to continuing the opportunities for input and participation in the development of the annual revisions of the Network Description and Ambient Air Network Monitoring Plan and the periodic assessments of the air quality surveillance system.

### **Network Operation**

The primary responsibility for the operation of the Monitoring Network is assigned to the Division of Air Quality Analysis (DAQA) in the Bureau of Environmental Health 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 to the national AQS database for storage and public access.

Criteria pollutant monitoring for the purpose of comparison to the NAAQS is performed using the 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. All monitors and samplers are calibrated at least once a year. Calibration is also performed whenever the monitor/sampler fails a bi-weekly QC/precision check or multi-point audit, when maintenance is performed that may affect the monitor response, or if the monitor is located away from the building in which it was calibrated. If possible, a QC/precision check or flow check should precede any maintenance that would affect monitor response.

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, SPM 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. Ozone monitors provide hourly data during Ozone Season (March 1-October 31).

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, the DHEC conducts additional visits of monitoring sites to document comparison with applicable siting criteria.

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<sup>1</sup><http://www.scdhec.gov/HomeAndEnvironment/Air/AmbientAir/>

It is the DHEC's intent that all criteria pollutant monitors and samplers be sited and operated in accordance with the requirements of 40 CFR Part 58. As required in 40 CFR Part 58 Appendix A, the Division of Air Quality Analysis (DAQA) in the Bureau of Environmental Health Services (Division) establishes, maintains, and operates the sites and instruments and performs the analysis of samples collected. Data generated by the network for comparison to the NAAQS is verified to be accurate and reported by the Division to the national AQS database for storage and public access. Regular calibration and audits are performed to verify that the instruments are operating correctly and data being collected is accurate. As required in 40 CFR Part 58 Appendix C, all criteria pollutant monitoring in the South Carolina Monitoring Network for the purpose of comparison to the NAAQS is performed using the EPA designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM). Also, all criteria pollutant monitoring in the South Carolina Monitoring Network meets the monitoring objectives, spatial scales, and design criteria as described in 40 CFR Part 58 Appendix D. Finally, in this document, each site page contains a statement addressing compliance to 40 CFR Part 58 Appendix E. If the site is not in compliance, a plan is presented to address the deficiency.

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. The EPA Region 4 office 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 the EPA to provide independent audits.

### **Station Description Content**

Specific siting information for each site and monitor is stored in the EPA's 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 information, including site descriptions. All ambient air monitoring data is stored in AQS, including non-NAAQS parameters, ambient air toxics, total suspended particulate (TSP), and supporting QA data.

Each network station description contained in this document includes a Site Description and Monitor Details. An explanation of the information in each station description is presented below.

*Site Description* – The site description includes specific information about each ambient air monitoring site. The site description header includes the following:

- 1) Site Name – The name given to the site.
- 2) CSA/MSA – Area where site is located as defined by the United States Census. (July, 2015).<sup>3</sup>
- 3) AQS Site ID – The unique site ID used in AQS in the form of 45-cc-ssss where:
  - a) 45 is the federal identification code for South Carolina
  - b) ccc is the county identification code, and
  - c) ssss is the site identification code within the county

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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, March, 2014.

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

- 4) Location – Typically, the street address of the site where available.
- 5) County – County in which the site is located.
- 6) Coordinates – Latitude (N), then Longitude (W) listed in decimal degrees using WGS84 projection.
- 7) Date Established – The date when each existing monitoring station was established is shown in the description. For new stations proposed in this Monitoring 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.
- 8) 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 new monitoring site has not yet been evaluated, it will be denoted with the word “PENDING”.

*Monitor Details* – Each station description has a table that lists the parameter(s) and the descriptive information associated with that particular parameter. An explanation of the information in the tables is presented below.

- 1) 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.
- 2) 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 approximately 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 to account for local sources, topography and differing land use.

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

- 3) Objective – The ambient air monitoring network is designed to meet three primary objectives:
  - a) 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.
  - b) 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.

- c) 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 scale most appropriate to meet the monitoring objective of the monitor. The relationship of appropriate scale to the six basic purposes as follows:

Monitoring Purpose	Siting Scale
Highest concentration	Micro, Middle, Neighborhood
Population exposure	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.

- 4) Designation – Monitor designations that may be found in the tables include the State and Local Air Monitoring Station (SLAMS), special purpose monitor (SPM), National Core Monitoring Network (NCore), non-regulatory, QA collocated, and National Atmospheric Deposition Program Mercury Deposition Network (NADP-MDN) monitoring. Definitions of these designations are:
- a) SLAMS – Monitors for which NAAQS 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.
  - b) SPM – Monitors which 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. The SPM may also monitor for air toxics, particulate, Mercury, criteria pollutants, precipitation, and meteorology. Supplemental speciation is a type of SPM monitor that operates according to CSN protocols, but is not contained in the STN Network. This monitoring data will be reported to AQS where possible. Siting and probe exposure will conform to all requirements for SLAMS monitors whenever possible.

- c) NCore – NCore is a national multi-pollutant network that utilizes advanced measurement systems for particles, pollutant gases, and meteorology. It provides data for long-term trends of criteria and non-criteria pollutants and supports air quality model evaluation, scientific studies, and ecosystem assessments. Most NCore monitors are SLAMS.
- d) Non-regulatory Monitor – A monitor that measures data on a pollutant that will not be used for regulatory purposes.
- e) Collocated QA Sampler – A particulate matter sampler that is paired with but operated independent of a similar sampler. It is used to indicate measurement accuracy.
- f) NADP-MDN – Monitors for the NADP-MDN provide data on the geographic distributions and trends of mercury in precipitation. These monitors are operated in the State of South Carolina in cooperation with the federal government, but are not included in the Site Tables.
- g) IMPROVE – The Interagency Monitoring of Protected Visual Environments (IMPROVE) network collects visibility related data. These monitors are operated in the State of South Carolina in cooperation with the federal government, but are not included in the Site Tables.

The SLAMS and SPM data may be used in the reporting of an area's 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 Ozone and PM<sub>2.5</sub> monitors is collected hourly and reported as AQI maps on the EPA's AIRNow website. A daily AQI is provided for the areas in and around Aiken, Charleston, Columbia, Florence/Darlington, Greenville-Spartanburg, Myrtle Beach, and York/Chester/Lancaster.

- 5) 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.
- 6) Analysis Methods – All sampling and analytical procedures used to determine ambient concentrations of criteria pollutants for comparison to the NAAQS will use either Federal Reference or Equivalent Methods (FRM or FEM). For the reactive gases, borosilicate glass or FEP Teflon are used in the sampling train. Where appropriate for specific monitoring objectives, well characterized non-equivalent methods may be used. The analysis method for the parameters most commonly measured and listed in the station descriptions are described below.
  - a) Particulate Matter less than 10 microns (PM<sub>10</sub>) – PM<sub>10</sub> samplers operated by the DHEC are designated as either FRM or FEM and are operated consistent with the requirements in 40 CFR Part 50 Appendix J and 40 CFR Part 58. Intermittent samplers collect a 24-hour sample no less than every sixth day on a filter. The filter is conditioned and weighed before and after the sample run. The weight of material collected on the filter and the volume of air sampled is used to calculate the average concentration, expressed as micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) for the sample period. The filters are equilibrated before each weighing for a minimum of 24 hours at a

mean temperature between 15 and -30°C and a mean relative humidity between 25 and 45 percent.

Continuous PM<sub>10</sub> 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. The flow rate, critical to precise particle size separation, is monitored and controlled constantly. Particulate in the sample stream is collected on a Teflon-coated glass fiber filter. The mass collected on the filter is also continuously monitored. 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 calculated by dividing the mass gained by the flow through the filter for the period. The concentration measurements are averaged over 1-hour and 24-hour periods. Data is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system. Only 24-hour daily averages are used for comparison to the ambient standards.

- b) Particulate Matter less than 2.5 microns (PM<sub>2.5</sub>) – All PM<sub>2.5</sub> samplers operated by the DHEC for comparison to the NAAQS are designated FRM samplers. Manual samplers are operated consistent with the requirements 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 at local ambient temperature and pressure. The flow rate must be maintained within ±5 percent during throughout the sample period. Samples filters are collected within 96 hours of the end of the sample run and are kept cooled during transit to minimize potential sample loss.

The PTFE filters are equilibrated before each weighing for a minimum of 24 hours at a mean temperature between 20 and 23°C and 30 to 40 percent mean relative humidity. Filters are weighed before and after the sample period. Filters are used within thirty days of initial weighing. Collected samples are typically weighed within two weeks of sampling. If the samples are maintained below 4°C after collection, they can be held for up to thirty days from the end of the sample period. The mass collected and the volume sampled are used to calculate the concentration, expressed in µg/m<sup>3</sup>.

Unless designated FEM, continuous PM<sub>2.5</sub> monitors do not provide concentration data suitable for comparison to the NAAQS. Non-FEM continuous monitors that provide reasonably comparable measurements may be used to provide data for calculation of an area Air Quality Index (AQI). Continuous PM<sub>2.5</sub> samplers provide 24-hour concentration measurements every day. During sampling, ambient air passes through an inlet system designed to pass only particles smaller than 2.5 microns in diameter. The flow rate, critical to precise particle size separation, is monitored and controlled constantly. Particulate in the sample stream is collected on a Teflon-coated glass fiber filter. The mass collected on the filter is also continuously monitored. 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 calculated by dividing the mass gained by the flow through the filter for the period. The concentration measurements are averaged over 1-hour and 24-hour periods. Data is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system. Only 24-hour daily averages from FEM monitors are used for comparison to the ambient standards.

- c) PM<sub>2.5</sub> Speciation sampling and analysis – In addition to operating PM<sub>2.5</sub> samplers that provide measurement of only the PM<sub>2.5</sub> mass concentration, the DHEC also operates PM<sub>2.5</sub> speciation samplers to collect samples for analysis to determine the chemical makeup of the particulate. Speciation sample collections are part of the national Chemical Speciation Network. Samples are collected on a set of two cartridges on the Met-One SASS sampler for nitrates, sulfates, and

metals and a on a single cartridge in the URG 3000N sampler for carbon containing material. The samples are collected 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 cold to the EPA contract laboratory for analysis. At the laboratory, the samples are analyzed using thermal optical analysis (for carbon), ion chromatography (IC) for nitrates and sulfates and x-ray fluorescence for metals to determine the presence and concentration of specific compounds. Sample results are available the EPA website.

- d) Sulfur Dioxide (SO<sub>2</sub>) – Instruments used to continuously monitor SO<sub>2</sub> concentrations in the atmosphere use the Ultraviolet (UV) Fluorescence Federal Reference 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 and audits of their performance are done using the EPA protocol gas mixtures containing a certified concentration of SO<sub>2</sub> in nitrogen. This gas is diluted to provide known concentrations of SO<sub>2</sub>. These known concentrations are supplied to the instrument, which is adjusted so 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.

- e) Carbon Monoxide (CO) – Continuous monitoring for CO is performed using of the FRM non-dispersive infrared correlation method. Data is stored locally on redundant data acquisition systems and recovered hourly by the DAQA automated central data acquisition system.

Calibration of the instrument and audits of its performance are done using the EPA Protocol gas mixtures containing a certified concentration of CO in air. The gas is diluted to provide known concentrations of CO. Known concentrations are supplied to the instrument, which is adjusted so the instrument output corresponds with the specific concentrations. Calibration curves are prepared for each instrument which are used to calculate concentration measurements for storage in the data acquisition system.

- f) Ozone – Ozone is monitored using the FEM UV photometry method. The continuous data output from the instrument is stored locally on redundant data acquisition systems and recovered hourly by the automated central data acquisition system.

Monitors are routinely calibrated and performance audited using portable ozone transfer standards. Calibration curves are prepared for each instrument which are used to calculate the concentration measurements stored in the data acquisition system.

- g) Nitrogen Dioxide (NO<sub>2</sub>) – The FRM UV chemiluminescence method is used for measurement of NO<sub>2</sub> 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 and audits of their performance is done using the EPA protocol gas mixtures containing a known concentration of nitric oxide (NO) and Nitrogen Oxides (NO<sub>x</sub>) in nitrogen. The gas is diluted to present several known concentrations of the oxides. A converter is used to convert NO<sub>x</sub> to NO for reaction with internally generated ozone and measurement of the light produced by the reaction of NO and Ozone. Known concentrations are supplied to the instrument, which is adjusted so the instrument output corresponds with the supplied concentrations. Calibration curves are prepared for each instrument which are then used to provide concentration measurements for storage in the data acquisition system.

- h) Lead – Lead concentrations are determined by the analysis of TSP collected using high volume particulate samplers as described in 40 CFR Part 50 Appendix G. Particulate samples are acid extracted from a portion of the filter to dissolve metals from the collected materials. The lead content is determined using Flameless (Graphite Furnace) Atomic Absorption Spectrometry or may be analyzed by the EPA national contract laboratory using Inductively Coupled Plasma Mass Spectroscopy (ICP/MS).
- i) Meteorology – Meteorology consists of wind direction, wind speed, precipitation, temperature and pressure. Collection and/or analysis methods are discussed below.
- Wind Direction and Speed – Wind data is collected using systems that incorporate high precision ‘Air Quality’ systems. The systems use separate or combined wind vanes and anemometers mounted 10 meters above ground. The systems provide supporting information about the local meteorology.
  - Precipitation – Precipitation is measured by tipping bucket gauges that provide a signal indicating the occurrence, rate, and amount of precipitation. The gauges are not heated, so they may not accurately provide the time and rate for frozen precipitation events. The monitors are checked periodically for operation and accuracy using a known volume of water and compared with actual volumes of collected precipitation where there are collocated samplers.
  - Ambient Temperature and Pressure – Ambient temperature is available from sensors that are part of the sampling systems for the FRM PM<sub>2.5</sub> samplers. Ambient temperature measurement is necessary for the systems to maintain the required flow rate required to reproducibly separate the desired particulate size fractions as conditions change. Although the primary use of the measurement is for sampler flow control, the sensors are accurate and regularly audited. Temperature and pressure sensors are compared to reference systems at least once per month.
- j) Volatile Organic Compounds – Volatile organic compounds (VOCs) are collected into passivated or silica lined stainless steel canisters. The canisters are cleaned, tested, and evacuated at the laboratory prior to installation at the sampling site. At the sampling location, the canisters are filled and pressurized with ambient air throughout the sampling period (typically 24 hours). Measured portions of the captured air are concentrated at low temperature and analyzed using gas chromatography with a mass spectrometer detector (GC/MS) to identify and quantitate target compounds. The collection and analysis method is based on the EPA Method TO-15.
- k) Semi-volatile Organic Compounds – Semi-volatile organic compounds (SVOCs) are collected using polyurethane foam (PUF) and a solid adsorbant to trap the compounds from air pulled through the material by a high volume sampler. The SVOCs are extracted from the collection cartridge using a solvent, and the rinses are concentrated for analysis. Measured portions of the extract are analyzed using GC/MS to identify and quantitate the collected compounds. The collection and analysis method is based on the EPA Method TO-13.
- l) Carbonyls – Carbonyls (including aldehydes and ketones) are extracted from ambient air by reaction with a compound that stabilizes them enough to capture and hold. The reaction of the target compounds with Dinitrophenylhydrazine (DNPH) removes them from the sampled air and concentrates them in the sample cartridge. Solvent extraction of the DNPH derivatives from the cartridge is followed by analysis using High Pressure Liquid Chromatograph to identify and quantitate the collected Carbonyls. The collection and analysis method is based on the EPA Method TO-11.

- m) Metals – Metals in particulate are collected on filters using the TSP or PM<sub>10</sub> High Volume samplers. Metals are extracted from a portion of the filter using sonication in an acid solution. Detection, identification and quantitation of the target metals use Graphite Furnace AA or inductively coupled plasma with a mass spectrometer (ICP/MS). The collection and analysis method is based on the EPA Method IO-3.
- n) Precipitation Chemistry – A portion of the precipitation sample collected each week is analyzed for pH and conductivity. To determine concentrations of dissolved material that contributes to acid rain, the collected material is analyzed for cations and anions using ion chromatography (IC).
- o) Sulfate – Sulfate in particulate can be measured in both samples and continuous monitoring. The continuous method thermally reduces Sulfate in ambient particulate to SO<sub>2</sub> for detection in a dedicated SO<sub>2</sub> monitor. Particulate samples collected on the species-specific denuders used in the Chemical Speciation Networks (CSN) are analyzed for anions (SO<sub>4</sub><sup>-</sup> and NO<sub>3</sub><sup>-</sup>) using ion chromatography for separation and quantification of the species.
- p) Light Absorbing Carbon (Black Carbon) – Light absorbing carbon is measured continuously by the use of an aethalometer. The transmittance of infrared light through a filter is measured as particulate is captured to determine the amount of Black Carbon collected.
- q) Mercury – Mercury is analyzed in ambient air and in weekly precipitation samples. Ambient concentrations are monitored using by collecting the Mercury vapor on an adsorbent followed by thermal desorption and analysis using cold vapor atomic fluorescence spectroscopy.

Mercury in precipitation is sampled and analyzed as part of the National Atmospheric Deposition Program, Mercury Deposition Network (NADP/MDN). Details of the sampling and analysis are available on the NADP website at <http://nadp.sws.uiuc.edu/NADP/>.

Sampling frequency indicates how often a measurement is made. Sampling typically involves collection of a sample over a period (typically 24 hours, midnight to midnight EST) and the 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), every twelfth day (1:12) or weekly, depending on the data quality objectives of the project. Results are reported as averages for the sample period. The EPA publishes the 1:3 and 1:6 day sampling schedules used by the South Carolina Ambient Air Monitoring Network and nationwide.<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. Five minute averages are also reported for SO<sub>2</sub> concentrations. One minute averages are collected from many of the continuously monitored parameters for use in verification and validation of the reported monitoring data.

### ***Changes for 2017***

Any planned changes in parameters monitored, the configuration, or operations at the site planned for 2017 are described herein and summarized in the Summary of 2017 Network Changes. Unless otherwise indicated, changes at a site including the beginning of new monitoring activity will be effective January 1, 2017. Ozone monitoring for 2017 at new or special project sites may start at the beginning of the Ozone monitoring season (March 1-October 31).

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

*Network Summary*

Network Summary: Calendar Year 2017 Air Monitoring Stations																			
Region	Sites	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	TSP/Lead	Ozone	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, GA-SC 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	0	1	0	2	2	2	0	0	1	0	0	0	0	0	0	1
Charlotte-Concord-Gastonia, NC-SC MSA	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Columbia MSA	6	3	2	1	2	1	3	3	3	1	0	1	2	3	0	1	2	2	2
Florence MSA	5	1	1	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0
Greenville-Anderson-Mauldin MSA	4	3	1	0	1	0	3	1	1	0	0	1	0	0	0	0	0	0	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	1	0	0	0	0	0	1	0	0	0	0	0	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
Remainder of State	4	1	3	1	3	0	3	1	0	0	0	1	1	1	1	0	0	0	1
<b>TOTALS</b>	<b>29</b>	<b>13</b>	<b>11</b>	<b>2</b>	<b>7</b>	<b>5</b>	<b>17</b>	<b>8</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>7</b>

This summary table presents the elements of the 2017 Monitoring Plan after implementation of changes described in this plan.

\*MET data includes wind speed and wind direction.

**2015 Criteria Pollutant Design Values**

This section presents the 2015 design values for the South Carolina criteria pollutant monitoring network.

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> ) (2015-NOT 3 yrs DV)
001-0001	Abbeville	Due West	0.056									
003-0003	Aiken	Jackson Middle School	0.060									
007-0005	Anderson	Big Creek	0.060									
015-0002	Berkeley	Bushy Park	0.057									
019-0003	Charleston	Jenkins Avenue				*0	11	35	6			
019-0046	Charleston	Cape Romain	0.057				*4	*9	*2			
019-0048	Charleston	FAA		7.9	17							
019-0049	Charleston	Charleston Public Works		7.2	15							
021-0002	Cherokee	Cowpens	0.063									
025-0001	Chesterfield	Chesterfield	0.058	7.9	16	*0						
029-0002	Colleton	Ashton	0.054									
031-0003	Darlington	Pee Dee	0.061									
037-0001	Edgefield	Trenton	0.054	8.4	17							
041-0003	Florence	Williams		8.7	17							
041-8001	Florence	JCI Railroad										*
041-8002	Florence	JCI Entrance										*
041-8003	Florence	JCI River										*
043-0006	Georgetown	Georgetown CMS										
043-0011	Georgetown	Howard High #3				*0						
045-0015	Greenville	Greenville ESC		8.9	20	*0	4	*	*			
045-0016	Greenville	Hillcrest	0.064	8.8	19							

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> ) (2015-NOT 3 yrs DV)
045-1003	Greenville	Famoda Farms	0.062									
063-0008	Lexington	Irmo		9.2	19		38					
063-0009	Lexington	Cayce CMS										
063-0010	Lexington	Cayce City Hall				0						
073-0001	Oconee	Long Creek	0.059	*6.0	*16		3					
077-0002	Pickens	Clemson	0.062									
077-0003	Pickens	Wolf Creek	0.059									
079-0007	Richland	Parklane	0.055	8.7	18	*	10			1	1	
079-0019	Richland	Bates House		9.0	18	*0						
079-0021	Richland	Congaree Bluff	0.055				*18					
079-1001	Richland	Sandhill	0.062									
083-0009	Spartanburg	North Spartanburg	*0.065									
083-0011	Spartanburg	T.K. Gregg		8.8	19							
091-0006	York	York CMS	0.059				*4					

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

### ***Required Monitoring***

The EPA regulation 40 CFR Part 58 Appendix D 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, these minimum requirements are based on the MSA population and current ambient air monitoring design values. The following sections discuss the minimum monitoring criteria for each of the criteria pollutants (Ozone, Particulate Matter (PM<sub>2.5</sub> and PM<sub>10</sub>), Lead, SO<sub>2</sub>, NO<sub>2</sub> and CO), the CBSAs, and the MSA population. The final section shows the current South Carolina minimum monitoring requirements.

*Minimum Monitoring for Ozone* – The Ozone minimum monitoring criteria has two requirements:

- 1) Required Ozone SLAMS sites – A minimum number of required Ozone SLAMS sites for each CBSA that is determined by CBSA population and the peak Ozone concentrations.
- 2) NCore Requirement – Each NCore site must include an Ozone monitor.

*Minimum Monitoring for PM<sub>2.5</sub>* – The PM<sub>2.5</sub> minimum monitoring criteria has six requirements:

- 1) Required PM<sub>2.5</sub> SLAMS sites – A minimum number of required PM<sub>2.5</sub> SLAMS sites for each CBSA.
- 2) Continuous Requirement – A continuous PM<sub>2.5</sub> monitoring requirement which is equal to at least one-half (round up) the minimum required PM<sub>2.5</sub> SLAMS sites. Also, at least one required continuous analyzer in each CBSA must be collocated with one of the required Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitors, unless at least one of the required FRM/FEM monitors is itself a continuous FEM monitor, in which case, no collocation requirement applies.
- 3) Regional Background and Transport – At least one PM<sub>2.5</sub> site must be established in each state to monitor for regional background and at least one PM<sub>2.5</sub> site to monitor regional transport.
- 4) NCore Requirement – Each state is required to operate at least one NCore site which measures PM<sub>2.5</sub> using both continuous and integrated/filter-based samplers.
- 5) Near-road PM<sub>2.5</sub> Monitoring – The 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 1,000,000 or more by January 1, 2017. The Charlotte-Concord-Gastonia, NC-SC MSA is the only MSA in South Carolina that meets the population requirement for a collocated PM<sub>2.5</sub> monitor. The near-road monitoring requirement for the Charlotte-Concord-Gastonia, NC-SC MSA will be fulfilled by the Mecklenburg County Air Quality Commission.
- 6) Speciation Monitoring – Chemical speciation monitoring and analyses at sites designated and funded as part of the PM<sub>2.5</sub> Speciation Trends Network (STN).

*Minimum Monitoring for PM<sub>10</sub>* – The PM<sub>10</sub> minimum monitoring criteria has one requirement that is based on the CBSA population, the number of exceedances of the NAAQS, and the percentage of PM<sub>10</sub> concentrations over or under the NAAQS. Unlike other criteria pollutants, the minimum monitoring requirements for PM<sub>10</sub> is given as a range of required monitoring sites for a CBSA.

*Minimum Monitoring for Lead* – The Lead minimum monitoring criteria has two requirements:

- 1) Facility Requirement – Any facility with annual Lead emissions exceeding 0.5 tpy will be required to have a Lead sampler.
- 2) NCore Requirement – NCore sites in CBSA with a population of 500,000 (as determined in the latest Census) or greater shall also measure Lead either as Pb-TSP or Pb-PM10.

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

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, the 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>6</sup> with several petitioners, the Florence Recycling Center supports source-oriented ambient Lead monitoring being conducted by the 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 Monitoring Plan under the site name “Johnson Controls.”

*Minimum Monitoring for SO<sub>2</sub>* – The SO<sub>2</sub> minimum monitoring criteria has three requirements:

- 1) Requirement for Monitoring by the Population Weighted Emissions Index – The population weighted emissions index (PWEI) is determined using the most current population of each CBSA and the most recent level of SO<sub>2</sub> emissions for each county within the CBSA. The emissions data is available from the National Emissions Inventory. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO<sub>2</sub> monitors are required. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO<sub>2</sub> monitors are required. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO<sub>2</sub> monitor is required.

The following table presents each CBSA’s 2014 population, 2011 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	2014 CBSA Population	2011 CBSA SO <sub>2</sub> Emissions (Tons)	PWEI	SO <sub>2</sub> Minimum Monitors Required
*Charlotte-Concord-Gastonia, NC-SC MSA	2,380,314	19735	46975.78	1
Greenville-Anderson-Mauldin MSA	862,463	7199	6209.05	1
Columbia MSA	800,495	17192	13762.39	1
Charleston-North Charleston MSA	727,689	26443	19242.15	1
*Augusta-Richmond County, GA-SC MSA	583,632	9567	5583.71	1
*Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	417,668	8914	3723.24	0
Spartanburg MSA	321,418	708	227.57	0
Florence MSA	207,030	8400	1739.08	0
Hilton Head Island-Bluffton-Beaufort MSA	203,022	586	119.06	0
Sumter MSA	107,919	183	19.73	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>				

<sup>6</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)

- 2) Regional Administrator Required Monitoring – The Regional Administrator may require additional SO<sub>2</sub> monitoring sites above the minimum number of monitors required by the PWEI in areas that have the potential to have high SO<sub>2</sub> concentrations, in areas impacted by sources which are not conducive to modeling, or in locations with susceptible and vulnerable populations that are not otherwise being monitored. South Carolina does not have any SO<sub>2</sub> Regional Administrator Required Monitoring.
- 3) NCore Requirement – Each NCore site must include a SO<sub>2</sub> monitor.

*Minimum Monitoring for NO<sub>2</sub>* – The NO<sub>2</sub> minimum monitoring criteria has four requirements:

- 1) Near-road NO<sub>2</sub> Monitors – Each state must have one microscale near-road NO<sub>2</sub> monitoring site in each CBSA with a population of 500,000 or more persons. An additional near-road NO<sub>2</sub> monitoring site is required for any CBSA with a population of 2,500,000 or more, or in any CBSA with a population of 500,000 or more that has one or more roadway segments with 250,000 or greater Annual Average Daily Traffic (AADT) counts.

On March 7, 2013, the EPA established staggered deadlines (phased deployment) for the establishment and operation of the required near-road NO<sub>2</sub> monitors. The phased deployment deadlines are as follows:

- a) One required near-road NO<sub>2</sub> monitor shall be operational in any CBSA with 1,000,000 or more by January 1, 2014 (phase 1).
- b) If a CBSA is required to have two near-road NO<sub>2</sub> monitors, the second monitor shall be operational by January 1, 2015 (phase 2).
- c) All remaining CBSAs having at least 500,000 or more, but less than 1,000,000 shall have their single near - road NO<sub>2</sub> monitor 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 near-road monitoring requirement for the Charlotte-Concord-Gastonia, NC-SA MSA has been fulfilled by the Mecklenburg County Air Quality Commission.

Adequate funding is necessary to ensure operation of this network. To date, the EPA has not been able to guarantee that funding will necessarily be available for the third phase of the deployment. Also, EPA has indicated that phase 3 may be revoked in a future rulemaking, but has not yet proposed regulations to do so. The DHEC will not be able to establish near-road monitoring without adequate funding from the EPA.

- 2) Requirements for Area-wide NO<sub>2</sub> Monitoring – Each state must have one monitoring site in each CBSA with a population of 1,000,000 or more persons which will monitor a location of expected highest NO<sub>2</sub> concentrations representing the neighborhood or larger spatial scales.
- 3) Regional Administrator Required Monitoring – The Regional Administrators, in collaboration with states, require a minimum of forty additional NO<sub>2</sub> monitoring sites above the minimum monitoring requirements (nationwide) in any area, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations. The Greenville ESC site is a Regional Administrator Required Monitoring site.
- 4) NCore Requirement (NO<sub>v</sub> Monitoring) – Each NCore site must include a NO/NO<sub>v</sub> monitor that will collect data to be used to produce conservative estimates for NO<sub>2</sub> and further Ozone research.

*Minimum Monitoring for CO* – The CO minimum monitoring criteria has two requirements:

- 1) Near-road CO Monitors – Each state with CBSAs having a population of 1,000,000 or more people must have one CO monitor collocated with one required near-road NO<sub>2</sub> monitor to be operational by January 1, 2017. The Charlotte-Concord-Gastonia, NC-SC MSA is the only CBSA in South Carolina that meets the population requirement for a collocated CO monitor.
- 2) NCore Requirement – Each NCore site in a CBSA with a population of 500,000 or more must include a CO monitor. The Parklane (45-079-0007) monitoring site in the Columbia, SC MSA is the NCore site for South Carolina and supports one CO monitor. The Garinger (37-119-0041) monitoring site in Mecklenburg County is also an NCore site and supports a CO monitor.

*Minimum Monitoring for the Photochemical Assessment Monitoring Stations (PAMS)* – South Carolina does not meet and is not subject to the PAMS requirement.

*The CBSAs and the Minimum Monitoring Requirements* – The term CBSA is a collective term for the defined MSAs and Micropolitan Statistical Areas (mSA). A MSA area contains a core urban area of 50,000 or more population, and a mSA 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>7</sup>.

A MSA or mSA geographic composition, or list of geographic components at a particular point in time, is referred to as its "delineation". The MSA or mSA are delineated by the U.S. Office of Management and Budget (OMB) and are the result of the application of published standards based on 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 July of 2015.<sup>8,9</sup>

While the DHEC understands the need for establishing minimum monitoring requirements, the 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 are an example of the reasons for the incorporation of flexibility in the regulations and illustrate the necessity that the EPA uses 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 (MOA) with the States of Georgia<sup>10</sup>, North Carolina, and Mecklenburg County, North Carolina<sup>11</sup> which specifies the responsibilities of each party to develop a monitoring network that meets the appropriate monitoring objectives for the MSA.

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

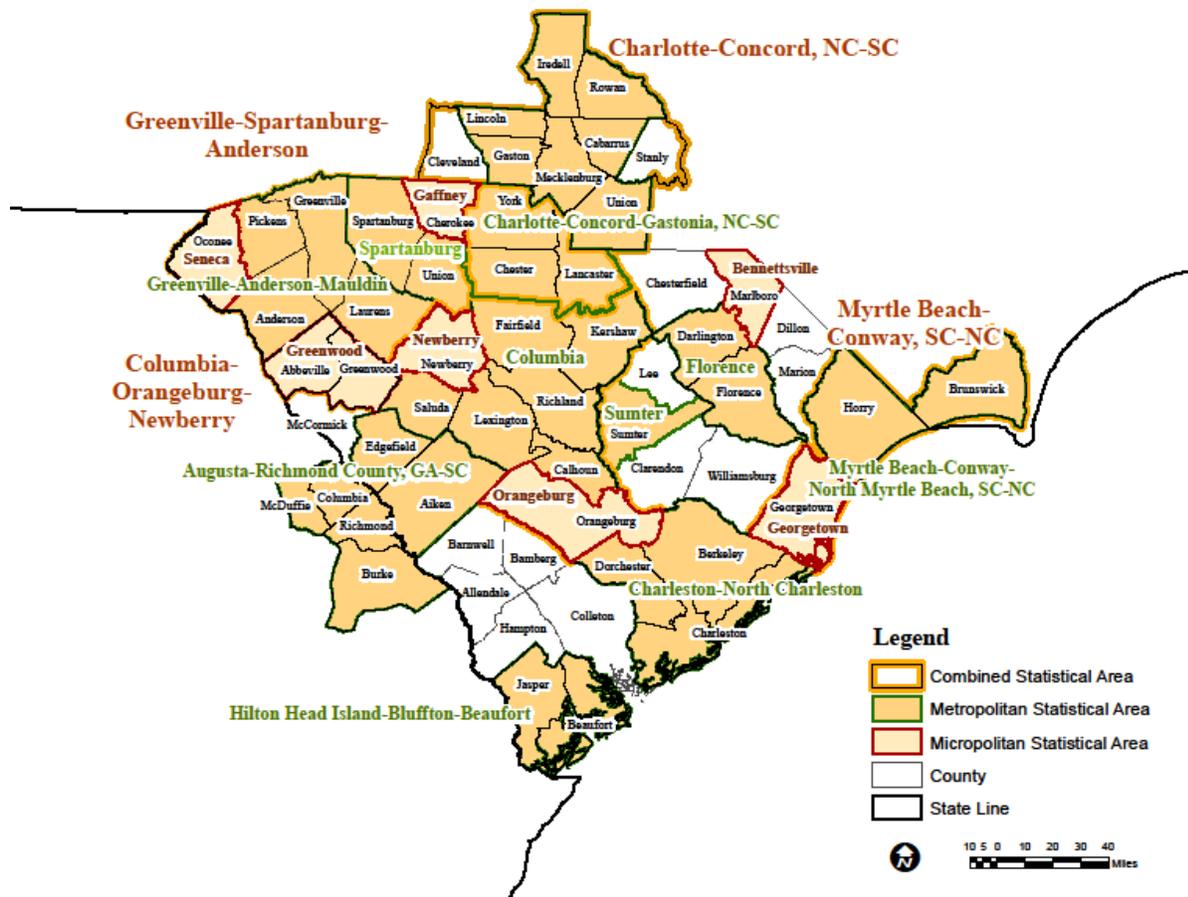
<sup>8</sup> <http://www.census.gov/population/metro/data/>

<sup>9</sup> OMB Bulletin No. 15-01-"Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas", July 15, 2015.

<sup>10</sup> The Memorandum of Agreement on Air Quality Monitoring for Criteria Pollutants for the Augusta-Richmond County Metropolitan Statistical Area (MSA) was signed on October 9, 2007 by the South Carolina DHEC Bureau of Air Quality and the Georgia Environmental Protection Division-Air Protection Branch.

<sup>11</sup> The Memorandum of Agreement on Air Quality Monitoring for Criteria Pollutants for the Charlotte-Gastonia-Concord Metropolitan Statistical Area (MSA) was signed on January 12, 2006 by the South Carolina DHEC Bureau

The map below presents South Carolina's CBSAs based on the definitions published in July, 2015.



*Population and the Minimum Monitoring Requirements* – The minimum monitoring criteria only applies to MSAs. The table below presents the latest (2014)\* population estimates for each MSA in South Carolina and the total population of MSAs shared with North Carolina and Georgia.

MSA	2014 Population
Charlotte-Concord-Gastonia, NC-SC MSA	2,380,314
Greenville-Anderson-Mauldin MSA	862,463
Columbia MSA	800,495
Charleston-North Charleston MSA	727,689
Augusta-Richmond County, GA-SC MSA	583,632
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	417,668
Spartanburg MSA	321,418
Florence MSA	207,030
Hilton Head Island-Bluffton-Beaufort MSA	203,022

of Air Quality, the North Carolina Department of Environmental and Natural Resources-Division of Air Quality and the Mecklenburg County, North Carolina Land Use and Environmental Service Agency-Air Quality.

MSA	2014 Population
Sumter MSA	107,919
*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	

*South Carolina Minimum Monitoring Requirements* – Based on the \*latest available United States Census population estimates and the 2015 ambient air quality design values (page 12), the minimum monitoring requirements for each MSA are:

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
**Augusta-Richmond County, GA-SC MSA	2	1	1	1-2	0	1	1	0
Charleston-North Charleston, MSA	1	1	1	1-2	0	1	1	0
**Charlotte-Concord-Gastonia, NC-SC MSA	2	2	1	2-4	0	1	2	1
Columbia MSA (NCore)	2	1	1	1-2	1	1	1	1
Florence MSA	1	0	0	0	0	0	0	0
Greenville-Anderson-Mauldin MSA	2	1	1	1-2	0	1	2	0
Hilton Head Island-Bluffton-Beaufort MSA	0	0	0	0	0	0	0	0
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	1	0	0	0-1	0	0	0	0
Spartanburg MSA	1	0	0	0-1	0	0	0	0
Sumter 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.								

*Summary of 2017 Network Changes*

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

No changes planned for 2017.

**Charleston-North Charleston MSA**

No changes planned for 2017.

**Charlotte-Concord-Gastonia, NC-SC MSA**

York County (45-091-0007) - This new monitor will be established to replace the York CMS (45-091-0006) site.

**Columbia MSA**

Parklane (45-079-0007) - PM<sub>2.5</sub> sampling was added to fulfill 40 CFR Part 58 Appendix A collocation requirement.

Congaree Bluff (45-079-0021) - Scale for Ozone and Sulfur Dioxide was changed from Urban to Neighborhood to meet Site Waiver commitments.

**Florence MSA**

No changes planned for 2017.

**Greenville-Anderson-Mauldin MSA**

Clemson CMS (45-077-0002) - Site will be terminated at the conclusion of the 2016 Ozone season.

**Hilton Head Island-Bluffton-Beaufort MSA**

No changes planned for 2017.

**Myrtle Beach-Conway-North Myrtle Beach SC-NC MSA**

Coastal Carolina (45-051-0008) - An Ozone monitor will be established and become operational during the summer of 2016.

**Spartanburg MSA**

No changes planned for 2017.

**Sumter MSA**

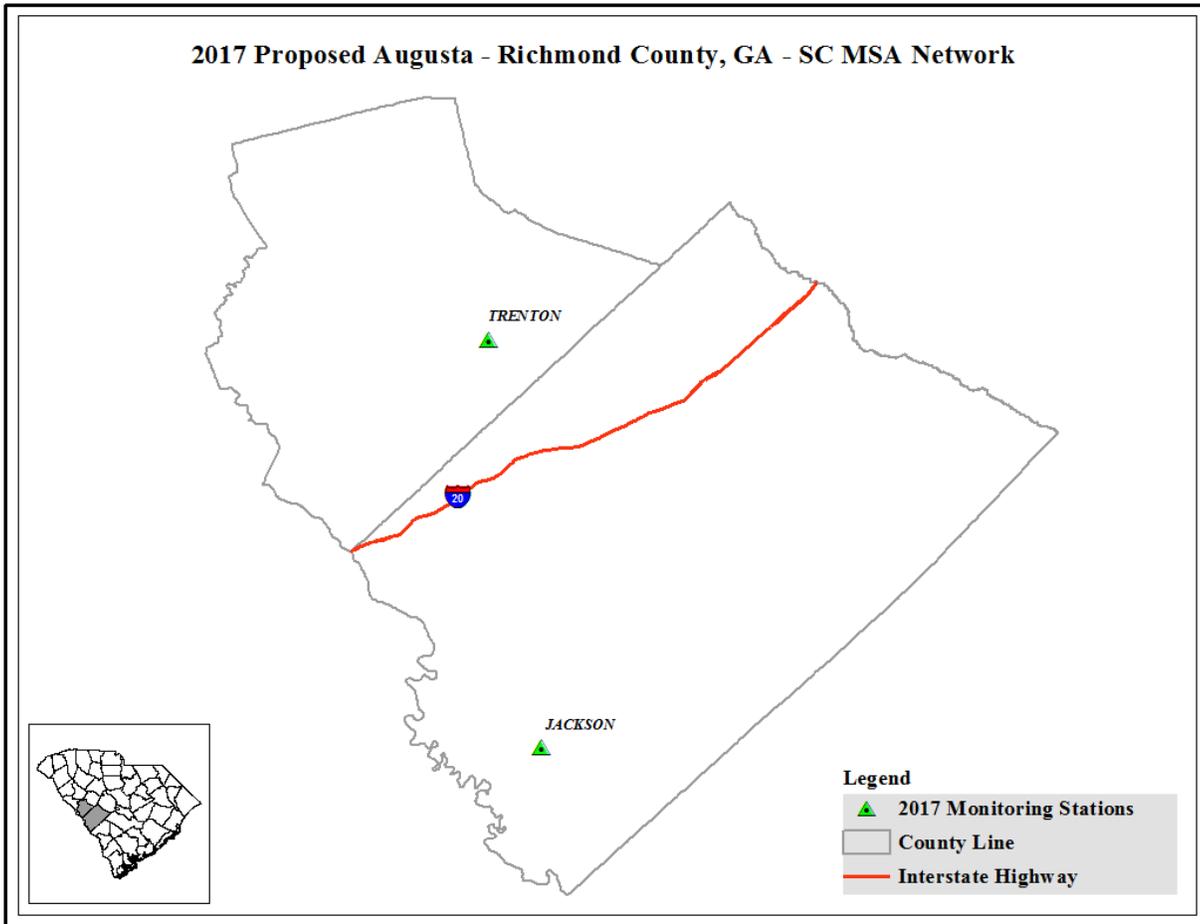
No changes planned for 2017.

**Remainder of State**

Due West (45-001-0001) - Site will be terminated at the conclusion of the 2016 Ozone season.

## Site Descriptions

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



### Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOC's	Mercury	Precip. Chem.	Precip.	MET
45-003-0003	Jackson Middle School						●												
45-037-0001	Trenton	○	○				●												
	<b>TOTAL</b>	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:** +33.34219, -81.78872

**Date Established:** October 24, 1985

**Site Evaluation:** May 20, 2016



The Jackson Middle School site is located in southwestern Aiken County, within the town limits of Jackson at the Jackson Middle School. Jackson is located in a suburban setting to monitor concentrations upwind of the Augusta urbanized area. The Jackson site monitors for Ozone. The sample inlet is 153 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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:** +33.73993, -81.85362

**Date Established:** March 28, 1980

**Site Evaluation:** May 20, 2016



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 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

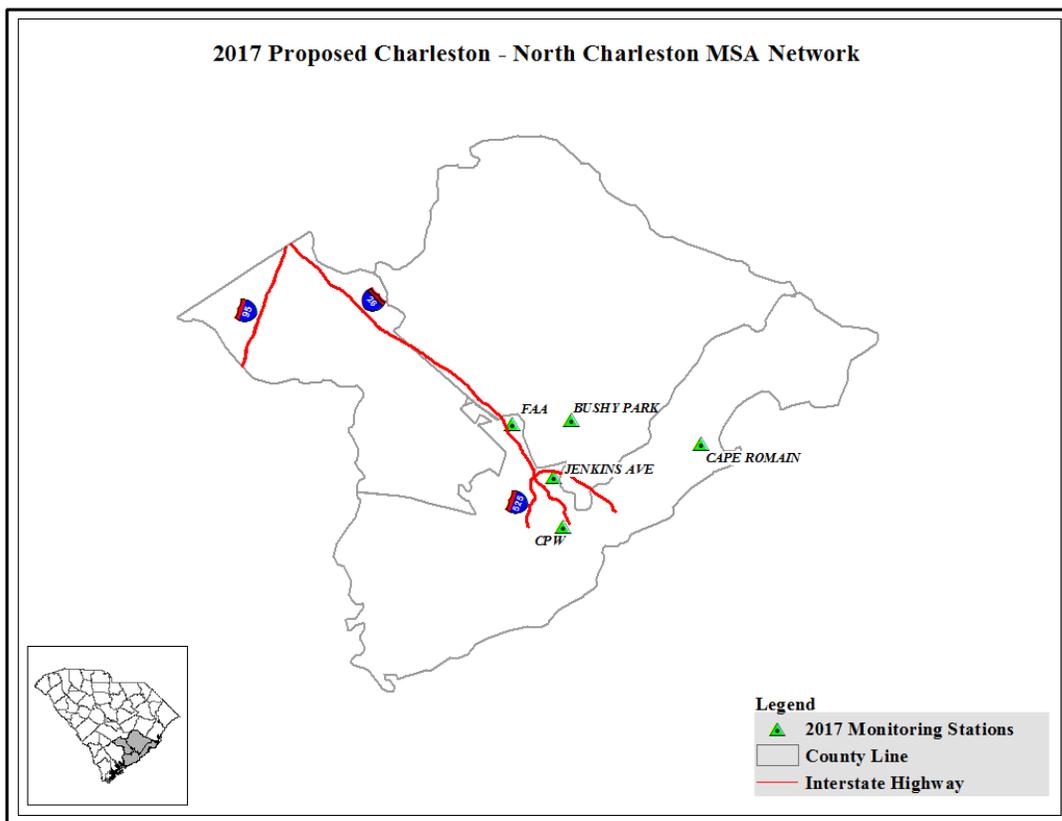
Changes for 2017:

There are no changes planned for 2017.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Urban	Extreme Downwind	SPM	4.5	FRM Gravimetric	1:3
Continuous PM <sub>2.5</sub>	Urban	Extreme Downwind	SPM	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

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	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	0	1	0	2	2	2	0	0	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:** +32.98724, -79.93671

**Date Established:** June 20, 1978

**Site Evaluation:** March 23, 2016



The Bushy Park Pump Station site is located in southeastern Berkeley County downwind from the Charleston urban area. This site monitors for Ozone, and the monitoring objective is maximum Ozone concentration. The sample inlets are 11 meters from the nearest road.

This site does not meet 40 CFR Part 58 Appendix E site obstruction requirements due to tree encroachment from the North, South, and East. It is not feasible to cut or trim the trees. Currently, a suitable replacement site is being sought. Once an appropriate site has been located and established, the Bushy Park

Pump Station site will be terminated.

Changes for 2017:

Due to tree encroachment, this site will be terminated when a suitable replacement site is established.

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:** +32.88228, -79.97755

**Date Established:** February 14, 1969

**Site Evaluation:** March 23, 2016



The Jenkins Ave. Fire Station site is located in the city of North Charleston behind a fire station in an urban and central city setting. The Jenkins Ave. Fire Station site supports monitors for PM<sub>10</sub>, SO<sub>2</sub>, and NO<sub>2</sub>. The sample inlets are 9 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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	SLAMS	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:** +32.94101, -79.65719

**Date Established:** July 11, 1983

**Site Evaluation:** October 23, 2015



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 (Hwy) 17, parallels the coast, with some development along the section of highway that is closest to the Refuge.

The Cape Romain site has continuous monitors for SO<sub>2</sub>, NO<sub>2</sub>, Ozone, BC, PM<sub>2.5</sub>, and meteorological parameters. The sample inlets are 18 meters from the nearest road.

All of the monitoring conducted by the DHEC meets 40 CFR Part 58 Appendix E requirements.

The IMPROVE sampler does not meet distance from obstructions criteria. This has been raised to the IMPROVE program, and they are working to either trim the trees or relocate their samplers.

Changes for 2017:

There are no changes planned for 2017.

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	4.70	FDMS Gravimetric	Continuous
Ozone	Regional	General Background	SLAMS	4.51	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Regional	Source Oriented	SPM	4.51	FEM UV Fluorescence	Continuous
Nitrogen Dioxide	Regional	General Background	SPM	4.51	FRM Chemiluminescence	Continuous
Black Carbon	Regional	General Background	Non-regulatory	4.00	Optical absorption	Continuous

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Wind Speed / Direction	Neighborhood	Local Conditions	SLAMS	10.00	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:** +32.98024, -80.06502

**Date Established:** April 9, 1999

**Site Evaluation:** December 17, 2015



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.

This site does not meet 40 CFR Part 58 Appendix E site obstruction requirements. The DHEC is currently working with the land owners to have the trees obstructions removed or trimmed.

**Changes for 2017:**

The obstructions will be corrected and brought into compliance with 40 CFR Part 58 Appendix E or the site will be terminated.

**Monitors:**

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

## Charleston Public Works (CPW)

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

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

**Location:** 360 Fishburne Street

**County:** Charleston

**Coordinates:** +32.79097, -79.95871

**Date Established:** November 20, 1998

**Site Evaluation:** December 17, 2015



The 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> monitors for the MSA. The sample inlets are 28 meters from the nearest road.

This site does not meet 40 CFR Part 58 Appendix E site obstruction requirements. The DHEC is currently working with the land owners to have the trees obstructions removed or trimmed.

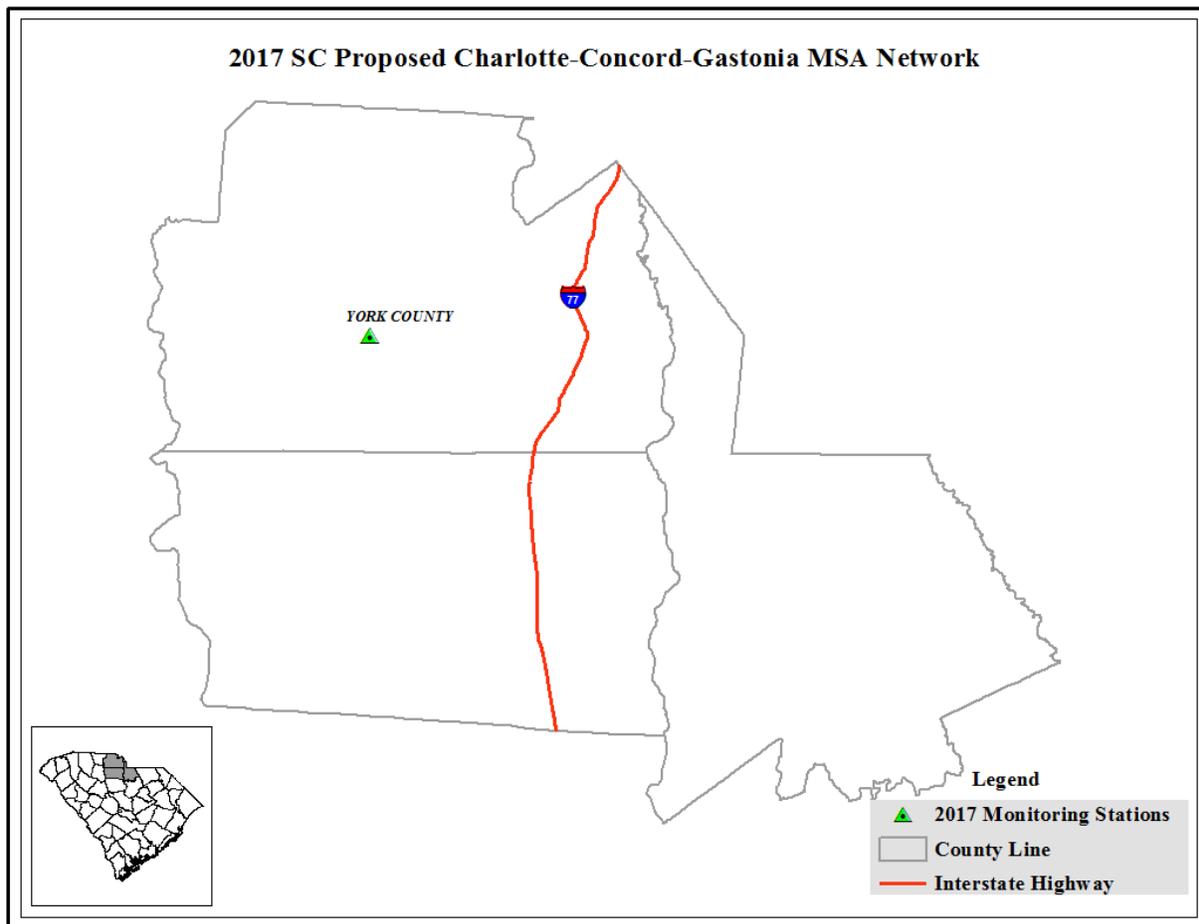
Changes for 2017:

There are no changes planned for 2017.

Monitors:

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

Charlotte-Concord-Gastonia MSA



Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip. Chem.	Precip.	MET
45-091-0007	York County Site						●	○											○
	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 County Site****CSA/MSA:** Charlotte-Concord CSA / Charlotte-Concord-Gastonia MSA**AQS Site ID:** 45-091-0007**Location:** Langrum Branch Rd.**County:** York**Coordinates:** +34.9776, -81.2074**Date Established:** PENDING**Site Evaluation:** PENDING

The York County site is located in south central York County in a rural setting. This site was established to replace the York Continuous Monitoring Site (45-091-0006) and represents background levels near the Charlotte urban area. The York County site has monitors for Ozone and SO<sub>2</sub>, as well as a wind tower.

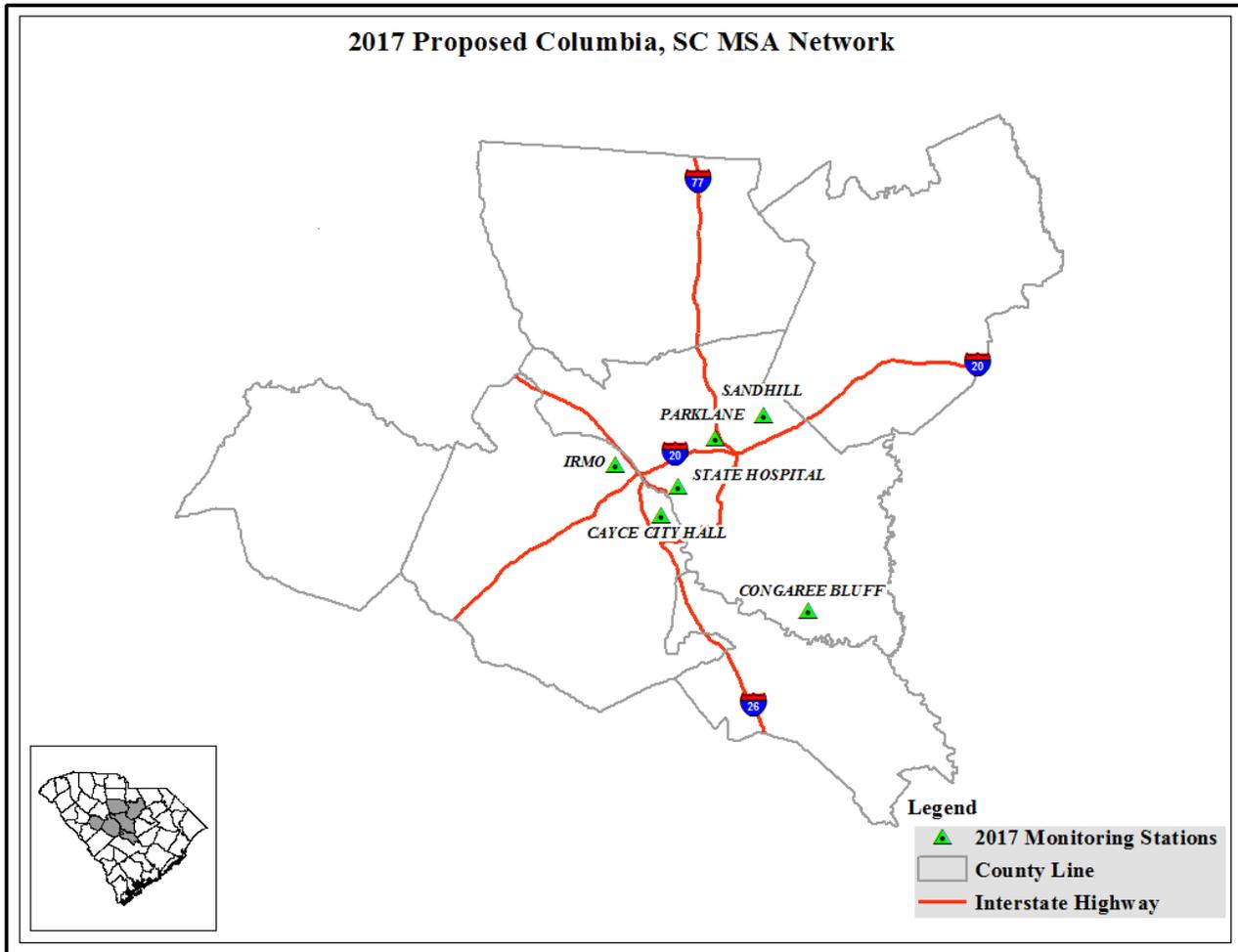
Changes for 2017:

This site is a replacement for the York Continuous Monitoring Site (45-091-0006).

Monitors:

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

Columbia MSA



### Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead /TSP	Ozone	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)	●●	○	●	○	●	●	●	●*	●				○			○	○	○
45-079-0020	State Hospital												○	○					
45-079-0021	Congaree Bluff						○	○								○	○	○	
45-079-1001	Sandhill						●												○
	TOTAL	3	2	1	2	1	3	3	3	1	0	1	2	3	0	1	2	2	2
○ SPM / Other ●●/○○ indicates duplicate / QA samplers ● SLAMS/NCore *NO and NO <sub>y</sub> are being monitored																			

**Irmo****CSA/MSA:** Columbia-Orangeburg-Newberry CSA / Columbia MSA**AQS Site ID:** 45-063-0008**Location:** 200 Leisure Lane**County:** Lexington**Coordinates:** +34.051017, -81.15492**Date Established:** April 7, 1989**Site Evaluation:** April 4, 2016

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 SO<sub>2</sub>, BC, 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 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

**Changes for 2017:**

There are no changes planned for 2017, but changes in the property use by the land owner may require relocation of the monitors on or near the property.

**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	SLAMS	4.95	FRM Gravimetric	1:1
PM <sub>2.5</sub>	Neighborhood	Population Exposure	SPM	4.55	FDMS Gravimetric	Continuous
Sulfur Dioxide	Neighborhood	Source-Oriented	SPM	3.23	Pulsed florescent	Continuous
Black Carbon	Urban	Population Exposure / General Background	Non-regulatory	4.0	Optical absorption	Continuous
Carbonyls	Neighborhood	Population Exposure/ General Background	Non-regulatory	3.9	HPLC Ultraviolet Absorption	1:6
SVOC	Neighborhood	Population Exposure/	Non-regulatory	3.9	PUF/GCMS	1:6

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
		General Background				

## Cayce City Hall

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

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

**Location:** 1830 Morlaine Rd.

**County:** Lexington

**Coordinates:** +33.96914, -81.06629

**Date Established:** December 6, 2007

**Site Evaluation:** December 12, 2015



The Cayce City Hall site is located in the City of Cayce and measures  $PM_{10}$ . This site 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 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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: +34.09398, -80.96230

Date Established: April 3, 1980

Site Evaluation: November 3, 2015



The Parklane site is located in north central Richland County within the city limits of Columbia. Parklane was originally sited 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 suite of samplers measure PM<sub>2.5</sub>, speciated PM<sub>2.5</sub>, Lead, precipitation chemistry, precipitation, and SVOC. The suite of continuous monitors measure PM<sub>2.5</sub>, Ozone, SO<sub>2</sub>, CO, NO, and nitrogen oxides (NO<sub>x</sub>). The site also provides support for demonstration, training, and equipment evaluation convenient to the DHEC's Columbia air

laboratory. The sample inlets are 57 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements

Changes for 2017:

There are no changes planned for 2017. In 2016, the Bates House (45-079-0019) site, which operated the required collocated PM<sub>2.5</sub> sampling, was terminated. The collocated PM<sub>2.5</sub> sampling was moved to Parklane to fulfill minimum monitoring requirements for the Columbia MSA.

Monitors:

\*Bolded parameters are an 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	4.90	FDMS Gravimetric	Continuous
<b>Collocated PM<sub>2.5</sub></b>	Neighbor hood	Population Exposure	QA Collocated		FRM Gravimetric	1:6
<b>Speciated PM<sub>2.5</sub></b>	Neighbor-hood	Population Exposure	NCore	2.50	CSN Protocol	1:3
PM <sub>10</sub>	Neighbor-hood	Population Exposure	NCore	4.4	TEOM	Continuous
<b>PM<sub>10-2.5</sub></b>	Neighbor hood	Population Exposure	NCore	4.4	Gravimetric FRM Pair	1:3

<b>Parameter *Required</b>	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
<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	Pulsed Florescence	Continuous
<b>Nitric Oxide</b>	Neighbor -hood	Population Exposure	NCore	10	Chemi- luminesence	Continuous
<b>NO<sub>y</sub></b>	Neighbor -hood	Population Exposure	NCore	10	Chemi- luminesence	Continuous
<b>Carbon Monoxide</b>	Neighbor -hood	Population Exposure	NCore	4.13	Gas filter Correlation	Continuous
SVOC	Neighbor -hood	Population Exposure	SPM	2.5	PUF- GC/MS	1:6
Precipitation chemistry	Neighbor -hood	Regional Transport	Non- regulatory	1.4	Not applicable	Weekly- Tues-Tues
Precipitation	Neighbor -hood	General/ Background	SPM	1.1	Tipping bucket	Continuous and Sample
<b>Wind Speed / Direction</b>	Neighbor -hood	Local Conditions	SLAMS	10.0	Instruments for wind speed, wind direction	Continuous
<b>NO<sub>2</sub></b>	Neighbor -hood	Population Exposure	SPM	4.13	Chemi- luminesence	Continuous

## State Hospital

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

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

**Location:** 2100 Bull Street

**County:** Richland

**Coordinates:** +34.01549, -81.03418

**Date Established:** January 7, 1999

**Site Evaluation:** April 4, 2016



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 SVOC. The sample inlets are 10 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

### Changes for 2017:

There are no changes planned for 2017. Access to this site may be lost due to recent sale and expected redevelopment of the property.

### Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Carbonyls	Middle	Highest Concentration	Non-regulatory	4.23	HPLC Ultraviolet Absorption	1:6
SVOC	Neighborhood	General / Background	Non-regulatory	2.87	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:** +33.81467, -80.78113

**Date Established:** December 27, 1999

**Site Evaluation:** December 15, 2015



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 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. Monitoring activities at this site are

intended to represent conditions found in the National Park only.

The Congaree Bluff site has monitors for Ozone, SO<sub>2</sub>, Mercury (vapor), precipitation and precipitation chemistry. The sample inlets are 191 meters from the nearest road.

This site does not meet 40 CFR Part 58 Appendix E requirements due to tree encroachment, but a waiver has been granted by EPA for these site obstructions.

Changes for 2017:

Scale for Ozone and Sulfur Dioxide was changed from Urban to Neighborhood to meet Site Waiver requirements.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Neighborhood	General / Background	SPM	4.23	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Neighborhood	General / Background	SPM	4.23	FEM UV Fluorescence	Continuous
Mercury (vapor)	Urban	Source Oriented	Non-regulatory	4.23	Cold Vapor Atomic Fluorescence	Continuous

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Precipitation chemistry	Regional	Regional Transport	Non-regulatory	1.5	IC	Weekly-Tue-Tue
Precipitation	Neighborhood	General/Background	Non-regulatory	1.73	Tipping Bucket	Continuous and Sample

**Sandhill Experimental Station**

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

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

**Location:** 900 Clemson Road

**County:** Richland

**Coordinates:** +34.13126, -80.86832

**Date Established:** January 1, 1959

**Site Evaluation:** November 10, 2015



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 Ozone, wind direction, and wind speed. The sample inlets are 33 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

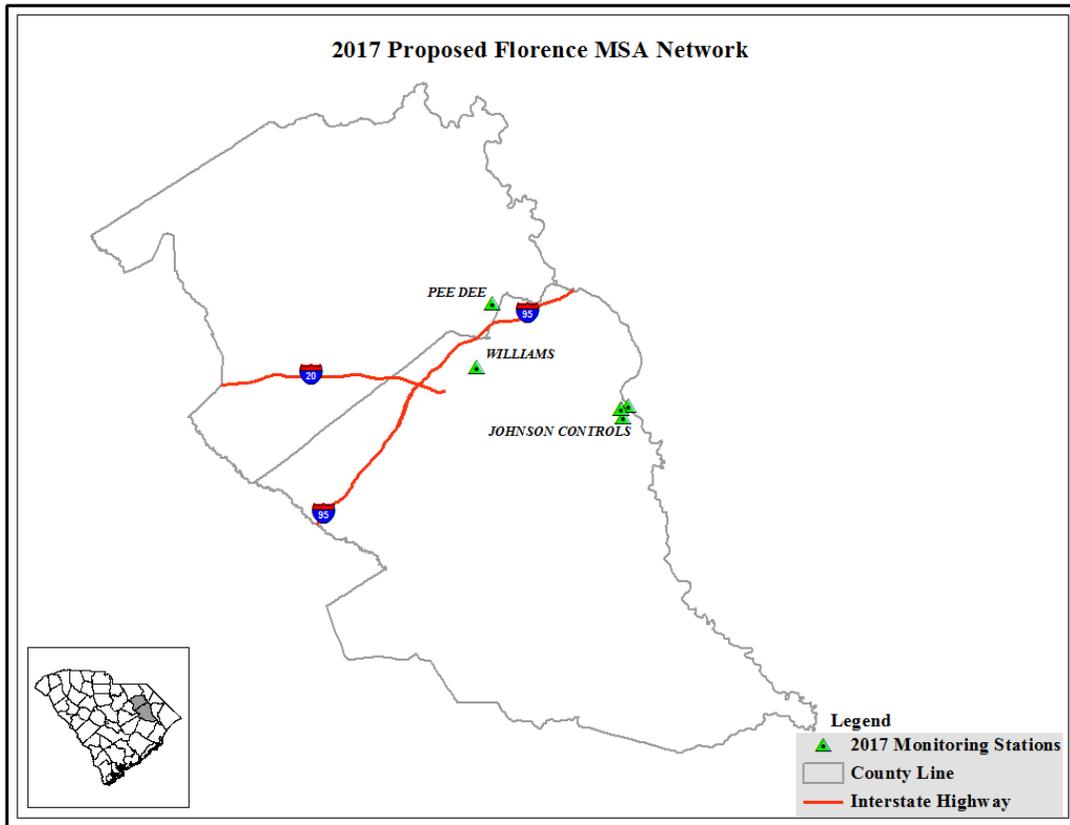
Changes for 2017:

There are no changes planned for 2017.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	4.15	FEM Ultraviolet Photometry	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**

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	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	4	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:** +34.28569, -79.74485

**Date Established:** February 25, 1993

**Site Evaluation:** March 29, 2016



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.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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:** +34.21427, -79.76735

**Date Established:** August 4, 2008

**Site Evaluation:** May 29, 2015



The Williams Middle School site is located in Florence County. The 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 has 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 91 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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	SLAMS	3.04	TEOM	Continuous

### Johnson Controls (3 Sites-JCI Railroad, JCI Entrance, JCI Woods)

**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:** +34.15567, -79.56981; +34.16413, -79.572330; +34.16747, -79.56266

**Dates Established:** January 4-10, 2012

**Site Evaluation:** April 9, 2015



Johnson Controls Incorporated (JCI) is located in Florence County. On May 7, 2010, the 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.

Sampling frequency may be increased if needed for special investigations.

The JCI Railroad (45-041-8001) site meets all 40 CFR Part 58 Appendix E requirements.

The JCI Entrance (45-041-8002) site does not meet 40 CFR Part 58 Appendix E site obstruction requirements due to tree encroachment. The DHEC is working with land owner to have the trees trimmed or removed.

The JCI Woods (45-041-8003) site does not meet 40 CFR Part 58 Appendix E site obstruction requirements due to tree encroachment. The DHEC is working with land owner to have the trees trimmed or removed.

Changes for 2017:

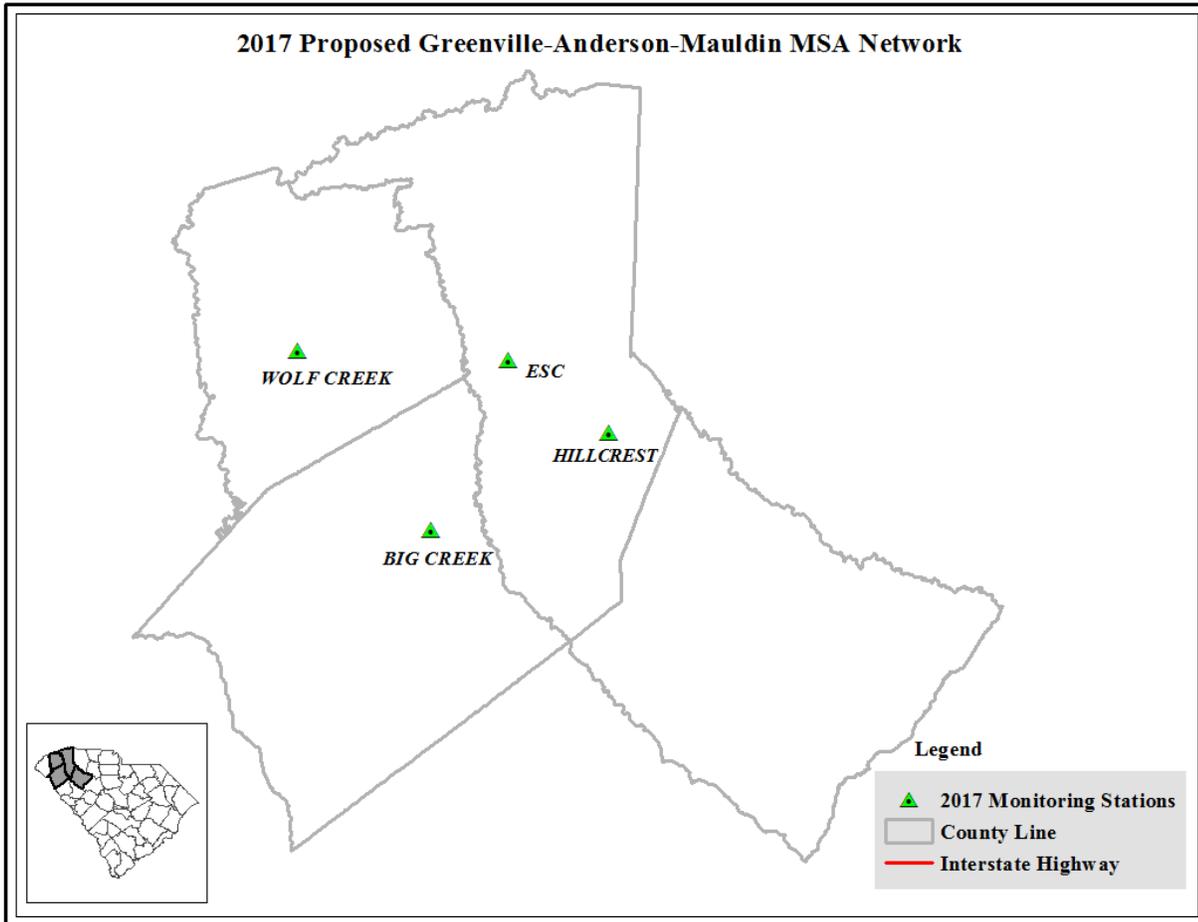
There are no changes planned for 2017.

Monitors:

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

\*Sampling frequency no less than 1:6

*Greenville-Anderson-Mauldin MSA*



Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead /TSP	Ozone	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	●●					●												
45-077-0003	Wolf Creek						○												
	TOTAL	3	1	0	1	0	3	1	1	0	0	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:** +34.62324, -82.53206**Date Established:** June 4, 2008**Site Evaluation:** April 18, 2016

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. The sample inlet is 49 feet from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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:** +34.84389, -82.41458

**Date Established:** April 11, 2008

**Site Evaluation:** April 25, 2016



The Greenville ESC site is located in the city of Greenville and 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 PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>2</sub>, Sulfate, BC, and measurements for wind speed and wind direction. The sample inlets are 15 meters from the nearest road.

The EPA Region 4 has selected this site as one of the locations for a Regional Administrator required NO<sub>2</sub> monitor to help protect susceptible and vulnerable populations as required by 40 CFR, Part 58, Appendix D, Section 4.3.4.

This site does not meet 40 CFR Part 58 Appendix E requirements due to tree encroachment, but a reissuance of a Site Waiver has been approved by EPA.

Changes for 2017:

There are no changes planned for 2017.

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/ Required FEM Collocation	SPM	4.40	FDMS Gravimetric	Continuous
PM <sub>10</sub>	Neighborhood	Population Exposure	SLAMS	4.35	FEM TEOM	Continuous
Sulfur Dioxide	Neighborhood	Population Exposure	SLAMS	4.51	FEM UV fluorescence	Continuous

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Nitrogen Dioxide	Neighborhood	Population Exposure	SLAMS	4.51	FRM Chemiluminescence	Continuous
Black Carbon	Neighborhood	Population Exposure / General Background	Non-regulatory	4.44	Optical absorption	Continuous
Wind Speed / Direction	Neighborhood	Local Conditions	Non-regulatory	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:** +34.75185, -82.25670

**Date Established:** February 17, 2009

**Site Evaluation:** April 18, 2016



The Hillcrest Middle School site represents suburban areas near the interstate corridors in the Greenville MSA. Initiated in 2008, this site was selected as a monitoring location based on results of the Greenville MSA Ozone study. This site supports an Ozone monitor, a FRM PM<sub>2.5</sub> sampler, and a collocated PM<sub>2.5</sub> sampler. The sample inlets are 61 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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	1:3
Collocated PM <sub>2.5</sub>	Urban	Population Exposure	QA Collocated	3.48	FRM Gravimetric	1:3
Ozone	Urban	Population Exposure	SLAMS	3.81	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:** +34.85154, -82.74458

**Date Established:** August 10, 2010

**Site Evaluation:** April 25, 2016



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

In 2013, Anderson County was reincorporated into a Greenville-Anderson-Mauldin MSA. The 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. The sample inlet is 71 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

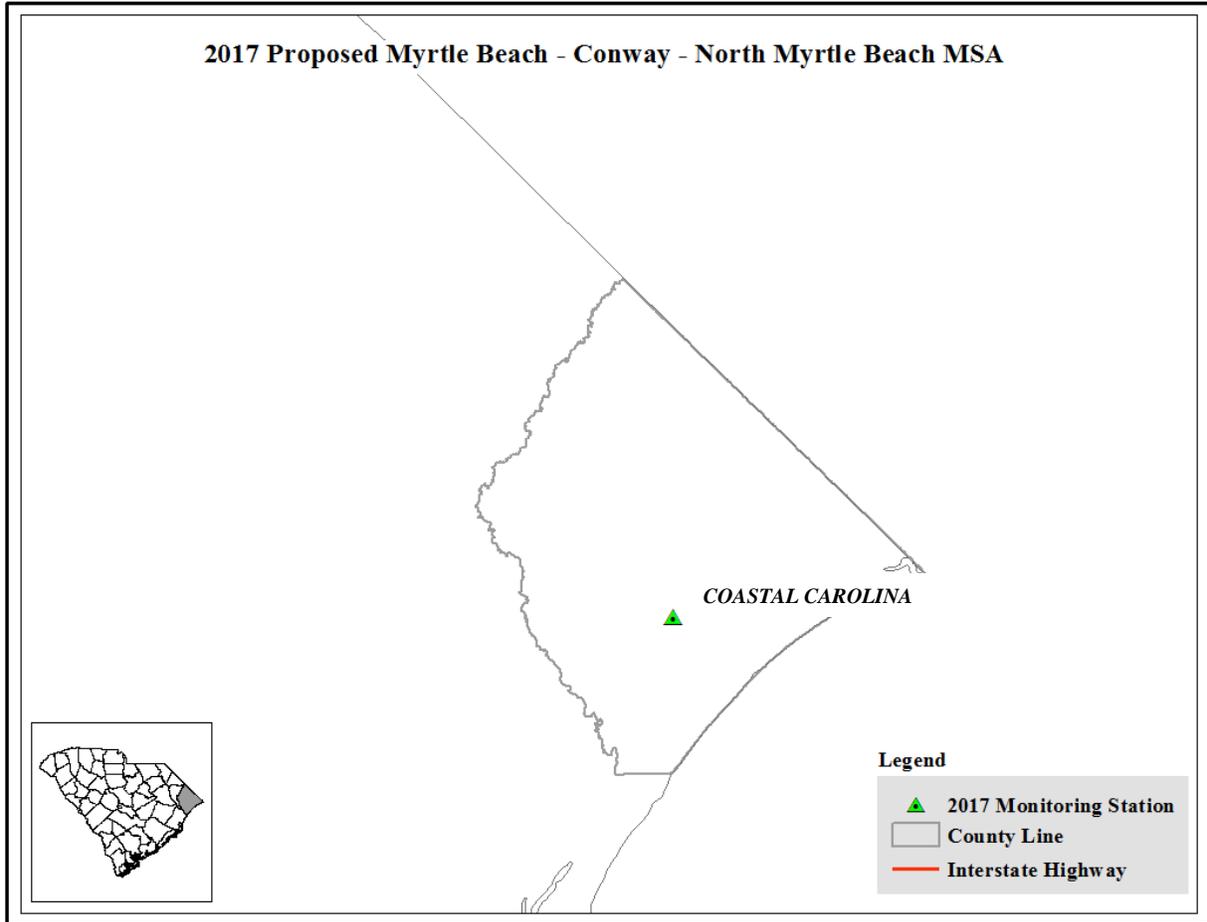
**Changes for 2017:**

There are no changes planned for 2017. The 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

**Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA**



**Classification of Monitoring Type by Site**

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET	
45-051-0008	Coastal Carolina						●													○
	TOTAL	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
○ SPM / Other ● SLAMS ●●/○○ indicates duplicate / QA monitors																				

## Coastal Carolina

**CSA/MSA:** Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA

**AQS Site ID:** 45-051-0008

**Location:** Century Circle

**County:** Horry

**Coordinates:** 33.8007, -78.9939

**Date Established:** June 22, 2016

**Site Evaluation:** June 30, 2016



In February 2013, OMB combined Horry County with Brunswick County, NC to establish the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA. In order to meet the minimum monitoring criteria in 40 CFR Part 58 Appendix D, at least one Ozone monitor is required in the MSA. In conjunction with the State of North Carolina, local government, and stakeholders, DHEC established the Coastal Carolina monitoring site to be representative of expected maximum Ozone concentrations in northeast South Carolina.

This site does not meet 40 CFR Part 58 Appendix E requirements for drip line. DHEC is going to reposition the probe inlet to bring the site in compliance with this requirement.

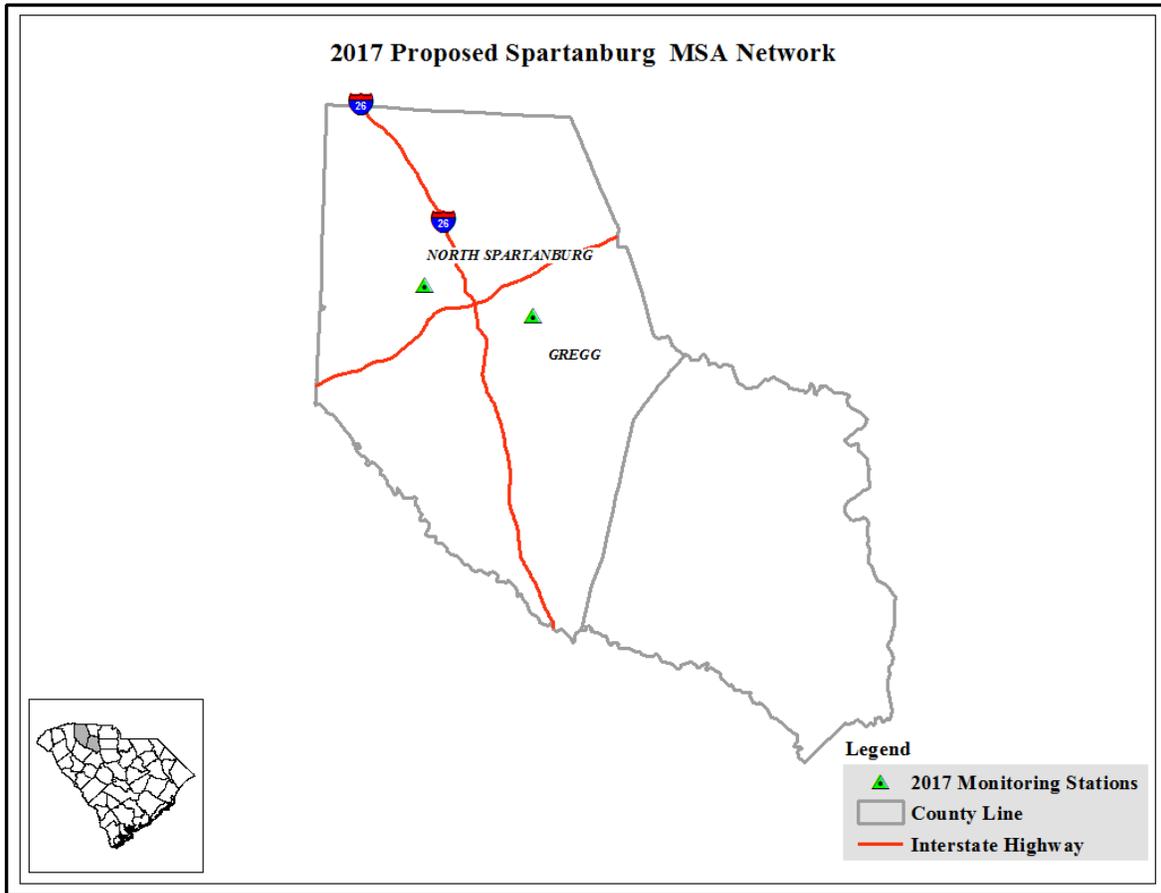
Changes for 2017:

There are no changes planned for 2017.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Concentration	SLAMS		FEM Ultraviolet Photometry	Continuous
Wind Speed / Direction	Neighborhood	Local Conditions	Non-regulatory		Instruments for wind speed and wind direction	Continuous

**Spartanburg MSA**



**Classification of Monitoring Type by Site**

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	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	●	○																
	<b>TOTAL</b>	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:** +34.98874, -82.07573

**Date Established:** April 4, 1990

**Site Evaluation:** February 29, 2016



The North Spartanburg Fire Station #2 site is located in rural Spartanburg County, northwest of the City of Spartanburg. This site supports an Ozone monitor and 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 inlet is 85 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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:** +34.95557, -81.92480

**Date Established:** December 29, 2008

**Site Evaluation:** February 29, 2016



The T. K Gregg Recreation Center site is located in Spartanburg County. With the cooperation of local government and stakeholders, the 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 a collocated PM<sub>2.5</sub> continuous monitor for the Spartanburg MSA. The sample inlets are 49 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

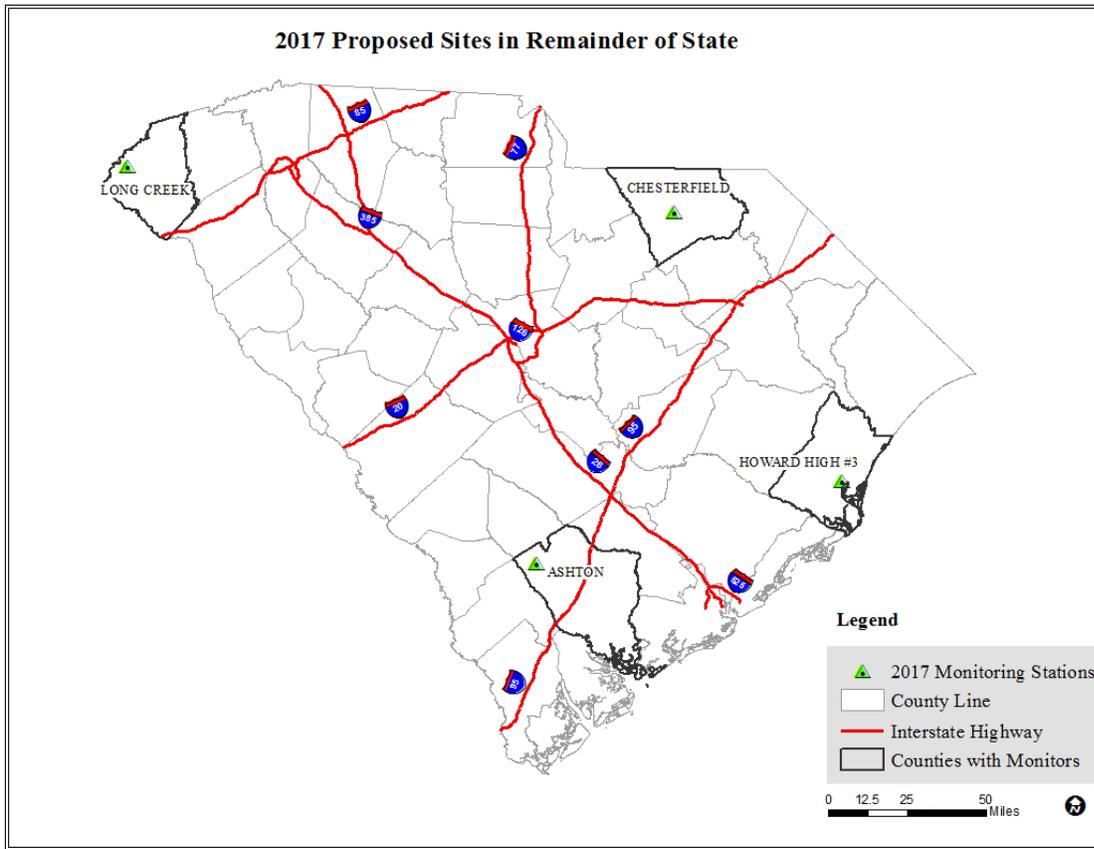
Changes for 2017:

There are no changes planned for 2017.

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	2.5	TEOM	Continuous

Remainder of State



Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead	Ozone	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip. Chem.	Precip.	MET
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	3	1	0	0	0	1	1	1	1	0	0	0	1
○ SPM / Other ● SLAMS ●●/○○ indicates duplicate QA monitors																			

**Chesterfield (NATTS)****CSA/MSA:** none/none**AQS Site ID:** 45-025-0001**Location:** SC Hwy 145, McBee (Route 2 Box 100)**County:** Chesterfield**Coordinates:** +34.61538, -80.19878**Date Established:** January 6, 2000**Site Evaluation:** March 29, 2016

The Chesterfield site is located in central Chesterfield County. The Chesterfield site has continuous monitors for BC, PM<sub>2.5</sub>, Ozone, and meteorological parameters. Sampling is done for 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 also a rural National Air Toxics Trends Site (NATTS) which includes Carbonyls, VOC, SVOC, and metals sampling.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

Federal funding for speciation sampling at this site was eliminated in 2015. Speciation sampling will continue as long as state resources are available.

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	3.86	TEOM - 50° C	Continuous
Speciated PM <sub>2.5</sub>	Regional	Regional Transport	Supplimental Speciation	3.96	CSN Protocol	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	Urban	NATTS	Non-regulatory	3.00	DNPH/IC	1:6
SVOC	Urban	NATTS	SPM	3.00	PUF/GCMS	1:6
Volatile Organic Compounds	Urban	NATTS	Non-regulatory	3.00	Canister/GCMS	1:6
Wind speed / direction	Neighborhood	Local Conditions	Non-regulatory	10.00	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:** +33.00784 -80.96504**Date Established:** March 7, 1990**Site Evaluation:** October 22, 2015

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. It also monitors Ozone concentrations. The sample inlets are 8 meters from the nearest road.

This site does not meet 40 CFR Part 58 Appendix E site obstruction requirements. The DHEC is working with the land owners to remove or trim the trees.

Changes for 2017:

There are no changes planned for 2017.

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:** +33.36892, -79.29662

**Date Established:** July, 15 2008

**Site Evaluation:** July 28, 2015



The Howard High #3 site is located in Georgetown County on the grounds of Howard High School and supports a PM<sub>10</sub> monitor. PM<sub>10</sub> monitoring in this area of Georgetown has been ongoing since 1970, when the original Howard High site was established. The sample inlet is 55 meters from the nearest road.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

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:** +34.805333, -83.23777

**Date Established:** August 1, 1983

**Site Evaluation:** April 8, 2016



The Long Creek 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 point for monitoring the impacts of transported pollutants. Long Creek has continuous monitors for Ozone, SO<sub>2</sub>, and PM<sub>2.5</sub>. The sample inlets are 11 meters from the nearest road.

Due to the importance of measuring region-wide SO<sub>2</sub>, PM<sub>2.5</sub>, and Ozone concentrations, the unique location, and collocated monitoring activity, the DHEC has determined that current monitoring at this site should be continued.

This site meets all 40 CFR Part 58 Appendix E requirements.

Changes for 2017:

There are no changes planned for 2017.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM <sub>2.5</sub>	Urban	General / Background	SPM	4.14	FDMS Gravimetric	Continuous
Ozone	Regional	General / Background	SPM	4.22	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Regional	Regional Transport	SPM	4.22	FEM UV fluorescence	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 TSP, Lead, CO, NO<sub>2</sub>, and SO<sub>2</sub>, 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 the 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:

- 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. The 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 the EPA.
- Charleston Port Monitoring – the Charleston Port Expansion project has a projected completion date of 2017-2019. At that time, the DHEC will work with local stakeholders to identify and establish an appropriate PM<sub>2.5</sub> site.
- Columbia MSA Ozone Study – an addition of supplementary SPM Ozone sites may be added to investigate variability and refine the monitoring network to meet monitoring objectives.

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## **APPENDIX A: Summary of Public Comments Received**

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

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## **Monitoring Plan – Comments Received**

On May 11, 2016, South Carolina Department of Health and Environmental Control (Department) - Bureau of Air Quality published its draft 2017 Ambient Air Network Monitoring Plan (2017 Monitoring Plan) and held an open public comment period from May 11 – June 9, 2016. The Department received comments from two individuals. Below is a summary of comments received, and the Department's responses (italicized). All comments were submitted via email. A copy of all comments received will be included with the final 2017 Monitoring Plan.

### **I. Public Input/Public Involvement**

- a. **Comment:** The Department loses/redacts/edits submitted comments to it.

*The Department maintains all individual public comments as received. The Department has grouped and summarized all comments submitted during the public comment period in this document. Some comments were repeated multiple times. A copy of all comments received will be forwarded to the EPA Region 4 staff along with the draft Monitoring Plan.*

- b. **Comment:** The Department should partner with local universities to advance air monitoring technology and encourage citizen science projects.

*The Department works with communities and academia to address local air quality issues and will continue to look for more opportunities for collaborative partnerships. Since 2008, the Department has worked with local communities and universities in the Charleston area to monitor and interpret data from a multitude of studies. The Department provided monitor operation training and assisted with grant applications to help these communities understand changes in air quality due to mobile sources, expansion of the Leatherman Terminal, and new or expanding sources in their neighborhoods. These efforts have led to the communities seeking out new grants and conducting and directing new studies in their areas allowing them to develop local solutions to their ambient air quality concerns.*

*In response to air concerns in the Chester area, the Department has established an informal, citizen-led air quality work group. The monthly work group served as a means to communicate with citizens about air quality issues and concerns. The Department encouraged all interested stakeholders to attend the work group meetings.*

*Additionally, the Department welcomes opportunities to partner with communities that are interested in collecting, analyzing, and interpreting environmental data. The U.S. Environmental Protection Agency (EPA) scientists have created a citizen science toolbox. The Department encourages citizens who are interested in learning more about local air quality data to visit EPA's Citizen Science webpage ([www.epa.gov/air-research/air-sensor-toolbox-citizen-scientists](http://www.epa.gov/air-research/air-sensor-toolbox-citizen-scientists)). Data quality is an important part of any monitoring, whether it is done by citizens, regulators, or our academic institutions.*

*We will continue to explore ways of helping communities use and understand the data they collect in order to develop appropriate local emission reduction strategies, where*

*needed. We will help communities understand the role of citizen monitoring and the role of regulatory monitoring, which is typically conducted by state air quality agencies. Regulatory monitoring must use Federal Reference Methods (FRM) and Federal Equivalent Monitors (FEM), which are very precise, to determine an area's compliance with federal, health-based ambient air quality standards.*

- c. **Comment:** The Department should have a “dashboard” to make data from the monitoring stations available to the public.  
*The Department maintains a web-based application that includes trend graphs for the criteria pollutants. This application is updated periodically to include historic monitoring data and may be found on the Department's web page at <http://gisweb01.dhec.sc.gov/monitoring/monitoring.html>. The Department reports its data to the EPA and this data can be found on the EPA's website ([www.epa.gov/airdata](http://www.epa.gov/airdata)). Near real-time data can be accessed via the AirNow website ([www.airnow.gov](http://www.airnow.gov)) along with forecasts of air quality daily.*
- d. **Comment:** All monitoring reports should be immediately posted to website.  
*The Department's monitoring data is reported to the EPA Air Quality System (AQS) database, which feeds several publicly available web-based applications (AirData – [www.epa.gov/airdata](http://www.epa.gov/airdata), EPA Data Mart – [https://aq.s.epa.gov/aqsweb/documents/data\\_mart\\_welcome.html](https://aq.s.epa.gov/aqsweb/documents/data_mart_welcome.html), and AirNow – [www.airnow.gov](http://www.airnow.gov)).*

## **II. Department Regulations/Authority/Staff**

- a. **Comment:** The Department forgoes its regulatory authority to neighboring states, based on designation of Chester, York, and Lancaster Counties in Greater Metro Area in North Carolina.  
*The Department does not delineate Metropolitan Statistical Area (MSA) boundaries. Since the 1950's, the federal government's Office of Management and Budget (OMB) has grouped areas together that contain at least one large populated city with adjacent communities that have a high degree of social and economic integration (as measured by where people live and commute). In February, 2013, the OMB updated their MSA definitions and added Chester and Lancaster counties to the Charlotte-Concord-Gastonia, NC-SC MSA. The EPA has developed regulations (40 CFR Part 58, Appendix D) which require state agencies to use the federal MSA definitions when designing a monitoring network and when calculating minimum monitoring requirements.*
- The Department, the North Carolina Department of Environmental Quality (NCDEQ), and the Mecklenburg Land Use and Environmental Services Agency (MCAQ) have entered into a Memorandum of Agreement (MOA) to operate ambient air monitoring stations cooperatively for the MSA. This MOA allows the government entities the ability to design an efficient network cooperatively in order to meet all of the necessary objectives to assess air quality in this region.*

*40 CFR Part 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 geographic 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."*

- b. **Comment:** A fee-based structure should be implemented in regulations to fund siting and operation of community-requested monitors.

*The Department is committed to continuing to work with communities to develop collaborative partnerships to seek grant funding (or use other additional funds as they become available) to purchase monitoring equipment to perform short-term community-based special studies. See response to comment "d" below for more information about fee-based funding.*

- c. **Comment:** The Department should relinquish its authority to the EPA.

*For each national ambient air quality standard (NAAQS), under section 110(a) of the Clean Air Act (CAA), the Department is required to provide for the implementation, maintenance and enforcement of the standard. Regarding monitoring, Section 110(a)(2)(B) of the CAA requires State Implementation Plans (SIPs) to provide for establishment and operation of ambient air quality monitors, collecting and analyzing ambient air quality data, and presentation of these data to the EPA upon request.*

*Congress intended for state and local agencies to implement these provisions of the CAA, and these programs are better implemented at the state and local levels.*

- d. **Comment:** Recommend increasing the fee structures of facilities.

*Air emission fees are required to be collected in order to fund activities associated with the air permitting program. The Department's air emission fee structure has been indexed to the Consumer Price Index since 1995, and the dollar per ton rate has increased each year. The Department has convened stakeholder workgroups to advise us on our fee structure, and we will continue to seek a variety of mechanisms (such as fees, grants, etc.) to obtain additional funding to modernize our monitoring network.*

- e. **Comment:** The Department needs to include succession planning and training in the Monitoring Plan.

*The Department has placed a high priority on succession planning to ensure continued institutional knowledge and expertise across the agency. This type of information is not required to be included in the monitoring plan.*

### **III. Health/Odor/Risk Concerns**

- a. **Comment:** The commenter requests that the Department build and maintain an Air Toxics database to measure concentrations for potential health impacts and odors.

Additionally, the commenter states that the repeal of the Department's nuisance regulations leaves a serious deficiency in protecting public health and providing a safe environment, and requests that the Department build and maintain an Air Toxics database to measure concentrations for potential health impacts and odors.

*Although the federal Clean Air Act only requires ambient air monitoring for criteria pollutants, South Carolina has conducted monitoring for air toxics since the early 1980's. Sampling methodologies for the air toxics that the Department collects can be found on pages 9 and 10 of the draft monitoring plan. Toxics monitoring data for South Carolina can be publically accessed at the EPA's AirData page ([www.epa.gov/airdata](http://www.epa.gov/airdata)).*

*The EPA AQS database serves as the official dataset for the Department's ambient air quality monitoring data. Air toxics data, along with data from the Department's criteria pollutant network, can be obtained through the EPA Data Mart application ([https://aqs.epa.gov/aqsweb/documents/data\\_mart\\_welcome.html](https://aqs.epa.gov/aqsweb/documents/data_mart_welcome.html)).*

*Data Mart contains all of the information housed in AQS, including every measured value the EPA has collected via the national ambient air monitoring program along with associated aggregate values calculated by the EPA (8-hour averages, daily averages, daily maximum concentrations, etc). Data Mart is updated once per week. The Data Mart application requires user registration to access data.*

*There are no federal or state air quality odor regulations. The presence of odor does not necessarily indicate the presence of dangerous air pollution. Many air pollutants can be detected by smell at much lower concentrations than the maximum allowable concentrations established to protect public health.*

*The commenter references the early 2016 repeal of Regulation 61-46, Nuisances. Regulation 61-46 was first promulgated in 1946 and amended one time in 1972. This regulation had become obsolete and was no longer needed. Current statutes (e.g., South Carolina Code of Laws, Section 44-1-140 and Section 48-1-10 et. seq.) and regulations give the Department sufficient authority to adequately address environmental and public health matters.*  
*(<http://www.scdhec.gov/Agency/docs/Update/Environmental%20Health%20Services.pdf>)*

- b. **Comment:** Chester County's ambient air poses a statistically significant cancer risk, per the Cancer Assessment done by the Department.

*The South Carolina Central Cancer Registry collects all newly diagnosed cancer cases occurring in South Carolina, by law. The data are used to provide information back to local communities in the state about their cancer incidence rates. While the Registry does collect and provide very valuable cancer incidence information, it is not able to make any conclusions about potential causes of cancer from the data. The Registry uses sophisticated statistical protocols to survey for any cancer excess or possible clustering of cancer cases. The Registry found that statistically significant higher rates of lung cancer have occurred in Chester County, but no clustering of cancer has been identified.*

*Additionally, no cause associated with the cancer rates in Chester County has been identified. Each type of cancer has its own set of risk factors. Some risk factors are inherited, some are associated with the environment, and some are related to life choices (for example, smoking).*

- c. **Comment:** The commenter requests a published list of air pollutants with potential to cause harm from acute exposure during worst-case incidents.

*The Department regulates the federal list of Hazardous Air Pollutants by implementing the National Emission Standards for Hazardous Air Pollutants (NESHAP) program (see SC Regulation 61-62.63 and 40 CFR 63), and regulates additional air toxic pollutants through South Carolina Regulation 61-62.5, Standard 8, Toxic Air Pollutants. The Department also implements the Chemical Accident Prevention Provisions of the Clean Air Act (see SC Regulation 61-62.68) to help prevent accidental releases. The Department refers the commenter to the applicable federal and state regulations for a list of regulated pollutants and toxic and flammable substances.*

- d. **Comment:** The commenter requests an extensive review of whether or not the chemical releases from 8 unspecified Title V facilities and 30 unspecified sewage sludge sites have affected the health of people and animals in the area.

*In accordance with South Carolina air quality regulations, “[n]o permit to construct or modify a source will be issued if emissions interfere with attainment or maintenance of any state or federal standard.” South Carolina Regulation 61-62.1, Section II.A.2. Prior to issuing any air permit, emissions are evaluated to ensure that facilities will not violate any state or federal air quality standard, which are designed to protect public health, including the health of sensitive populations.*

*The sewage sludge sites (land application of sludge) are not regulated by the Bureau of Air Quality because they do not meet the definition of a stationary source. However, these sites are regulated by the Bureau of Water and must meet SC Regulation 61-9.503. These state standards were developed based on a comprehensive risk assessment conducted by the EPA.*

#### **IV. Air Monitoring Stations/Network**

- a. **Comment:** The Department should increase air monitoring in Chester County by re-distributing air monitors from Columbia and Florence.

*The EPA determines the minimum number of monitors required in each MSA of the state. Some of the Department’s monitoring sites will monitor for multiple pollutants, while others will only monitor for a single pollutant. The number of sites in an area is not a good indicator of “over monitoring”. There are instances where the location of sources will require the Department to establish multiple monitoring sites in an area to meet all of the required monitoring objectives. While the Department meets the Federal minimum monitoring requirements, the Department’s Air Program requirements may dictate that additional monitoring sites be established. The Department will continue to evaluate the need to add or relocate monitoring sites through the annual Ambient Annual Air Monitoring Plan process.*

- b. **Comment:** An SO<sub>2</sub> monitor should be placed within county borders due to industries such as Jones Hamilton and Giti Tire, who have the potential to emit high SO<sub>2</sub> emissions. The commenter also stated that the areas of Chester, Fairfield, and Lancaster are likely to have greater concentrations of ground level SO<sub>2</sub>, yet the 2017 Monitoring Plan doesn't allow for a monitor.

*Facilities across the state are permitted based on health-protective federal standards. The federal standards undergo vigorous scientific review by a panel of leading air quality experts. The need for additional SO<sub>2</sub> monitors is determined by calculating the Population Weighted Emissions Index (PWEI) score for each Core Based Statistical Area (CBSA) based on the requirements found in 40 CFR Part 58, Appendix D section 4.4. The PWEI formula, developed by the EPA, requires as inputs the latest publicly available population estimates and emissions inventory. PWEI scores based on EPA's methodology can be found on page 15 of the monitoring plan. The current PWEI score indicates that only one SO<sub>2</sub> monitor is currently required for the Charlotte-Concord-Gastonia MSA, which includes Chester and Lancaster counties. The Department will evaluate the PWEI score each year to ensure that the required number of monitors is being met.*

*Furthermore, the SO<sub>2</sub> Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO<sub>2</sub>) Primary National Ambient Air Quality Standard (NAAQS) (80 FR 51052), published on August 21, 2015, requires each state to either monitor or model emissions from any facility emitting more than 2000 tons per year (tpy) of SO<sub>2</sub> during the most recent year for which emissions data is available. There are no facilities in Chester County currently emitting (or have the potential to emit) more than 2000 tpy of SO<sub>2</sub>.*

- c. **Comment:** EPA's most recent Technical Systems Audit questions the quality and accuracy of the auditing, data collection, and measurement of the air monitoring network. Additionally, the commenter wants to know what the Department will be doing differently to ensure compliance, improve data quality, exceed EPA standards, and ensure integrity of the monitoring network. Additionally, the commenter requested a copy of the most recent Technical Systems Audit.

*The Department and the EPA are working closely together to resolve issues noted during the Technical Systems Audit (TSA). Copies of the TSA and the Department's responses were sent to the commenter on May 27, 2016. The EPA also provided a copy of the TSA to the commenter.*

- d. **Comment:** The commenter requests the basis for the location chosen for the new monitoring site in York County.

*The purpose of the new monitoring site in York County is to serve as a background site for the Charlotte-Gastonia-Concord MSA. This monitor works in concert with monitoring stations throughout the MSA to ensure that all of the monitoring objectives necessary are met. Placing the monitoring station in a more urbanized area would change the objective, which is unnecessary for the area because there are urban monitoring stations already in existence on the North Carolina side of the MSA.*

*Particulate matter is sampled within the MSA. The Charlotte-Concord-Gastonia MSA currently exceeds the federal minimum monitoring requirements for PM<sub>2.5</sub>. As we continue to evaluate the effectiveness of our monitoring network, we will consider adding a PM<sub>2.5</sub> sampler for the new monitoring site in York County.*

- e. **Comment:** New equipment should be purchased for new sites, instead of moving old equipment to new sites.

*Equipment at the Department's monitoring sites is designed to be easily swapped out when newer equipment becomes available. The Department verifies that all equipment (new or existing) is properly working prior to the collection of ambient air data. The Department attempts to use the most cost effective method for maintaining adequate monitoring equipment by replacing existing components with newer ones as resources become available.*

- f. **Comment:** Commenter questioned whether or not the Department considered the EPA's Population Weighted Emissions Index when considering siting requirements.

*The purpose of the PWEI is to determine the number of monitors needed to meet the Network Design criteria in 40 CFR Part 58, Appendix D for SO<sub>2</sub> monitoring sites. This was used in reviewing siting criteria.*

- g. **Comment:** Traffic patterns should be considered for near road monitoring, especially in regard to the I-77 Corridor.

*The EPA established network design requirements in 40 CFR Part 58, Appendix D, Section 4.3.2. Each state must have one microscale near-road NO<sub>2</sub> monitoring site in each CBSA with a population of 500,000 or more persons. An additional near-road NO<sub>2</sub> monitoring site is required for any CBSA with a population of 2,500,000 or more, or in any CBSA with a population of 500,000 or more that has one or more roadway segments with 250,000 or greater Annual Average Daily Traffic (AADT) counts.*

*On March 7, 2013, the EPA established staggered deadlines (phased deployment) for the establishment and operation of the required near-road NO<sub>2</sub> monitors. The phased deployment deadlines are as follows:*

- *One required near-road NO<sub>2</sub> monitor shall be operational in any CBSA with 1,000,000 or more by January 1, 2014 (phase 1).*
- *If a CBSA is required to have two near-road NO<sub>2</sub> monitors, the second monitor shall be operational by January 1, 2015 (phase 2).*
- *All remaining CBSAs having at least 500,000 or more, but less than 1,000,000 shall have their single near - road NO<sub>2</sub> monitor operational by January 1, 2017 (phase 3).*

*The EPA emphasized in this regulation that the near-road NO<sub>2</sub> monitoring station was to be placed in an area of expected maximum hourly concentrations sited near a major road with high traffic counts. The EPA further provided instructions on how to identify these*

sites. It was required that the near-road monitor had to be placed on a road-segment which contained the highest traffic counts. In the Charlotte-Gastonia-Concord MSA, this site was identified by the MCAQ as being located in Charlotte near I-77.

Phases 1 and 2 (the Charlotte-Gastonia-Concord MSA was established as part of the Phase 2 deployment) were installed at maximum concentration locations consistent with the EPA guidance documents. The MSAs which contained one of the Phase 1 or 2 sites have higher mobile source emissions determined by traffic counts. Analysis of data collected as part of the first two phases of the deployment indicated that all existing near-road  $\text{NO}_2$  sites were well below the level of both the annual and 1-hour form of the  $\text{NO}_2$  NAAQS. County traffic counts in the Charlotte-Gastonia-Concord MSA were evaluated per guidance provided by the EPA. None of the road segments on I-77 in Chester County were high enough to warrant a near-road  $\text{NO}_2$  monitoring station. Also based on the low concentrations of  $\text{NO}_2$  found during Phase 1 and 2, the EPA has proposed to not implement Phase 3 in smaller MSA populations (81 FR 30224, May 16, 2016).

- h. **Comment:** The commenter requests the scientific basis for why the Department does not monitor for trace metals.  
*The Department does measure for trace metals at the Chesterfield, Parklane, and Cape Romain monitoring station for  $\text{PM}_{2.5}$  and  $\text{PM}_{10}$ . Information pertaining to this monitoring can be found in the monitoring plan under the name "Speciation", or Speciated  $\text{PM}_{2.5}$ . A description of the sampling methodology can be found on pages 7 and 9 of the monitoring plan.*
- i. **Comment:** The commenter alludes to a lack of quality assurance procedures in the Monitoring Plan. The Monitoring Plan should include a summary of procedures.  
*The Department currently has a general description of the quality assurance program in the monitoring plan. The monitoring plan is not the best place to detail these procedures due to the complexity and length of many of the Standard Operating Procedures, and the frequency at which these procedures are updated.*
- j. **Comment:** The commenter requests a visibility camera system and nephelometer to be installed in Chester County.  
*The Department utilizes these instruments to assess visibility and regional haze in Class I areas as required by the federal Regional Haze rule. There are no Class I areas in Chester County.*
- k. **Comment:** The Department should consider adding an Air Toxics monitoring station in Chester County.  
*There is an air toxics monitoring station in nearby Chesterfield County that represents similar, rural background concentrations across the state. Many of the pollutants suggested for monitoring by the commenter (over 70) do not have federal reference methods to provide for a standard way of sampling. Furthermore, there are no federal ambient air standards for the pollutants suggested for monitoring and data from these pollutants cannot be compared to any standard.*

- l. **Comment:** The photographs included in the Monitoring Plan are insufficient because they are of poor quality and do not depict the directional vantages of each station. *The Department will explore ways to make higher resolution pictures available and to show the extra cardinal directions requested.*
- m. **Comment:** The Department's request for waivers should be denied. *The EPA approved South Carolina's waiver request on May 26, 2016. The Department conducted the public review and comment period for the waiver request from February 8 – March 8, 2016. We received no comments on the waiver request.*
- n. **Comment:** Changing the scale at the Congaree Bluff monitoring station from urban to neighborhood due to encroachment is scientifically indefensible. *The EPA approved the Department's waiver request on May 26, 2016, which included a change in scale for the ozone monitor. This change in scale is appropriate because the trees, which are obstructions, reduce the area that the monitor represents. The objective of the monitoring site is to measure concentrations in the Congaree Swamp, which is a National Park. This change in objective reinforces the necessity to change the scale of the monitor. The Department conducted the public review and comment period for the waiver request from February 8 – March 8, 2016. We received no comments on the waiver request.*
- o. **Comment:** The Monitoring Plan needs to indicate which monitors are the required Ozone SLAMS and that they're operated during the entire Ozone season. It is difficult to determine whether the Department is complying with the requirements of 40 CFR Part 58, Appendix D. *The monitoring plan does indicate which monitors are State and Local Air Monitoring Stations (SLAMS) and which are Special Purpose Monitors (SPM). Any monitor which is designated as a SLAMS can be used to comply with the Appendix D requirements which require operation at a minimum for the entire ozone season. The EPA's Monitoring Plan approval letters state that our monitoring networks comply with the Appendix D requirements. The approval letter for the 2016 Monitoring Plan (the latest approved by EPA) can be accessed on our webpage:*  
[http://www.dhec.sc.gov/HomeAndEnvironment/Docs/EPA%20Letter%20to%20SC\\_Final%20SC%20Network%20Plan%20Response%2011-19-15.pdf](http://www.dhec.sc.gov/HomeAndEnvironment/Docs/EPA%20Letter%20to%20SC_Final%20SC%20Network%20Plan%20Response%2011-19-15.pdf)  
*The Department will add a statement to the Monitoring Plan specifically stating the dates of the ozone monitoring season.*
- p. **Comment:** The commenter questions whether the Fort Mill area is in attainment. The commenter states that at the time the Department removed the Chester (45-023-0002) monitoring station in 2007, the last design value was 76 ppb (or 0.076 ppm), which was above the EPA level of 70 ppb (or 0.070 ppm) for ozone. *Currently, the Charlotte-Gastonia-Concord MSA (of which Chester County is a part) attains all of the National Ambient Air Quality Standards. In 2007, when the Chester monitoring station was approved by EPA to be terminated, the Ozone NAAQS was 84*

*ppb. Based on the data collected by the Department, and approval granted by the EPA, it was determined that termination of the Chester ozone air monitoring station was appropriate. Chester County was in full compliance with the Ozone NAAQS in effect in 2007.*

- q. **Comment:** Referenced materials in the Monitoring Plan should be included in an appendix.  
*The Department will work to make referenced materials available on its website in the future. Meanwhile, until this process is completed, all referenced material cited in the monitoring plan can be made available upon request.*
- r. **Comment:** Compliance with the Charlotte-Gastonia-Concord Metropolitan area is questioned due to change in relocated monitors in Charlotte Mecklenburg area. The commenter stated that the Department should certify that any agreements with out-of-state air monitoring representatives remain in place and any changes made are not in violation of agreement.  
*The Department shares monitoring responsibilities with other states and a local jurisdiction. Memoranda of Agreement (MOA) with Georgia, North Carolina and Mecklenburg County describe how the jurisdictions will jointly meet the minimum monitoring requirements (as detailed in 40 CFR Part 58, Appendix D) in their respective areas. These MOA are filed with the EPA Region 4 office. At a minimum each state or local jurisdiction makes its monitoring plan available to each of the parties during the public comment period and informs them of changes to their plan. The Department is also in periodic communication with the other jurisdictions to ensure that changes to the network are known to all parties. The MOAs with other state and local jurisdictions are being fulfilled in accordance with 40 CFR Part 58, Appendix D requirements.*
- s. **Comment:** The Monitoring Plan should include reasoning behind not moving a monitor.  
*Establishing a new monitoring station is a complicated endeavor that requires substantial investment by the Department. The Department typically leaves a monitoring site in place long-term, in order to fully assess the impacts of emission reduction strategies which often take many years for full implementation. Due to the complex, dynamic nature of the atmosphere, it can take many years of data to get a complete picture of trends in the data. The Department is required to provide a narrative explanation for why we wish to terminate or establish a new monitoring site. There is no requirement to provide a narrative supporting the maintenance of a monitoring station.*
- t. **Comment:** The Department must account for population shifts when siting monitors.  
*The Department has developed its monitoring plan as required by 40 CFR § 58.10 and 40 CFR Part 58, Appendix D, which considers population growth as one of the factors for determining proper network design. According to the US Census population estimates from the period 2010 – 2015, Chester County has had a population decrease of 2.7%.*
- u. **Comment:** The Department failed to provide a review of changes to a  $PM_{2.5}$  monitoring network that impacts the location of a violating  $PM_{2.5}$  monitor.

*The commenter did not give a specific regulatory citation for this statement. The Department believes that the commenter is referring to 40 CFR § 58.10. There are no violating PM<sub>2.5</sub> samplers or monitors in South Carolina. The only change to the monitoring plan related to PM<sub>2.5</sub> was to relocate a sampler to maintain quality assurance collocation requirements (40 CFR Part 58, Appendix A). Therefore, the Department has not failed to provide for the review of changes to the PM<sub>2.5</sub> network.*

- v. **Comment:** The Department failed to mention any new technologies that could be incorporated into the monitoring network. The commenter references that Section 58.10(13)(d) requires the Department to acquaint itself with any new technologies that are appropriate for incorporation into the ambient air monitoring network.  
*Pursuant to 40 CFR § 58.10(a)(13)(d), the Department would consider this issue at the time of its five-year assessment, and not in the scope of its annual ambient air network monitoring plan.*
- w. **Comment:** Although the Department mentioned obsolete equipment in its budget request to the State Senate, it was not mentioned in the Monitoring Plan.  
*The purpose of the Monitoring Plan is to show what the Department plans to monitor (pollutants, locations, etc.) during the next eighteen months and to demonstrate that the Department is complying with the requirements found in 40 CFR Part 58. Monitoring equipment condition and funding are not required to be included in the Monitoring Plan.*
- x. **Comment:** Wind rose information should be included in the Monitoring Plan for each station.  
*The Department develops and evaluates wind rose information when proposing to establish or terminate a monitoring site. The Department provides that information to the EPA as part of its justification. Wind rose information is not typically included in a state's annual monitoring plan; however the Department will consider providing this type of information on our Ambient Air Monitoring Network webpage.*
- y. **Comment:** Compared to other state monitoring plans, South Carolina's Monitoring Plan is inferior. Plans from Kentucky and Oregon were specifically mentioned or provided.  
*The Department is committed to improving the content and format of its monitoring plan and welcomes all suggestions. The Department's plan meets all of the requirements of 40 CFR § 58.10. The approval of the Department's most recent Monitoring Plan can be found at:*  
[http://www.dhec.sc.gov/HomeAndEnvironment/Docs/EPA%20Letter%20to%20SC\\_Final%20SC%20Network%20Plan%20Response%2011-19-15.pdf](http://www.dhec.sc.gov/HomeAndEnvironment/Docs/EPA%20Letter%20to%20SC_Final%20SC%20Network%20Plan%20Response%2011-19-15.pdf).
- z. **Comment:** Comment was received stating that 75% of the 50 monitoring stations inspected by the EPA during the most recent TSA were found to have significant deficiencies.  
*Seventeen monitoring stations (50% of our sites) were inspected by the EPA during the TSA. 75% of those sites were found to have probes/inlets which did not meet regulatory requirements. These issues were related to either trees being too close to the monitoring*

*station, or trees located near the monitor being too high and are not considered significant deficiencies. The Department has worked closely with the EPA and landowners since the findings from the TSA were finalized to trim/remove trees, seek site terminations, move equipment, and seek waivers for the requirements (where appropriate). We are still in the process of relocating a small number of sites and are communicating regularly with the EPA to find mutually acceptable areas to conduct air monitoring.*

## **V. Industry**

- a. **Comment:** Chester County is the “de facto” location of heavy-polluting industries. DHEC must increase air monitoring stations from Columbia, SC to the fast growing county of Chester, South Carolina.

*Monitoring stations in South Carolina’s ambient air monitoring network are specifically located to represent ambient pollution levels in a diverse set of geographical areas and are required to be placed in areas with the highest population, or where the highest pollutant concentrations are expected to occur. If an ambient monitor in an area with high concentrations demonstrates compliance with the national health-protective standards, then it is reasonable to expect that other areas with lower emissions which are not required to have a monitor will also have concentration lower than the national standards. The Department does not believe that additional ambient air monitoring is warranted in Chester County at this time. Furthermore, according to the US Census population estimates from the period 2010 –2015, Chester County had a population decrease of 2.7%, while Richland County had a population increase of 5.9% during the same time period. The Department will continue to evaluate the need to add or relocate monitors across the state annually.*

## **VI. Environmental Justice Concerns**

- a. **Comment:** The Department is actively creating an environmental justice issue by concentrating pollution sources in a community with no air monitoring that is very poor, elderly, and without health insurance. The commenter asserts that Chester County is a vulnerable population based on the latest Census data. The commenter also claims that the Department is actively creating an environmental justice issue by concentrating pollution sources in a community with no air monitoring that is very poor, elderly, and without health insurance.

*Each facility is required to comply with state and federal air quality regulations and standards, which are established to protect the public health of all citizens, especially sensitive populations, and the environment.*

*The Department encourages communities to stay engaged with local government, and stakeholder groups to influence local planning and zoning decisions.*

- b. **Comment:** Because Chester County is one of the poorest areas in one of the poorest states, the possible EJ component of NO<sub>2</sub> monitoring should be considered for adding sites.

*The Department believes the commenter is referring to the Regional Administrator's required monitoring sites established as part of the 2010 National Ambient Air Quality Standards for NO<sub>2</sub>. 40 CFR Part 58, Appendix D, Section 4.3.4 states that the Regional Administrator will require a minimum of forty additional NO<sub>2</sub> monitoring stations nationwide to protect susceptible and vulnerable populations. The EPA established criteria for where it wanted to place the monitoring stations and contacted the affected states to establish monitoring. South Carolina's ambient air monitoring network was evaluated by the EPA, and it was determined that Greenville County was the most appropriate location for this type of monitor. The Department will work closely with the EPA if it determines that additional NO<sub>2</sub> monitoring stations are warranted.*

- c. **Comment:** Monitoring site determinations lack an EJ analysis.  
*Although there is currently no requirement for the annual monitoring plan to include an EJ analysis, the Department is working closely with the EPA to assist them in determining what an appropriate EJ analysis should entail for future federal rulemakings and policies.*
- d. **Comment:** Jones Hamilton and Giti Tire are collocated Title V facilities that, added to another 6 Title V facilities, violate the EJ Executive Order.  
*This comment is not relevant to the Department's monitoring plan. Jones Hamilton and Giti Tire are separate facilities with separate Title V Air Permits. By definition, they are not co-located for permitting purposes, as they are not on contiguous or adjacent property, do not share common control of emission activities, and the operations at each plant are classified under different industrial classifications.*

*Chester County includes six facilities with Title V permits. Each facility is required to comply with state and federal air quality regulations, which are established to protect public health and the environment.*

*Executive Order 12898 is a federal policy written to ensure that federal agencies consider environmental justice in minority populations and low-income populations. The Department is working closely with the EPA to support this policy. We are also in the process of providing the EPA valuable feedback on its draft EJ2020 Action Agenda.*

## **VII. Air Permitting Process/Air Program Concerns**

- a. **Comment:** The Department should incorporate analyses comparable to other states in the air permitting process. The commenter provided a copy of Texas's "State Property Line Standard Analysis" and "Health Effects Analysis" as a means of replacing the Department's repeal of Regulation 61-46, Nuisances.  
*This comment is not relevant to the Department's monitoring plan. The Department's Nuisance Regulation was repealed in April, 2016 because there were other regulations and statutes that give the Department sufficient authority to adequately address environmental and public health matters.*

- b. **Comment:** “Polluters” should be required to install fenceline monitors if the facility is ever in violation of Federal or state standards.  
*This comment is not relevant to the Department’s monitoring plan. The Department addresses violations of federal or state standards through enforcement channels provided for in statutes and regulations. In accordance with South Carolina air quality regulations, “no permit to construct or modify a source will be issued if emissions interfere with attainment or maintenance of any state or federal standard.” South Carolina Regulation 61-62.1, Section II.A.2.*
- c. **Comment:** Emissions and ambient air quality data should be made publicly available within 24 hours of receipt.  
*Near real-time monitoring data from all states can be accessed by the public at any time via the AirNow website ([www.airnow.gov](http://www.airnow.gov)) along with ozone forecasts.*
- d. **Comment:** The Department should implement a VOC emissions monitoring program.  
*Volatile organic compounds (VOCs) are monitored as part of the ambient air quality monitoring network. The Department currently monitors for VOCs as part of its National Air Toxics Trends site at Chesterfield. The Department periodically evaluates the monitoring network to ensure that the appropriate type of monitoring is occurring.*
- e. **Comment:** The commenter refers to the Department’s response to comments for an unspecified Title V permit and asserts that reliance on monitoring data for drafting permits was false because the monitoring data and equipment were inaccurate and faulty.  
*Deficiencies found during the recent EPA Technical Systems Audit did not specifically lead to an invalidation of monitoring data used in drafting permits. In many cases, the Department was required to “flag” the data, which means that the data user is made aware that the data point may have been affected by the conditions at the site, or affected during the data collection process in some manner. A flag indicates that the deviation was not significant enough to warrant invalidating the data point. The Department and the EPA are working closely together to resolve issues found during the Technical Systems Audit.*
- f. **Comment:** Fees for Title V permits should be increased and the fenceline monitors should be a permit requirement for any new Title V facilities.  
*This comment is not relevant to the Department’s monitoring plan. Furthermore, the Department disagrees that fenceline monitoring is needed for all new Title V facilities. The permitting process, which includes air dispersion modeling for certain pollutants at and beyond the fenceline, ensures that the facility will not cause or contribute to an exceedance of the federally established health protective national ambient air quality standards.*
- g. **Comment:** The newest version of AERMOD should be required for use, all permits utilizing AERMOD should be updated, and the Department shouldn’t issue any more permits until the newest version of AERMOD is installed. Furthermore, air permits

should not continue to be issued since the air monitoring data used for modeling in permits is known to be deficient.

*This comment is not relevant to the Department's monitoring plan.*

- h. **Comment:** Permit issued for Giti Tire did not specify what air monitoring station data was pulled from and could have used insufficient data from station far away.

*This comment is not relevant to the Department's monitoring plan.*

#### **VIII. Other/General Comment**

*One commenter made several comments of a derogatory nature about Departmental staff and management. The Department will not provide a response to any of these types of comments. However, all comments (as received) will be forwarded directly to the EPA Region 4 staff as part of our monitoring plan submission.*

## APPENDIX B: Termination Requests

The Table below contains information on the monitoring sites the DHEC has scheduled for discontinuance.

Site	ID	Date Established	Notes
Due West	45-001-0001	04/02/1991	The DHEC has determined that the Ozone monitoring at this site provides little value in supporting Ozone reduction strategies in the western part of the state.
Clemson CMS	45-077-0002	07/14/1979	The DHEC has determined that the Ozone monitoring at this site is duplicative and will be discontinued at the conclusion of the 2016 Ozone season.

**Termination requests**

The Department requests approval for termination of the Due West Site in Abbeville County, South Carolina. Basic site and monitor information is contained in the table below.

**Due West**

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

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

**Location:** 59 Jim Scott Lane

**County:** Abbeville

**Coordinates:** +34.32527, -82.38653

**Date Established:** April 2, 1991

**Site Evaluation:** 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 2017:

This site will be terminated.

Monitors:

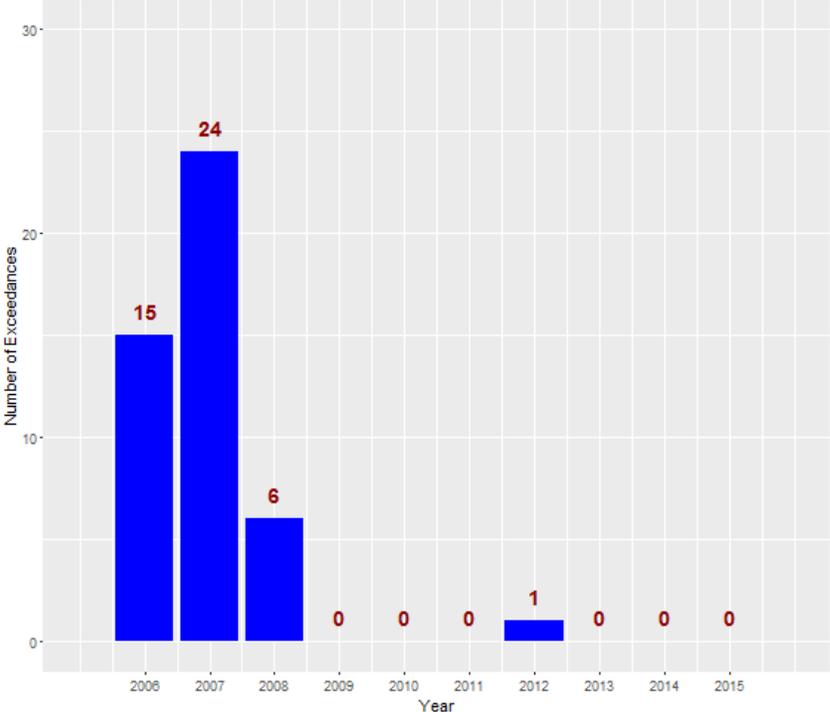
Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General / Background	SLAMS	4.2	FEM Ultraviolet Photometry	Continuous
Precipitation Chemistry	Regional	Regional Transport	Non-regulatory	1.5	IC	Weekly-Tue-Tue
Precipitation	Neighborhood	General/ Background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

<b>Item</b>	<b>Description</b>
AQS ID	45-001-0001
Street Address	59 Jim Scott Lane
Geographic coordinates	+34.32527, -82.38653
<b><i>OZONE</i></b>	
Designation	SLAMS
Analysis method	FEM Ultraviolet Photometry
Operating schedule	Continuous
Monitoring objective	General / Background
Monitoring scale	Urban
<b><i>PRECIPITATION CHEMISTRY</i></b>	
Designation	Non-regulatory
Analysis method	IC
Operating schedule	Weekly (Tuesday -Tuesday)
Monitoring objective	Regional Transport
Monitoring scale	Regional
<b><i>PRECIPITATION</i></b>	
Designation	Non-regulatory
Analysis method	Tipping bucket
Operating schedule	Continuous
Monitoring objective	General / Background
Monitoring scale	Neighborhood
MSA represented	None

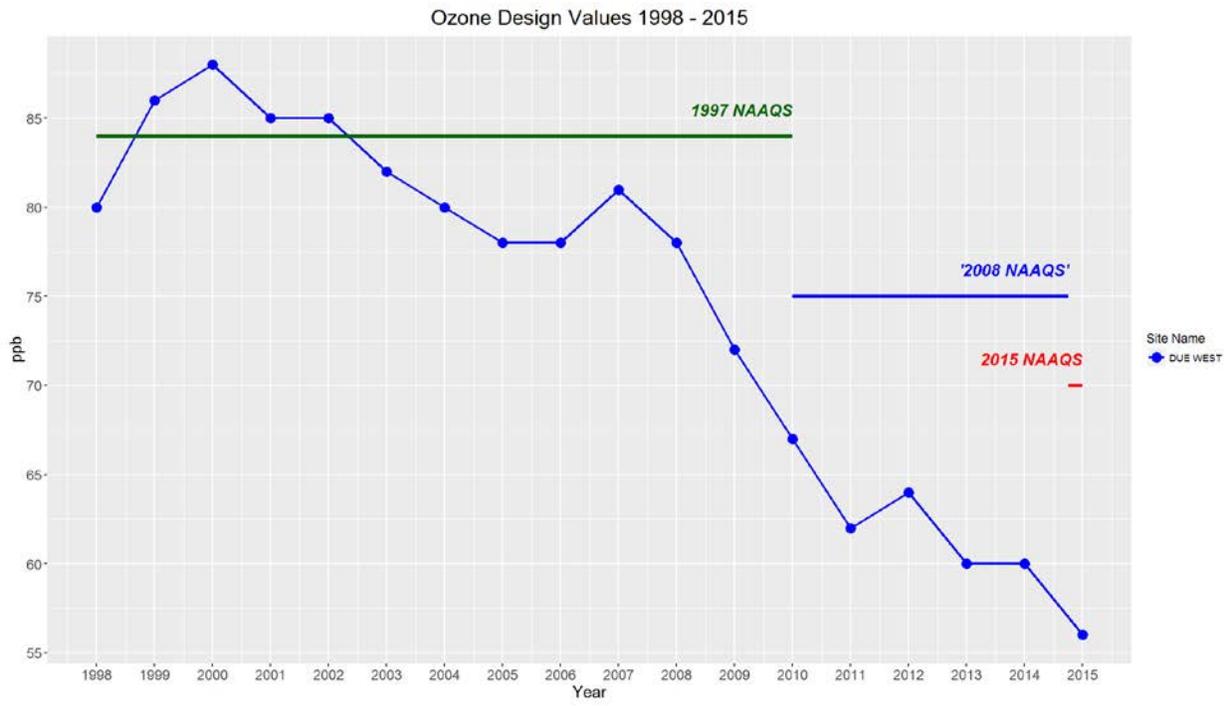
*Justification for request*

The Due West site, located in Abbeville County is located in the Greenwood micropolitan area (mSA). The Greenwood mSA does not have minimum monitoring requirement for Ozone. The site was established as part of the Southeast Regional Oxidant Network- Spatial Ozone Network in 1991 and has since served to document transport of Ozone entering the state from the west. The Due West monitoring site has had only one 8-hour average exceeding the current Ozone standard since 2009 (Figure 1). Based on significantly decreased concentrations, the area-wide decreasing trend in Ozone design values, and the low design value at this location (Figure 2), the Department believes that the data collected at the Due West monitoring site is providing little value in supporting Ozone reduction strategies in the western part of the state.

**Figure 1:  
Due West Exceedances Over 70 ppb**



**Figure 2:**



The Department requests approval for termination of the Clemson CMS Site in Pickens County, South Carolina. Technical documentation justifying this site termination was submitted to the EPA on March 16, 2016

**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:** +34.65366, -82.83865

**Date Established:** July 14, 1979

**Site Evaluation:** October 15, 2015



The Clemson CMS site is located on the grounds of Clemson University near the western border of Pickens County. This monitor measures Ozone concentrations upwind of the Greenville-Spartanburg urbanized area.

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. The sample inlets are 27 meters from the nearest road.

Changes for 2017:

This site will be terminated at the end of the 2016 Ozone season.

Monitors:

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

## **APPENDIX C: EPA Response to 2016 Site Terminations and Waivers Request**

This appendix contains the documentation provided to the EPA requesting waivers, site terminations and site startups on March 16, 2016. Additionally, this appendix contains the EPA approval letter for the changes requested. The purpose of these documents is to provide the complete documentation of all changes to the monitoring plan in 2016.



Catherine E. Heigel, Director

*Promoting and protecting the health of the public and the environment*

February 8, 2016

Beverly H. Banister, Director  
Air, Pesticides & Toxics Management Division  
US EPA Region 4  
Sam Nunn Atlanta Federal Center  
61 Forsyth St., SW  
Atlanta, GA 30303

RE: Ambient Air Monitoring Site Waiver Requests

This letter is to inform you of modifications that the South Carolina Department of Health and Environmental Control (Department) wishes to make to the South Carolina Monitoring Network. Specifically, the Department respectfully requests approval for a 40 CFR Part 58, Appendix E – Probe Siting waiver to be granted for the Congaree Bluff (45-079-0021) Site. Also, the Department requests a waiver to be reissued for the Greenville ESC (45-045-0015) Site.

Chapter 40 of the Code of Federal Regulation (CFR) Part 58 Appendix E Section 10 - Waiver Provisions, states that "The EPA will consider a written request from the State agency to waive one or more siting criteria for some monitoring sites providing that the State can adequately demonstrate the need (purpose) for monitoring . . . at that location" and (in Section 10.1.2) if "the monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints (e.g., inability to locate the required type of site the necessary distance from roadways or obstructions)". The Department believes that the requirements for consideration of the above waivers specified in 40 CFR Part 58 Appendix E 10 are met.

### **Reissuance of Waiver for Greenville ESC Ambient Air Monitoring Site (45-045-0015)**

#### ***General site information***

The Department requests a reissuance of a waiver for the probe siting criteria for spacing from obstructions specified in 40 CFR Part 58 Appendix E 4(a) for the criteria pollutant sampling being conducted at the Greenville ESC Ambient Air Monitoring Site (45-045-0015) in Greenville County. Basic information on the Site is listed in Table 1. The site record indicates that both requirements specified in 40 CFR Part 58 Appendix E 10.1 for consideration of a waiver have been met.

**Table 1: General Information for the Greenville ESC Site**

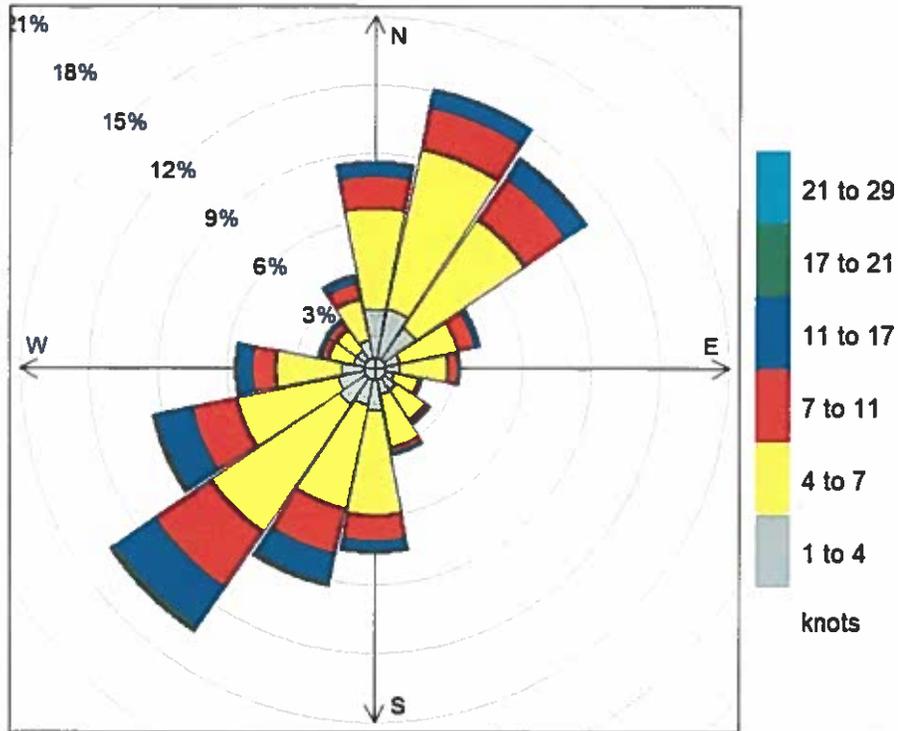
<b>Item</b>	<b>Description</b>
AQS ID	45-045-0015
Street Address	133 Perry Avenue
Geographic coordinates	+34.84389, -82.41458
<b><i>SULFUR DIOXIDE</i></b>	
Designation	SLAMS
Analysis method	FEM UV fluorescence
Sampling Frequency	Continuous
Monitoring objective	Population Exposure
Monitoring scale	Neighborhood
<b><i>NITROGEN DIOXIDE</i></b>	
Designation	SLAMS
Analysis method	FRM
Sampling Frequency	Continuous
Monitoring objective	Population
Monitoring scale	Neighborhood
MSA represented	Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA
<b><i>PM<sub>2.5</sub></i></b>	
Designation	SPM
Analysis method	FEM TEOM
Sampling Frequency	Continuous
Monitoring objective	Population Exposure Required FEM Collocation
Monitoring scale	Neighborhood
<b><i>PM<sub>10</sub></i></b>	
Designation	SLAMS
Analysis method	FEM TEOM
Sampling Frequency	Continuous
Monitoring objective	Population Exposure
Monitoring scale	Neighborhood

***Predominant and secondary wind patterns***

The wind data from the Greenville-Spartanburg International Airport is representative of the wind pattern for the Greenville ESC Site. Using 2010-2013 data, the wind rose in Figure 1 was created. It indicates that the predominant wind directions for this Site are from the southwest and the north-northeast. Also, secondary dominant winds come from the northeast.

**Figure 1: Wind Rose for the Greenville ESC Site**

### Greenville-Spartanburg Airport Wind Rose 2010-2013



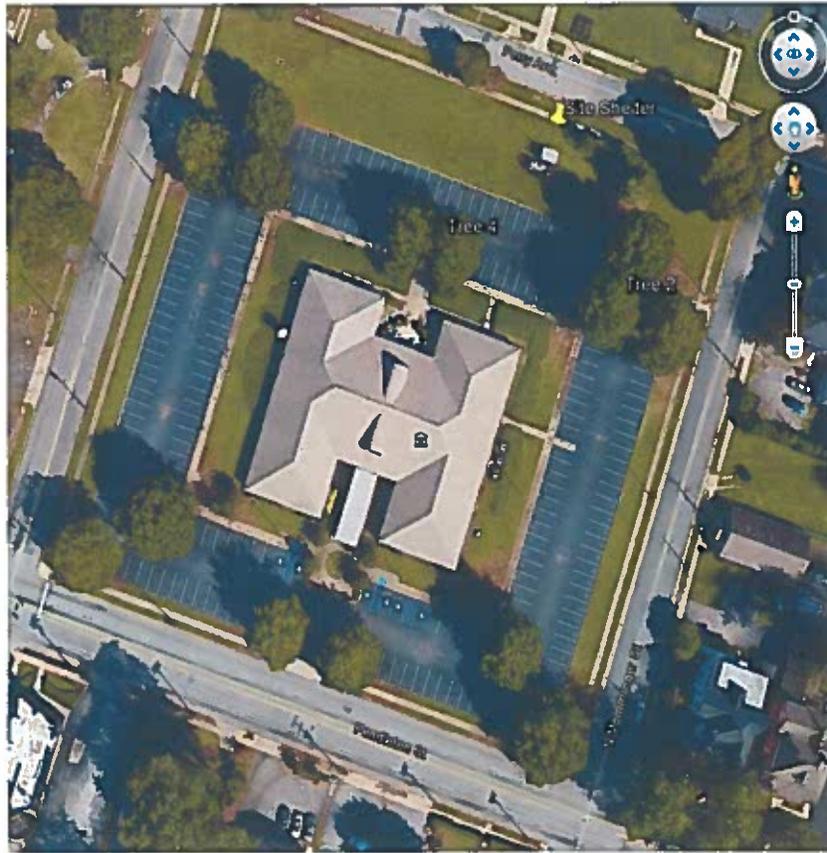
#### *Justification for request*

An aerial picture of the Greenville ESC Site location and the obstructions (Figure 2), and two panoramic views of the Site (Figures 3 and 4), are shown below. The Greenville ESC Site is constrained by the presence of underground utilities that limit possible placement of the building and stand. The Site was placed approximately equidistant from the most significant trees. The Site topography, land use, and vegetation density is typical of the area being represented. The Site was granted a waiver for the potential obstruction to air flow in 2009<sup>1</sup>.

Two mature trees have been identified as protruding above the sampler probes, as currently configured, more than half the distance to the probe. Relocation of the monitors on the stand was done to maximize the distance from the trees, but the minor rearrangements and improvements that were possible did not have any detectable impact on measured concentrations or representativeness of the monitoring for the criteria pollutants. All other Appendix E probe siting criteria are being met at this Site.

<sup>1</sup> Meiburg, Nov 6, 2009

**Figure 2: Greenville ESC (45-045-0015) - Site Location and Obstructions**



**Figure 3: Greenville ESC Panorama Taken from Stand**



**Figure 4: Greenville ESC Panorama Taken from Roof of Monitoring Building**



**Waiver for Congaree Bluff (45-079-0021)**

***General site information***

The Department requests approval for a waiver to be granted for the probe siting criteria for spacing from obstructions specified in 40 CFR Part 58 Appendix E Section 4, Section 5, and Section 11 Table E-4 for the ozone monitoring being conducted at the Congaree Bluff Ambient Air Monitoring Site (45-079-0021) in Richland County.

The Congaree Bluff Site is located within the boundary of the Congaree National Park (Park), which was established by Congress in 1976. The Site represents general/background concentrations within the Congaree National Park. Most of the Park is designated as Wilderness and also has a Class II Floor Area designation<sup>2</sup>. The NPS has a Resource Management Plan, which includes an agreement with the Department to operate an air monitoring station within the Park boundaries. The original Site (Congaree Swamp (45-079-1006)) was located in the flood plain and had to be relocated in 2001 because of operation and long term viability of the monitoring activity within a designated wilderness area<sup>3</sup>. As a result of the Wilderness designation, modifications or improvements are highly restrictive and, in some cases, prohibited. Basic information on the Site is listed in Table 2.

**Table 2: General Information for the Congaree Bluff Site**

<b>Item</b>	<b>Description</b>
AQS ID	45-079-0021
Street Address	1850 South Cedar Creek Road
Geographic coordinates	+33.81467, -80.78113
<b><i>OZONE</i></b>	
Designation	SPM
Analysis method	FEM Ultraviolet Photometry
Sampling Frequency	Continuous
Monitoring objective	General / Background
Monitoring scale	Urban
<b><i>SULFUR DIOXIDE</i></b>	
Designation	SPM
Analysis method	FEM UV Fluorescence

<sup>2</sup>Southeast Support Office, Natural Resources Management, *Relocation of the Ambient Air Quality Monitoring Station at Congaree Swamp National Monument*, by Bobby C. Carson, (Columbia, South Carolina, August, 1998).

<sup>3</sup>South Carolina Department of Health and Environmental Control, *General Management Plan/Wilderness Suitability Study and Environmental Assessment letter*, by Otto Pearson, (Columbia, South Carolina, December 17, 1987).

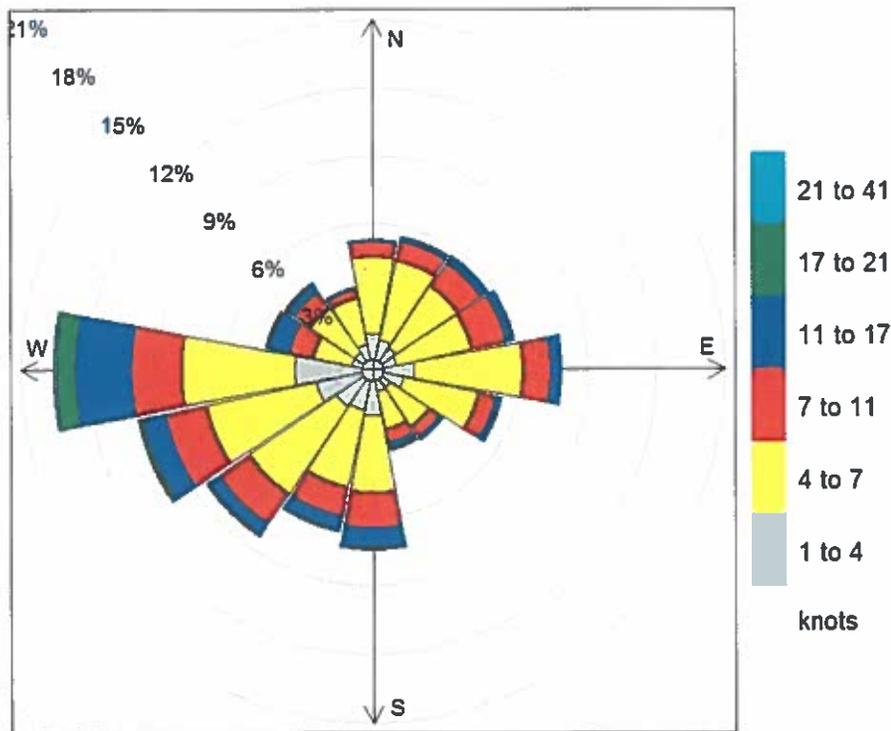
Table 2: General Information for the Congaree Bluff Site	
Item	Description
Sampling Frequency	Continuous
Monitoring objective	General / Background
Monitoring scale	Urban

***Predominant and secondary wind patterns***

The wind data from the Columbia Metropolitan Airport is representative of the wind pattern for the Congaree Bluff Site. Using 2010-2013 data, the wind rose in Figure 5 was created. It indicates that the predominant wind direction for this Site is from the west. Also, secondary dominant winds come from the west-southwest, southwest, and north.

**Figure 5: Wind Rose for the Congaree Bluff Site**

**Columbia Airport Wind Rose 2010-2013**



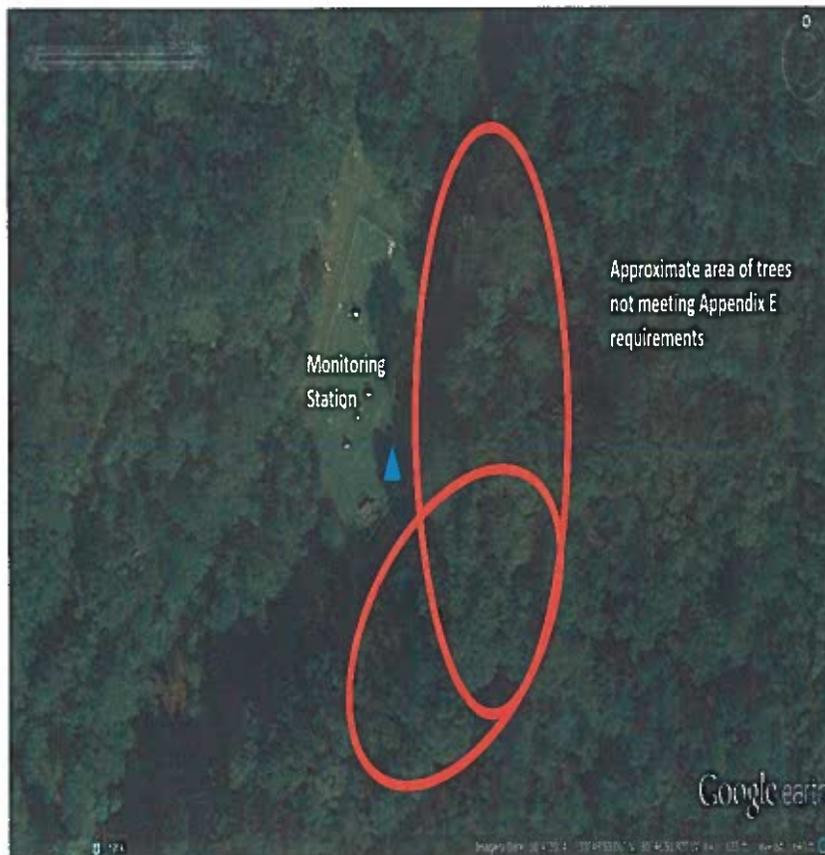
***Justification for request***

An aerial picture of the Congaree Site location and the obstructions in Figure 6, and one panoramic view of the Site (Figure 7), are shown below. The Department conducted an evaluation of siting criteria in accordance with 40 CFR Part 58, Appendix E, Section 4(a), which requires that the distance from the obstacle (such as a tree) to the probe inlet must be at least twice the height that obstacle protrudes above

the probe inlet. The requirement for Spacing from trees (Appendix E 5(a)) is not met at this Site. Two types of spacing violations of the siting criteria exist. The first is a drip line violation southeast of the monitoring site. The probe is not at least ten meters from the drip line of the tree. These limbs will be pruned back to increase the distance from the probe to greater than ten meters before March 31, 2016. The second violation is that numerous trees were identified as obstructions and would need to be removed in order to meet the siting criteria. Staff have estimated that in order to comply with the requirements of Appendix E approximately 44 trees would need to be removed. Figure 7 provides a comprehensive view of all of the trees that would need to be removed. The trees of concern are primarily located to the north-east, east, south-east, and south of the monitoring site. The forestry staff at the Park are willing, but hesitant to remove some of the trees as they are vital to the delicate ecosystem there, particularly to the endangered Red-cockaded Woodpecker.

The probes at the Congaree Bluff Site cannot be reasonably located so as to meet the siting criteria because of physical constraints, nor is there a suitable site to which to move the station, as there are firm restrictions on changes made to the Site. Also, the current location of the Congaree Bluff Site is in a clearing within the bounds of the Congaree National Park and is constrained by the presence of underground utilities that limit possible placement of the building and stand. In order to resolve the siting issues at the Congaree Bluff Site, the Department intends to explicitly state in the next modification of the annual monitoring plan that the purpose of this Site is to characterize air quality within the Congaree National Park and change the scale of the monitor in the Air Quality System (AQS) from “Urban” to “Neighborhood”.

**Figure 6: Congaree Bluff (45-079-0021) - Site Location and Obstructions**



**Figure 7: Congaree Bluff Panorama Taken from Continuous Monitor**



**Public comment period**

The public comment period for these site waiver requests will be from February 8, 2016 through March 8, 2016. All comments received will be forwarded to EPA Region 4 along with the Department's response.

Thank you for your consideration to grant these two waivers and the reissue of a waiver for the spacing from obstructions requirements for these Sites. Should you have any questions or need additional information regarding this matter, please contact Robert Brown of my staff at (803) 898-4105.

Sincerely,

A handwritten signature in black ink, appearing to read 'Rhonda Banks Thompson', written in a cursive style.

Rhonda Banks Thompson  
Interim Bureau Chief  
Bureau of Air Quality

cc: Todd Rinck, US EPA Region 4, Chief, Air Data & Analysis Section  
Ryan Brown, US EPA Region 4  
Renee Shealy, BEHS  
Sandra Flemming, BEHS  
Robert Brown, BAQ  
Scott Reynolds, BEHS



Catherine E. Heigel, Director

*Promoting and protecting the health of the public and the environment*

February 8, 2016

Beverly Banister, Director  
Air, Pesticides & Toxics Management Division  
U.S. EPA, Region 4  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street, SW  
Atlanta, GA 30303-8960

Re: Addendum to the South Carolina 2016 Annual Air Network Monitoring Plan

Dear Ms. Banister:

On July 20, 2015, the South Carolina Department of Health and Environmental Control (Department) submitted the State of South Carolina Network Description and Ambient Air Network for Calendar Year 2016 (Monitoring Plan) in accordance with the requirements of 40 Code of Federal Regulations (CFR) 58.10. The Department received the Monitoring Plan approval from the United States Environmental Protection Agency (EPA), Region 4 on November 19, 2015. This letter is to inform you of modifications the Department wishes to make to the ozone monitoring network and to the Monitoring Plan. Specifically, the Department respectfully requests approval to terminate the Clemson CMS (45-077-0002) Site, Cowpens National Battlefield (45-021-0002) Site, Bushy Park Pump Station (45-015-0002) Site, the York CMS (45-091-0006) Site, the Famoda Farm (45-45-1003) Site, and the Bates House (45-079-0019) Site. Additionally, the Department requests approval to establish two new sites, which includes a new site to replace the York CMS Monitoring Site and the startup of the Coastal Carolina (45-051-0008) Site. An addendum to the Monitoring Plan reflecting the implementation of the recommended modifications can be found in Appendix A.

### **Termination of the Clemson CMS (45-077-0002) Site**

The Department is requesting permission to terminate the Clemson CMS (45-077-0002) Site. A technical justification for this request can be found in Appendix B.

### **Termination of the Cowpens National Battlefield (45-019-0002) Site**

The Department is providing notification that it intends to terminate all monitoring at Cowpens prior to the start of the 2016 ozone monitoring season. Ozone monitoring at this site is designated as a special purpose monitor and is not used to meet minimum monitoring requirements. Cowpens is not a critical monitoring site for our ozone forecasting program. In recent years trees have grown up around the monitoring site, and it no longer meets siting criteria found in 40 CFR 58, Appendix E. After discussions with National Park Service representatives, there are no other areas in the Battlefield that we can relocate to due to the presence of cultural and historical artifacts. Basic site information about the Cowpens National Battlefield site can be found in Table 1 along with a picture showing the extent of tree growth near the site in Figure 1.

<b>Item</b>	<b>Description</b>
AQS ID	45-021-0002
Street Address	McGinnis Road (Old SC Hwy 110)
Geographic coordinates	+35.13045, -81.81656
Designation	SPM
Analysis method	FEM Ultraviolet Photometry
Sampling Frequency	Continuous
Monitoring objective	Upwind / Background
Monitoring scale	Urban
MSA represented	Greenville-Spartanburg-Anderson CSA/ None

The picture in Figure 1 presents a panoramic view of the Site. A horizontal red line has been added to the picture to mark an angle of approximately 26 degrees, indicating the limit of the requirement in Appendix E, Section 4(a) concerning spacing from obstructions and height above the monitor probe. In other words, if the top of an object is above the top red line in the picture, then it does not meet the Appendix E, Section 4(a) requirements.

**Figure 1: Cowpens Panorama Taken from Ozone Monitor**



### **Termination of the Bushy Park Pump Station (45-019-0002) Site**

The Department requests approval for termination of the Bushy Park Pump Station Site in Berkeley County. Basic information on the Site is listed in Table 2, and an aerial picture is shown in Figure 2.

<b>Item</b>	<b>Description</b>
AQS ID	45-015-0002
Street Address	River Oak Drive, Goose Creek, South Carolina, Berkeley County
Geographic coordinates	+32.98724, -79.93671
Designation	SLAMS
Analysis method	FEM UV photometry method
Operating schedule	Continuous
Monitoring objective	Maximum ozone concentration
Monitoring scale	Urban
MSA represented	Charleston-North Charleston, South Carolina MSA

**Figure 2: Bushy Park Site Location**



***Justification for request***

The Department has conducted an evaluation of siting criteria in accordance with 40 CFR Part 58, Appendix E. Two of the requirements were not met at this Site including: 1) Spacing from obstructions (Appendix E 4(a) and (b)); and 2) Spacing from trees (Appendix E 5(a)). After further evaluation, the Department has determined that the extent of the tree growth surrounding this Site would be too great to remedy by trimming or removing the trees and believes that the Site may not be providing ozone data consistent with the stated monitoring objective.

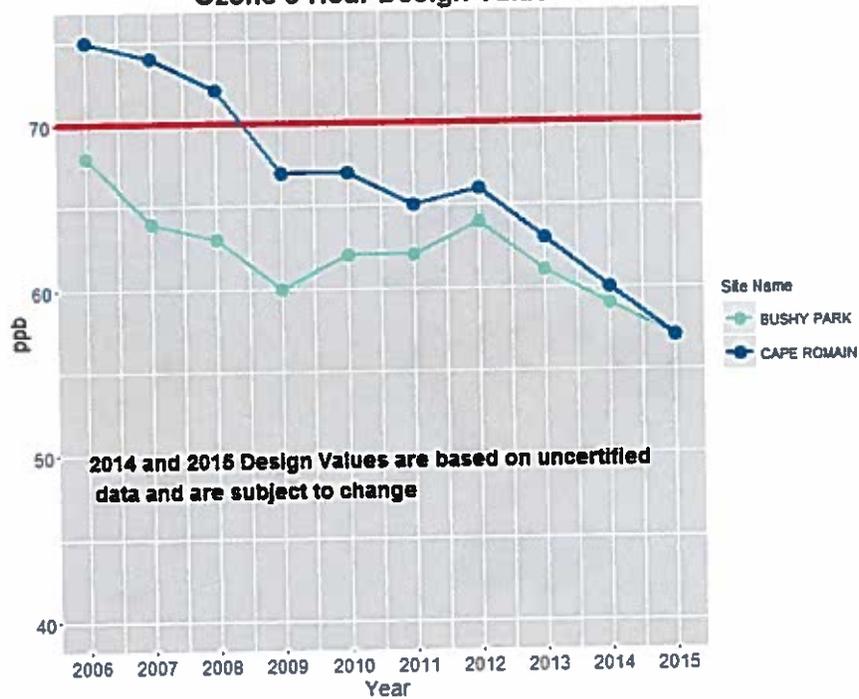
Appendix E, Section 4(a) requires that the distance from the obstacle (such as a tree) to the probe inlet must be at least twice the height that obstacle protrudes above the probe inlet. Figure 3 presents a panoramic view of the Site. A horizontal red line has been added to the picture to mark an angle of approximately 26 degrees, indicating the limit of the requirement in Section 4(a) concerning spacing from obstructions and height above the monitor probe. In other words, if the top of an object is above the top red line in the picture, then it does not meet the Section 4(a) requirements. As can be seen in Figure 3, numerous trees in almost all directions do not meet this requirement. The Department requests permission to terminate the Site. Termination of the Site will impact our 40 CFR 58, Appendix D requirements to maintain two ozone monitoring stations in the Charleston-North Charleston MSA. The Department is currently seeking a replacement site nearby within the same area of representativeness which will meet Appendix E requirements. Termination of the Bushy Park Site will occur once the replacement site is identified and approved by the EPA.

**Figure 3: Bushy Park Pump Station (45-015-0002) Site Panorama**



Figure 4 shows the ten-year design value trend graph for currently active monitors in the Charleston-North Charleston MSA. The Bushy Park Pump Station site has typically had lower design values than the other monitoring site in the MSA. As stated previously, the issues with meeting Appendix E siting criteria and review of available monitoring results has led the Department to conclude that a site location that meets exposure requirements and better serves the monitoring objectives for the MSA must be established, allowing termination of the Bushy Park site.

**Figure 4: Ten-Year Design Value Graph  
2006-2015 Charleston-North Charleston MSA  
Ozone 8-Hour Design Values**

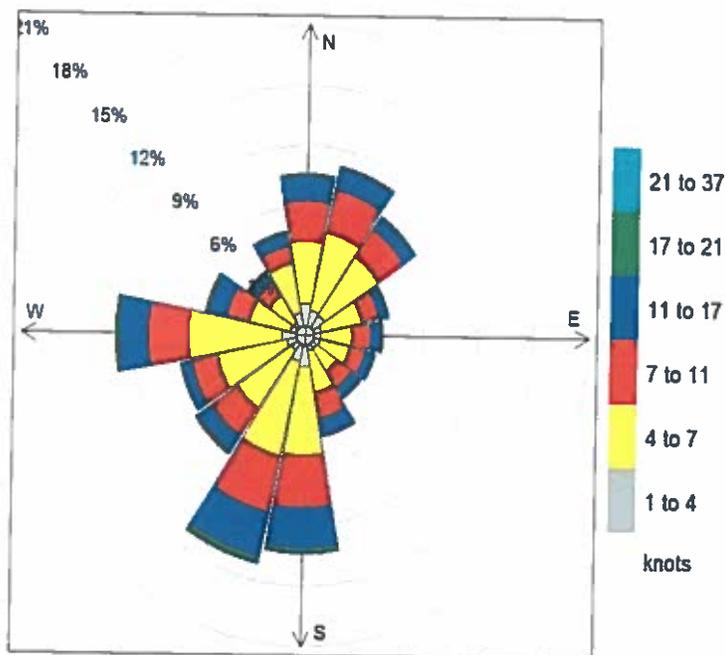


***Predominant and secondary wind patterns***

The wind data from the Charleston International Airport is representative of the wind pattern for the Bushy Park Site. The wind rose in Figure 5 was created using 2010-2013 wind data. It indicates that the predominant wind directions for this Site are from the south south-west, south, and west. Also, secondary dominant winds come from the north north-east.

**Figure 5: Wind Rose for the Bushy Park Site**

**Charleston Airport Wind Rose 2010-2013**



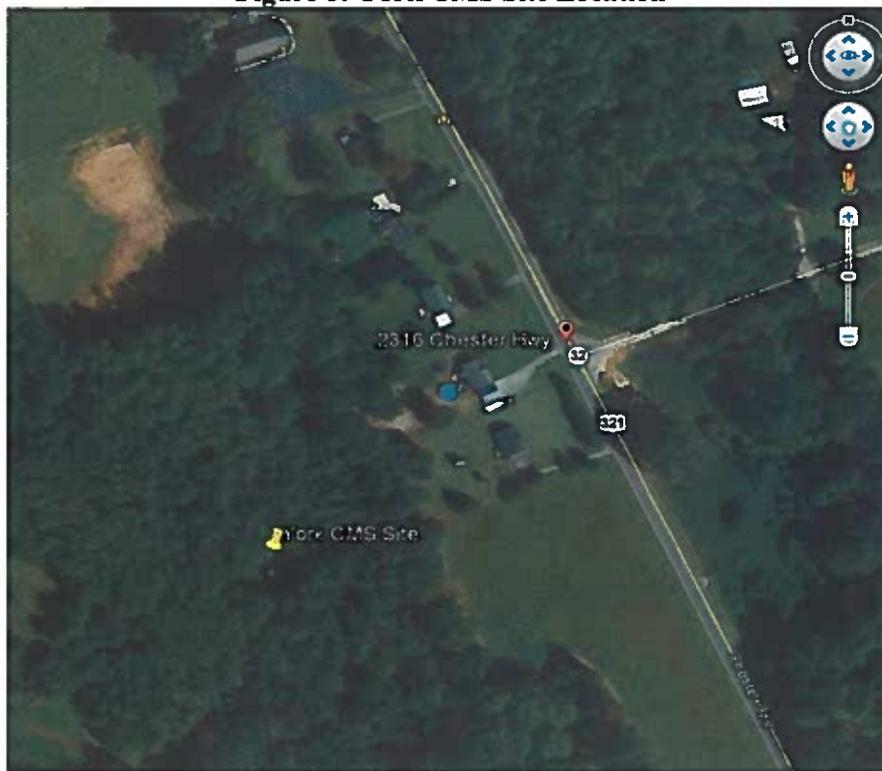
**Termination of the York CMS (45-091-0006) Site**

The Department requests approval for termination of all monitoring at the York CMS Site in York County, South Carolina. Basic information on the Site is listed in Table 3 below. An aerial view of the York CMS Site is shown in Figure 6.

<b>Table 3: York CMS Site Information</b>	
<b>Item</b>	<b>Description</b>
AQS ID	45-091-0006
Street Address	2316 Chester Hwy (US 321)
Geographic coordinates	+34.93581, -81.22838
<b>OZONE</b>	
Designation	SLAMS
Analysis method	FEM Ultraviolet Photometry
Operating schedule	Continuous
Monitoring objective	Upwind Background
Monitoring scale	Urban
<b>SULFUR DIOXIDE</b>	
Designation	SPM
Analysis method	FEM UV Fluorescence
Operating schedule	Continuous

Table 3: York CMS Site Information	
Item	Description
Monitoring objective	Upwind Background
Monitoring scale	Urban
<b>WIND SPEED / WIND DIRECTION</b>	
Designation	Non-regulatory
Analysis method	Instruments for wind speed, wind direction
Operating schedule	Continuous
Monitoring objective	Local Conditions
Monitoring scale	Neighborhood
MSA represented	Charlotte-Concord-Gastonia, NC-SC

**Figure 6: York CMS Site Location**



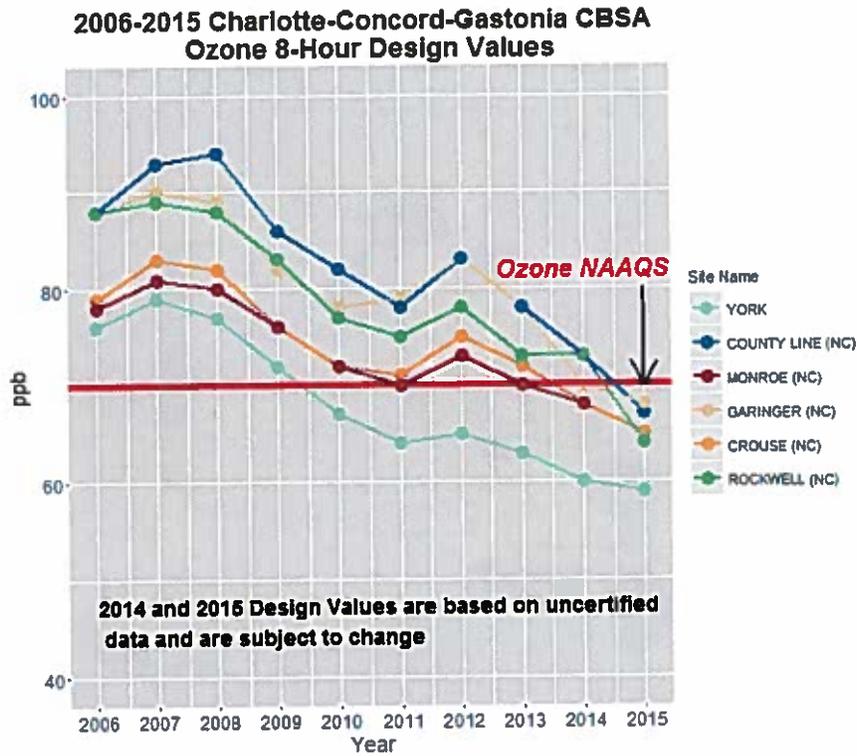
***Justification for request***

The York CMS (45-091-0006) Site (Figure 7) is being discontinued because access to the location is no longer available. The land owner has asked the Department to terminate and remove the site by June 2016. The Department requests that the EPA approve termination of the York CMS (45-091-0006) Site. A new site is being established approximately 3.5 miles northeast of the York CMS Site. Information on the new site and concurrence for establishment can be found in the next section. The York CMS Site has provided upwind, background data for the Charlotte, North Carolina area and is not the design value site for the MSA as indicated in Figure 8. The York CMS Site has had the lowest design value for the MSA over the last ten years.

**Figure 7: York CMS (45-091-0006) Site**



Figure 8: Ten Year Design Value Graph

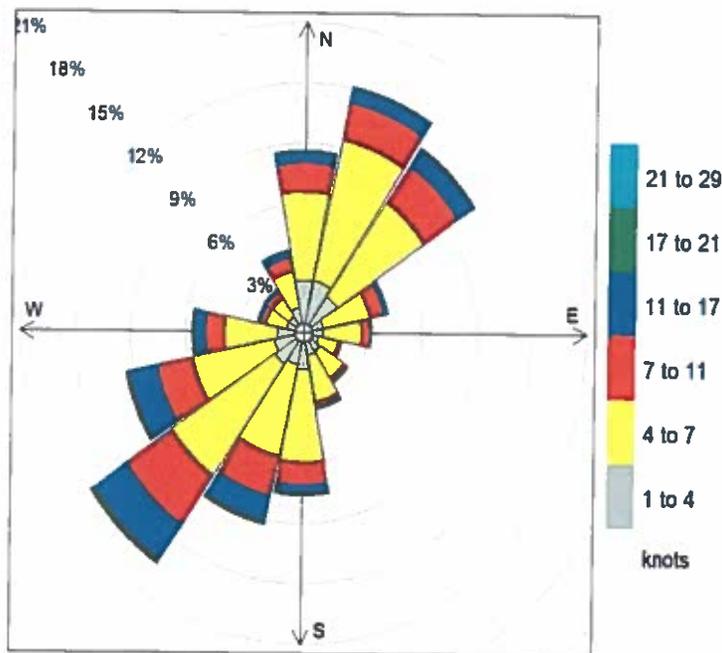


*Predominant and secondary wind patterns*

The wind data from the Greenville-Spartanburg Airport is representative of the wind pattern for the York CMS Site. The wind rose in Figure 9 was created using 2010-2013 wind data. It indicates that the predominant wind directions for this Site are from the south-west and north north-east. Also, secondary dominant winds come from the north-east and west south-west.

**Figure 9: Wind Rose for the York CMS Site**

**Greenville-Spartanburg Airport Wind Rose 2010-2013**



### **Establishment of the York County Monitoring Site**

Due to the impending loss of access at the York CMS Site, a replacement site is being established. The replacement site location is approximately 3.5 miles northeast of the current site in a rural area in central York County. This location is representative of the same area as the current location (Figure 10). The Department is in the process of obtaining the necessary permits for the new site construction. We anticipate startup of the new site during the 2016 ozone monitoring season, allowing several months of concurrent data collection at the current and replacement sites before the monitoring equipment at York CMS must be removed.

The location for the replacement York County site was visited by Science and Ecosystems Support Division and Air, Pesticides & Toxics Management Division staff in July 2015.

#### ***Statement of Purpose***

The purpose of the new York County Monitoring site will be to provide upwind background ambient air concentrations of ozone and sulfur dioxide for the Charlotte-Concord-Gastonia MSA.

#### ***Compliance with Appendices A, C, D and E***

As required in 40 CFR Part 58 Appendix A, the Division of Air Quality Analysis (DAQA) in the Bureau of Environmental Health Services (Division) establishes, maintains, and operates the sites and instruments and performs the analysis of samples collected. Data generated by the network for

comparison to the NAAQS is verified to be accurate and reported by the Division to the national AQS database for storage and public access. Regular calibration and audits are performed to verify that the instruments are operating correctly and data being collected is accurate.

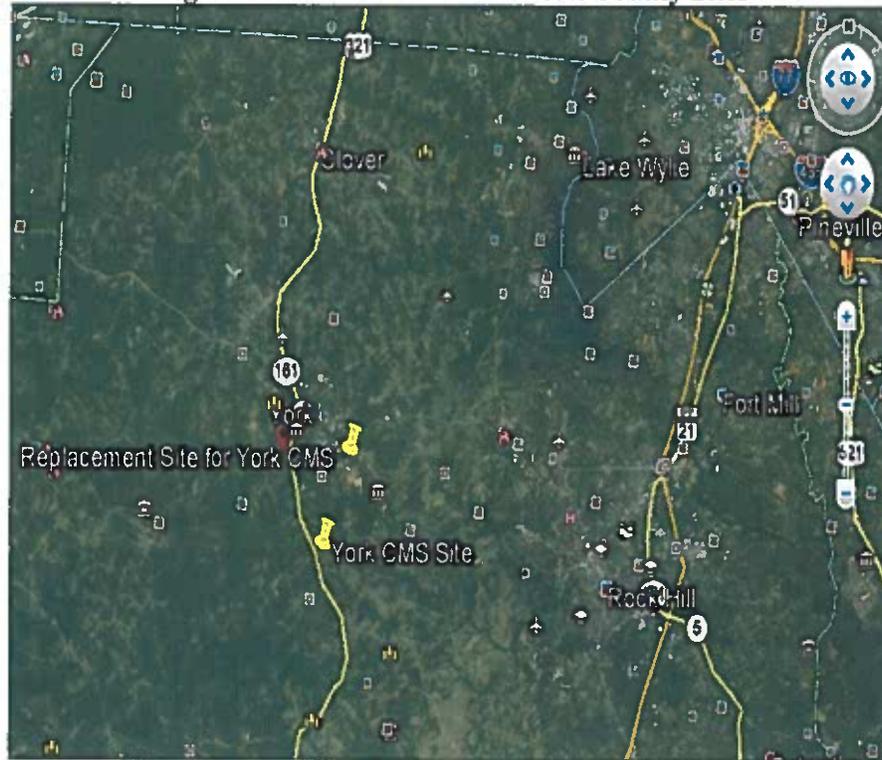
As required in 40 CFR Part 58 Appendix C, all criteria pollutant monitoring in the South Carolina Monitoring Network for the purpose of comparison to the NAAQS is performed using the EPA designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM).

All criteria pollutant monitoring in the South Carolina Monitoring Network meets the monitoring objectives and spatial scales and design criteria as described in 40 CFR Part 58 Appendix D.

Basic site and monitor information is contained in Table 4 below. An aerial view of the York County Site and the York CMS Site is shown in Figure 10.

<b>Table 4: York County Site Information</b>	
<b>Item</b>	<b>Description</b>
AQS ID	45-091-0007
Street Address	Langrum Branch Road
Geographic coordinates	+34.9776, -81.2074
<b><i>OZONE</i></b>	
Designation	SLAMS
Analysis method	FEM Ultraviolet Photometry
Operating schedule	Continuous
Monitoring objective	Upwind Background
Monitoring scale	Urban
<b><i>SULFUR DIOXIDE</i></b>	
Designation	SPM
Analysis method	FEM UV Fluorescence
Operating schedule	Continuous
Monitoring objective	Upwind Background
Monitoring scale	Urban
<b><i>WIND SPEED / WIND DIRECTION</i></b>	
Designation	Non-regulatory
Analysis method	Instruments for wind speed, wind direction
Operating schedule	Continuous
Monitoring objective	Local Conditions
Monitoring scale	Neighborhood
MSA represented	Charlotte-Concord-Gastonia, NC-SC

**Figure 10: Locations of Both York County Sites**

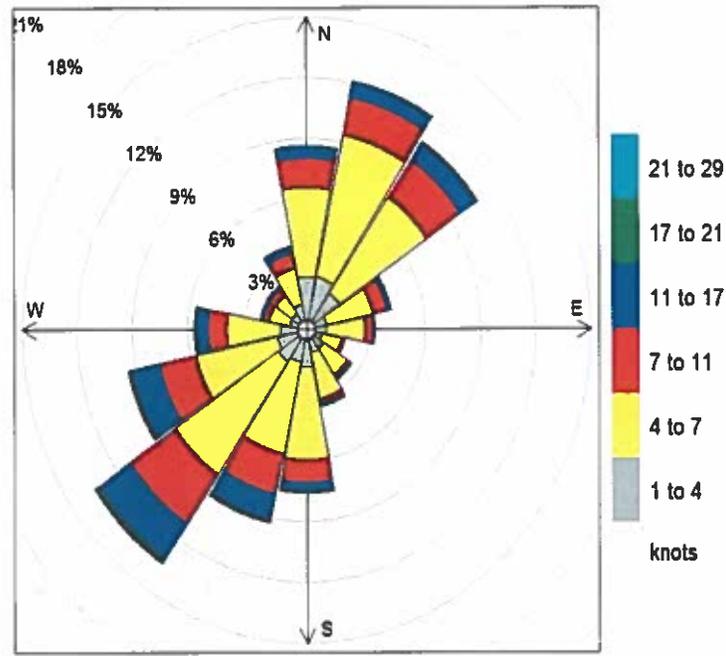


***Predominant and secondary wind patterns***

The wind data from the Greenville-Spartanburg Airport is representative of the wind pattern for the York County Site. The wind rose in Figure 11 was created using 2010-2013 wind data. It indicates that the predominant wind directions for this Site are from the south-west and north north-east. Also, secondary dominant winds come from the north-east and west south-west.

**Figure 11: Wind Rose for the York County Site**

**Greenville-Spartanburg Airport Wind Rose 2010-2013**



**Termination of the Famoda Farm (45-045-1003) Site**

The Department requests approval for termination of the Famoda Farm Site in Greenville County, South Carolina. Basic site and monitor information is contained in Table 5 below. An aerial view of the Famoda Farm Site is shown in Figure 12.

<b>Table 5: Famoda Farm Site Information</b>	
<b>Item</b>	<b>Description</b>
AQS ID	45-045-1003
Street Address	7401 Mountain View Road
Geographic coordinates	+35.05739, -82.37288
Designation	SLAMS
Analysis method	FEM Ultraviolet Photometry
Operating schedule	Continuous
Monitoring objective	Max Ozone Concentration
Monitoring scale	Urban
MSA represented	Greenville-Anderson-Mauldin

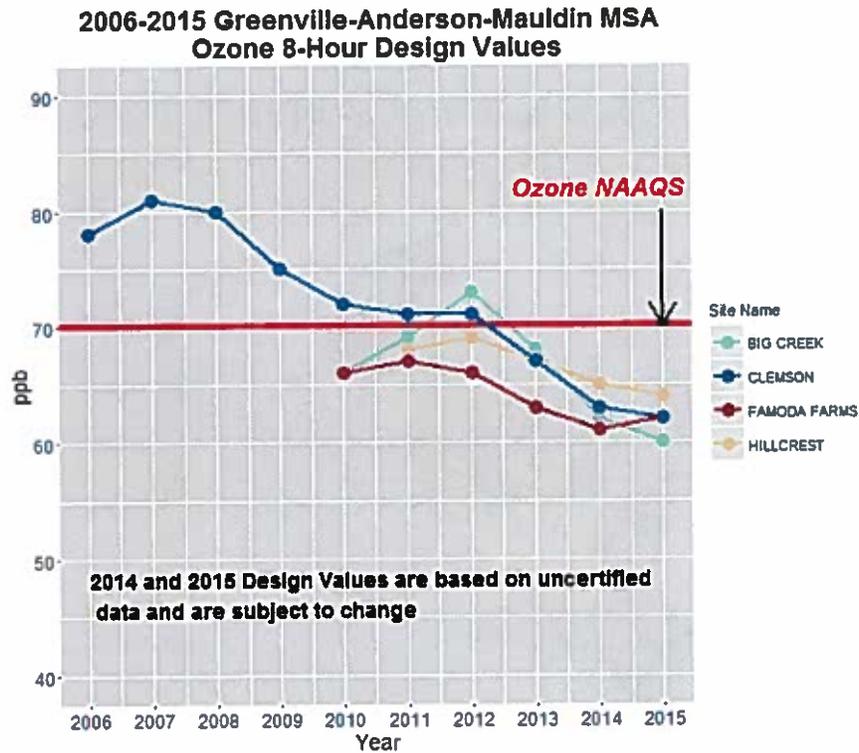
**Figure 12: Famoda Farm Site Location**



***Justification for request***

The current Greenville-Anderson-Mauldin MSA is required to have two ozone monitoring stations. The MSA currently has five ozone monitoring stations distributed along the I-85 corridor. The Department believes that loss of data due to the termination of the Famoda Farm Site will not compromise characterization of ozone in the Upstate of South Carolina. There will remain adequate coverage with the remaining network. Since data collection was reestablished in 2008 as a part of the Greenville MSA Ozone Study, the Famoda Farm site has had the lowest design value in the area and has not had a design value above the current level of the ozone standard (Figure 13).

**Figure 13: Ten Year Design Value Graph**

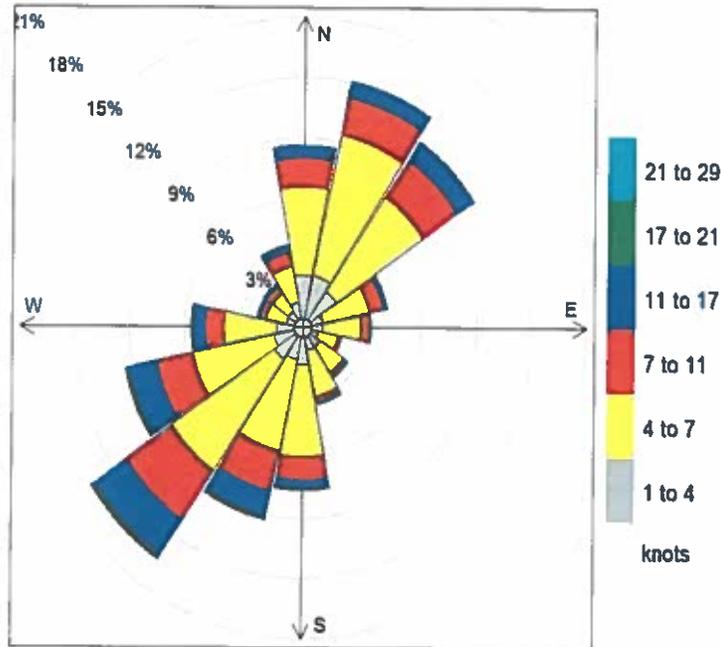


***Predominant and secondary wind patterns***

The wind data from the Greenville-Spartanburg International Airport is representative of the wind pattern for the Famoda Farm Site. The wind rose in Figure 14 was created using 2010-2013 wind data. It indicates that the predominant wind directions for this Site are from the south-west and north north-east. Also, secondary dominant winds come from the north-east and west south-west.

Figure 14: Wind Rose for the Famoda Farm Site

Greenville-Spartanburg Airport Wind Rose 2010-2013



**Termination of the Bates House (45-079-0019) Site**

The Department requests approval for termination of the Bates House Site in Richland County, South Carolina. Basic site and monitor information is contained in Table 6 below. An aerial view of the Bates House Site is shown in Figure 15.

Table 6: Bates House Site Information	
Item	Description
AQS ID	45-079-0019
Street Address	323 S. Bull Street
Geographic coordinates	+33.99150, -81.02413
<b>PM<sub>2.5</sub></b>	
Designation	SLAMS
Analysis method	FRM Gravimetric
Operating schedule	1:1
Monitoring objective	Population Exposure
Monitoring scale	Neighborhood
<b>PM<sub>2.5</sub> Collocated</b>	
Designation	SLAMS (QA Collocated)
Analysis method	Gravimetric
Operating schedule	1:6
Monitoring objective	Quality Assurance

Table 6: Bates House Site Information	
Item	Description
Monitoring scale	Neighborhood
<i>PM<sub>10</sub></i>	
Designation	SLAMS
Analysis method	TEOM
Operating schedule	Continuous
Monitoring objective	Population Exposure
Monitoring scale	Neighborhood
MSA represented	Columbia

**Figure 15: Bates House Site Location**



***Justification for request***

The Bates House (45-079-0019) Site is being discontinued because access to the location is anticipated to be lost during the summer of 2016. Demolition of a dormitory approximately 50 meters away is expected to commence at the conclusion of the current school semester. Based on this anticipated loss of access, the Department requests that the EPA approve the termination of the Bates House (45-079-0019) Site. There are a couple of trees to the south-west and west that do not meet Appendix E criteria for distance from the probe requirements (Figures 16 and 17). The Department will continue to flag data from these monitors in AQS to indicate issues with siting criteria until we have terminated sampling and monitoring activities at the site.

The current Columbia MSA is required to have one PM<sub>2.5</sub> sampler, one continuous PM<sub>2.5</sub> monitor and one to two PM<sub>10</sub> monitors. The MSA currently has four PM<sub>2.5</sub> samplers, two continuous PM<sub>2.5</sub> monitors, and three PM<sub>10</sub> monitors. If the Bates House Site is discontinued, the collocated PM<sub>2.5</sub> QA sampler would be

moved to the Parklane Site (45-079-0007), which is also located in Richland County. Elimination of this monitoring site would not impact the minimum number of monitors required for this MSA.

The  $PM_{10}$  monitor at the Bates House site has had no expected exceedances of the NAAQS over the last ten years. As shown in Figure 18, the graph for the Daily  $PM_{2.5}$  samplers in the Columbia MSA, including the Bates House sampler, have not had a design value above the current NAAQS of  $35\mu\text{g}/\text{m}^3$ . As shown in Figure 19, the Annual  $PM_{2.5}$  samplers for the Columbia MSA are well below the current annual NAAQS of  $12.0\mu\text{g}/\text{m}^3$ . Furthermore, prior to 2012, the annual NAAQS was set at  $15.0\mu\text{g}/\text{m}^3$ . Figure 19 shows that the Bates House sampler has not exceeded that level in 10 years.

**Figure 16: Bates House (45-079-0019) Site Panorama from the  $PM_{10}$  Monitor**



**Figure 17: Bates House (45-079-0019) Site Panorama from the  $PM_{2.5}$  Monitor**



Figure 18: PM<sub>2.5</sub> Ten Year Design Value Graph

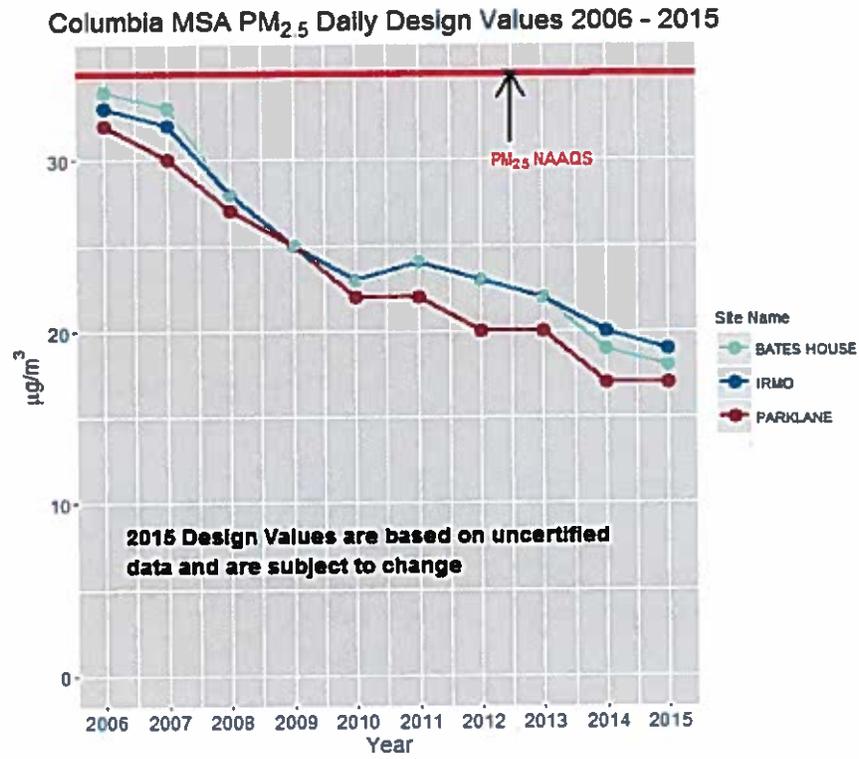
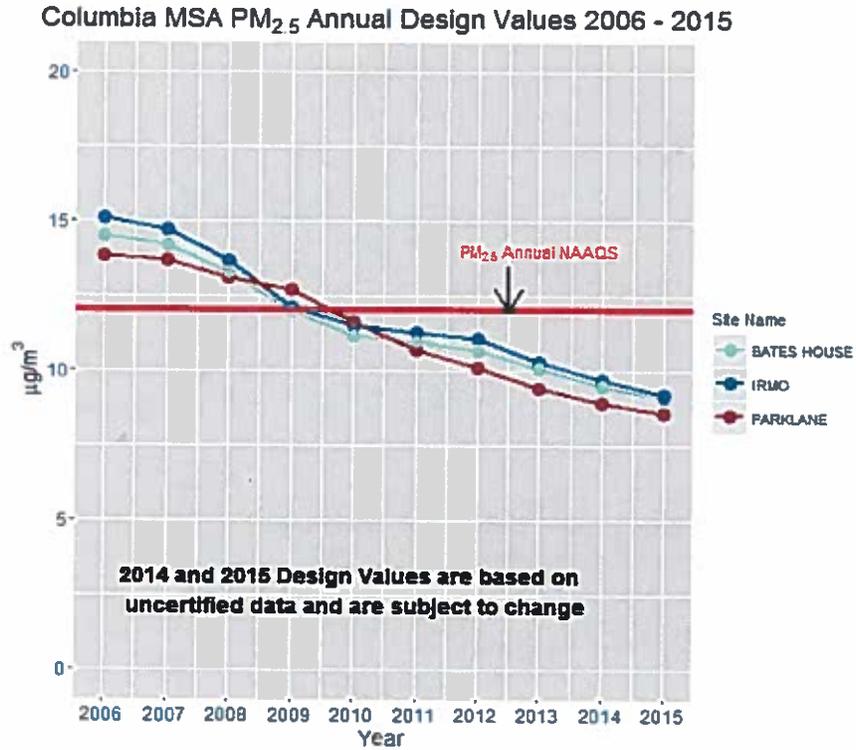


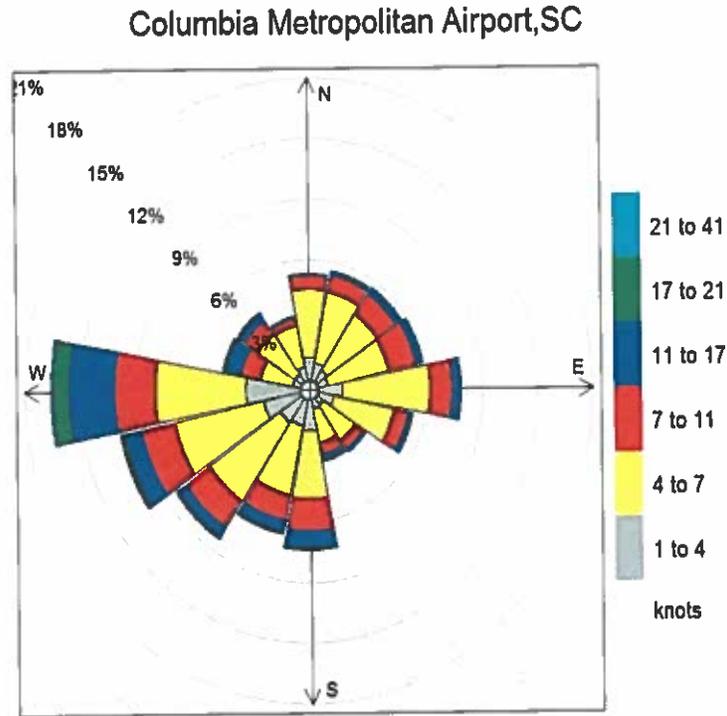
Figure 19: Annual PM<sub>2.5</sub> Ten Year Design Value Graph



*Predominant and secondary wind patterns*

The wind data from the Columbia Metropolitan Airport is representative of the wind pattern for the Bates House Site. Using 2010-2013 data, the wind rose in Figure 20 was created. It indicates that the predominant wind direction for this Site is from the west. Also, secondary dominant winds come from the west-southwest, southwest, and north.

**Figure 20: Wind Rose for the Bates House Site**



### **Establishment of the Coastal Carolina Monitoring Site**

The Coastal Carolina (45-051-0008) Site is being established in Horry County to represent the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA. The replacement Site location is located on the grounds of the Coastal Carolina University. In February 2013, OMB combined Horry County with Brunswick County, NC to establish the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA. In order to meet the minimum monitoring criteria in 40 CFR Part 58 Appendix D, at least one ozone monitor is required in the MSA. This Site will be representative of expected maximum ozone concentrations in northeast South Carolina.

The Department is in the process of obtaining the necessary permits for the new Site construction. We anticipate startup of the new Site prior to the beginning of the 2016 ozone monitoring season.

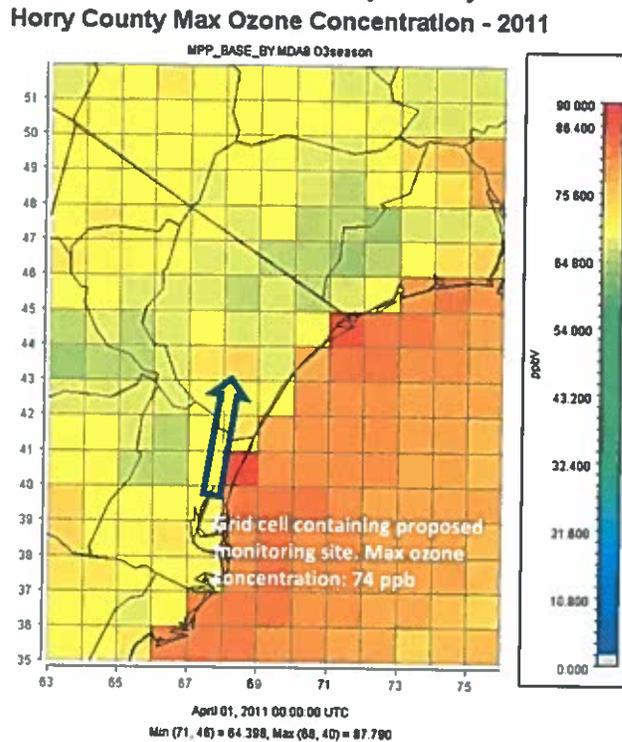
#### ***Compliance with Appendices A, C, D and E***

As required in 40 CFR Part 58 Appendix A, the Division of Air Quality Analysis (DAQA) in the Bureau of Environmental Health Services (Division) establishes, maintains, and operates the sites and instruments and performs the analysis of samples collected. Data generated by the network for comparison to the NAAQS is verified to be accurate and reported by the Division to the national AQS database for storage and public access. Regular calibration and audits are performed to verify that the instruments are operating correctly and data being collected is accurate.

As required in 40 CFR Part 58 Appendix C, all criteria pollutant monitoring in the South Carolina Monitoring Network for the purpose of comparison to the NAAQS is performed using the EPA designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM).

All criteria pollutant monitoring in the South Carolina Monitoring Network meet the monitoring objectives and spatial scales and design criteria as described in 40 CFR Part 58 Appendix D. In regards to the Coastal Carolina Site, Appendix D requires that the monitoring station be placed in an area of expected maximum ozone concentration. The most recent available Community Multiscale Air Quality (CMAQ)<sup>1</sup> modeling system outputs from 2011 were used to find the areas of maximum ozone concentration and are presented in Figure 21. The grid cell containing the proposed monitoring site (68, 43) is also the location containing the highest inland maximum daily 8-hour average ozone concentration for the 2011 modeling run.

**Figure 21: Ozone modeling for 2011 CMAQ baseline showing max ozone concentration location for Horry County**



Basic site and monitor information is contained in Table 7 below. An aerial view of the Coastal Carolina Site is shown in Figure 22. Based on the panorama in Figure 23, there appears to be no current obstructions to windflow.

<sup>1</sup> <https://www.cmascenter.org/cmaq/>

<b>Table 7: Coastal Carolina Site Information</b>	
<b>Item</b>	<b>Description</b>
AQS ID	45-051-0008
Street Address	Century Circle
Geographic coordinates	+33.8007, -78.9939
<b>OZONE</b>	
Designation	SLAMS
Analysis method	FEM Ultraviolet Photometry
Sampling Frequency	Continuous
Monitoring objective	Max Concentration
Monitoring scale	Urban
<b>WIND SPEED/DIRECTION</b>	
Designation	Non-regulatory
Analysis method	Instruments for wind speed and wind direction
Sampling Frequency	Continuous
Monitoring objective	Local Conditions
Monitoring scale	Neighborhood

**Figure 22: Coastal Carolina Site Location**



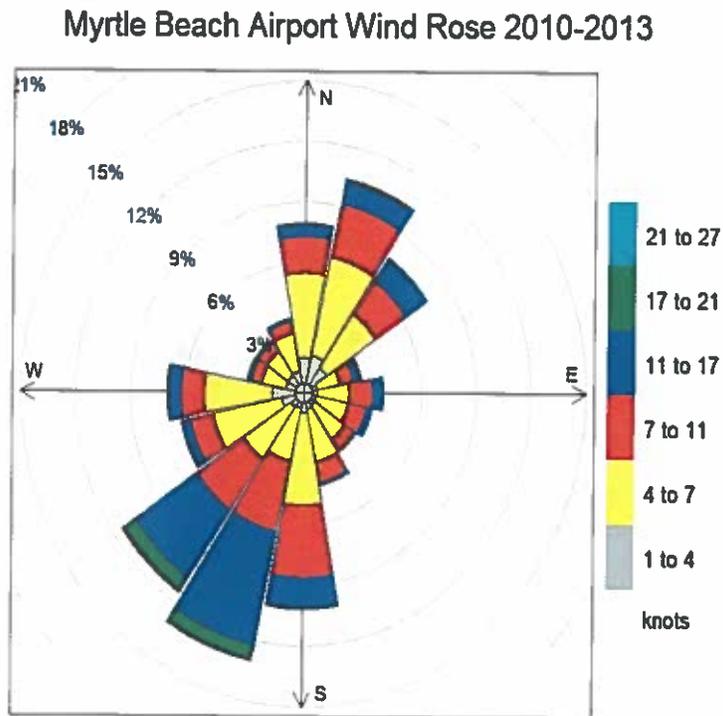
**Figure 23: Coastal Carolina (45-051-0008) Site Panorama**



*Predominant and secondary wind patterns*

The wind data from the Myrtle Beach Airport is representative of the wind pattern for the Coastal Carolina Site. The wind rose in Figure 24 was created using 2010-2013 wind data. It indicates that the predominant wind directions for this Site are from the south south-west, north north-east, and south-west with secondary dominant winds out of the south.

**Figure 24: Wind Rose for the Coastal Carolina Site**



## **Public comment period**

The public comment period for these site monitoring plan modifications will be from February 8, 2016 through March 8, 2016. All comments received will be forwarded to the EPA Region 4 along with the Department's response.

The revisions to the plan are expected to assist in optimization of our monitoring network, allowing more efficient use of our limited resources. Should you have any questions or need additional information regarding these requests, please contact Robert Brown of my staff at (803) 898-4105.

Sincerely,



Rhonda Banks Thompson  
Interim Bureau Chief  
Bureau of Air Quality

cc: Todd Rinck, US EPA Region 4, Chief, Air Data & Analysis Section (w/o attachments)  
Ryan Brown US EPA Region 4 (w/attachments)  
Renee Shealy, BEHS (w/o attachments)  
Sandra Flemming, BEHS (w/o attachments)  
Robert Brown, BAQ (w/o attachments)  
Scott Reynolds, BEHS (w/o attachments)

### **Attachments:**

Appendix A: Addendum to the 2016 Monitoring Plan  
Appendix B: Technical analysis for Clemson CMS termination

## **Addendum**

### **Plan Revisions**

The following pages contain revisions to the 2016 Network Description and Ambient Air Network Monitoring Plan. Changes to the 2016 plan are *italicized* with gray highlighting applied. Deletions to the 2016 plan are ~~italicized~~, struck-through and highlighted in gray. Page numbers from the original 2016 Ambient Air Network Monitoring Plan are provided at the bottom of each page as a reference.

## **Introduction**

The 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 the DHEC's Air Program and to comply with federal requirements. In 2016 the network will be comprised of ~~104~~ **102** monitors and samplers at ~~34~~ **30** sites.

In October, 2006, the 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.

This plan covers the eighteen month period from July 1, 2015 through December 31, 2016. 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 2016 with the exception of some Ozone monitors which may begin operation at the start of the South Carolina Ozone Monitoring Season (April-October). The annual Network Description and Ambient Air Monitoring Plan, as required and described in 40 CFR Part 58.10, and Periodic Network Assessment, must contain the following information for each monitoring station in the network:

- The Air Quality System (AQS) site identification number (ID) 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 Particulate Matter < 2.5 microns (PM<sub>2.5</sub>) National Ambient Air Quality Standard (NAAQS), and
- The MSA, Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor

This document constitutes the 2016 South Carolina Air Monitoring Network Plan and is organized into two main parts:

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

The Monitoring Network is reviewed annually. Planned changes are described in this 2016 Monitoring Plan and provided for public review and comment prior to submission to the EPA Region 4 Administrator.

## **Public Participation Opportunities**

In response to public interest and the potential impact of the monitoring regulation changes, the DHEC's Air Program solicits involvement from both internal (to the DHEC) and external workgroups. 1

**Network Summary**

Network Summary: Calendar Year 2016 Air Monitoring Stations																			
Region	Sites	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	TSP/Lead	Ozone	SO <sub>2</sub>	NO <sub>x</sub> /NO <sub>y</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOC	Mercury	Precip. Chem.	Precip.	*MET
Augusta-Richmond County, GA-SC 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	0	1	0	2	2	2	0	1	1	0	0	0	0	0	0	1
Charlotte-Concord-Gastonia, NC-SC 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	4	1	0	0	0	0	0	0	0	0	0	0	0	0
Greenville-Anderson-Mauldin MSA	3	3	1	0	1	0	2-3	1	1	0	0	1	0	0	0	0	0	0	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	1	0	0	0	0	0	1	0	0	0	0	0	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	3	1	3	1	3	0	5-4	1	0	0	0	1	1	1	1	0	2-1	1-0	1
<b>TOTALS</b>	<del>34</del> 32	14	11	2	8	5	<del>29</del> 18	8	6	1	1	4	3	4	1	2	4-3	3-2	7

This summary table presents the elements of the 2016 Monitoring Plan after implementation of changes described in this plan.

\*MET data includes wind speed and wind direction

**Summary of 2016 Network Changes**

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

No changes planned for 2016.

**Charleston-North Charleston MSA**

~~No changes planned for 2016.~~

*Bushy Park (45-015-0002) - Site will be terminated before the beginning of the 2016 Ozone season.*

*Replacement Site for Bushy Park (45-015-XXXX) - A Replacement Site for Bushy Park will be sought. The Department will provide site details in the 2017 Plan.*

**Charlotte-Concord-Gastonia, NC-SC MSA**

~~No changes planned for 2016.~~

*York CMS (45-091-0006) - Site will be terminated before the beginning of the 2016 Ozone season.*

*York County Monitoring Site (45-091-0007) - A Replacement Site for York CMS will be established.*

**Columbia MSA**

No changes planned for 2016.

**Florence MSA**

No changes planned for 2016.

**Greenville-Anderson-Mauldin MSA**

Greenville ESC (45-045-0015) - PM<sub>2.5</sub> Speciation sampling at this site was terminated due to a loss in federal funding.

*Famoda Farm (45-045-1003) - Site will be terminated before the beginning of the 2016 Ozone season.*

*Clemson CMS (45-077-0002) - Site will be terminated before the beginning of the 2016 Ozone season.*

**Hilton Head Island-Bluffton-Beaufort MSA**

No changes planned for 2016.

**Myrtle Beach-Conway-North Myrtle Beach SC-NC MSA**

*Coastal Carolina (45-051-0008) - An ozone monitor will be established before the beginning of the 2016 Ozone season.*

**Spartanburg MSA**

No changes planned for 2016.

**Sumter MSA**

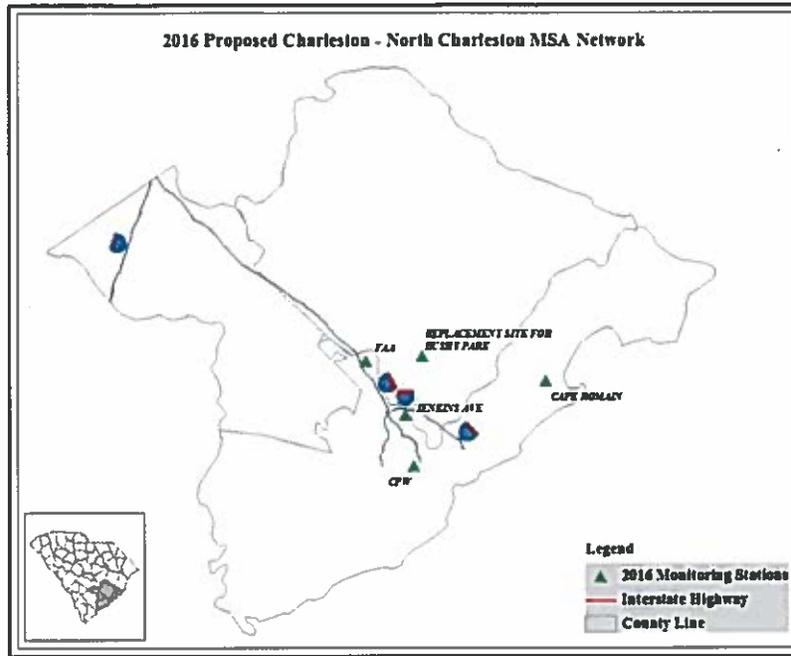
No changes planned for 2016.

**Remainder of State**

~~No changes planned for 2016.~~

*Cowpens (45-021-0002) - Site will be terminated before the beginning of the 2016 Ozone season.*

**Charleston-North Charleston MSA**



**Classification of Monitoring Type by Site**

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCS	Mercury	Precip Chem.	Precip. MET
<del>45-015-0002</del> <del>45-015-0004</del>	<del>Bushy Park Pump Station</del> <del>Replacement Site for Bushy Park Pump Station</del>						●											
45-019-0003	Jenkins Ave. Fire Station				●			●	○									
45-019-0046	Cape Romain		○				●	○	○		○	○						○
45-019-0048	FAA	○○																
45-019-0049	CPW	●	○															
	<b>TOTAL</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

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

***Bushy Park Pump Station (This site is to be discontinued)***

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

***AQS Site ID: 45-015-0002***

***Location: River Oak Drive (Goose Creek)***

***County: Berkeley***

***Coordinates: +32.98724, -79.93671***

***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. This site monitors for Ozone and the monitoring objective is maximum Ozone concentration. The sample inlets are 11 meters from the nearest road.***

***Changes for 2016:***

***There are no changes planned for 2016, but encroaching vegetation may require changes to the site or relocation.***

***The Bushy Park Pump Station site is being discontinued because access to the location is no longer available. A replacement site will be established when a suitable location has been identified.***

***Monitors:***

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

**Replacement Site for Bushy Park Pump Station**  
**CSA/MSA: none/Charleston-North Charleston MSA**  
**AQS Site ID: 45-015-XXXX**

**Location:**  
**County: Berkeley**  
**Coordinates:**  
**Date Established: 2016**

**Site Evaluation: This is a new site. It has not had a site evaluation or QA check performed.**



*The Replacement Site for the Bushy Park Pump Station site is located in southeastern Berkeley County downwind from the Charleston urban area. This site monitors for Ozone and the monitoring objective is maximum concentration. The sample inlet is XXX meters from the nearest road.*

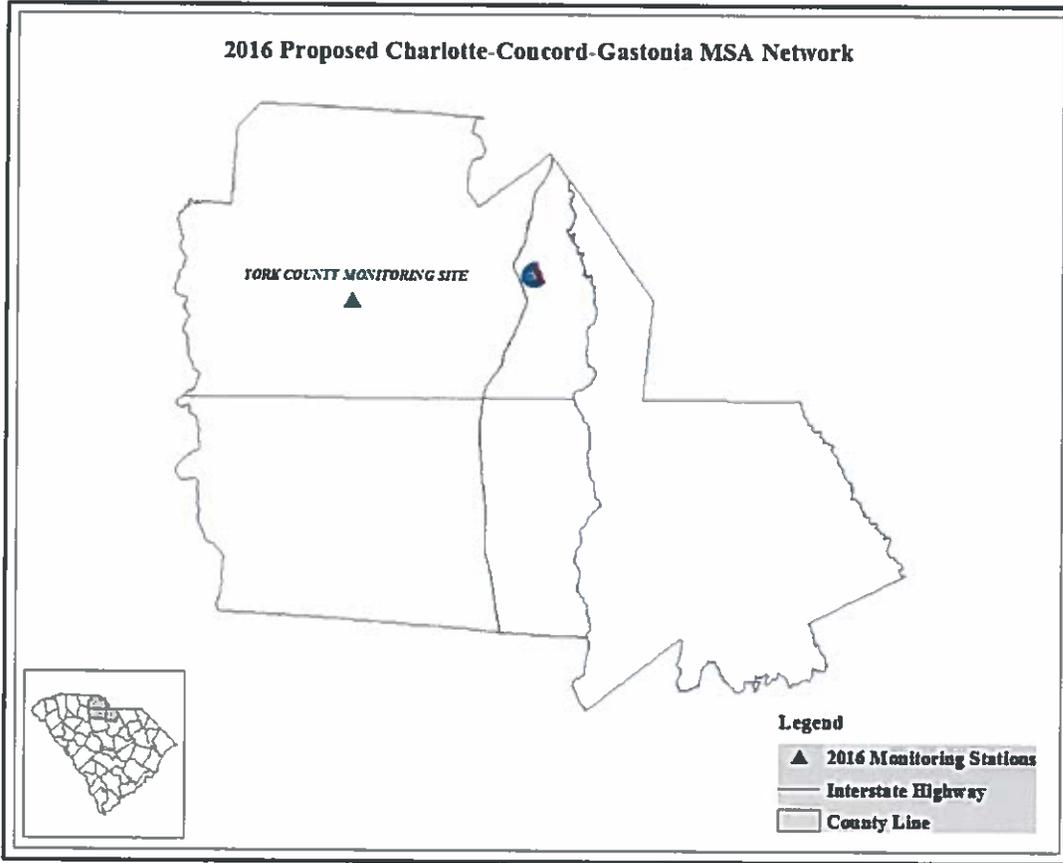
**Changes for 2016:**

*The Replacement Site for the Bushy Park Pump Station site was established as a replacement for the Bushy Park Pump Station (45-015-0002).*

**Monitors:**

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

Charlotte-Concord-Gastonia MSA



Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip. Chem.	Precip.	MET
<del>45-091-0006</del> 45-091-0007	<del>York CMS</del> York County Monitor ing Site						●	○											○
	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 Continuous Monitoring Site (CMS) (This site will be terminated)**

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

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

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

**County:** York

**Coordinates:** +34.93581, -81.22838

**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 in a rural setting. The site was established to represent background levels near the Charlotte urban area. York CMS has monitors for Ozone and SO<sub>2</sub> as well as a wind tower. The long historical record and location of the site make the data useful to both North and South Carolina Air Programs. The sample inlets are 17.1 meters from the nearest road.

**Changes for 2016:**

This site is not expected to be available in 2016 and will be replaced by a monitoring station established nearby and representative of the same area. The York CMS ambient air monitoring station is being discontinued because access to the location is no longer available. A replacement site location has been selected approximately 3 1/2 miles northeast of the current site and is representative of the same area.

**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

**York County Monitoring Site**

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

**AQS Site ID: 45-091-0007**

**Location: Langrum Branch Rd.**

**County: York**

**Coordinates: +34.977, -81.207**

**Date Established: 2016**

**Site Evaluation: This is a new site. It has not had a site evaluation or OA check performed.**



The York County Monitoring Site is located in central York County in a rural setting. The site was established to represent background levels near the Charlotte urban area. This site has monitors for Ozone and SO<sub>2</sub>, as well as a wind tower. The data from this site is useful to both North and South Carolina Air Programs. The sample inlets are XXX meters from the nearest road.

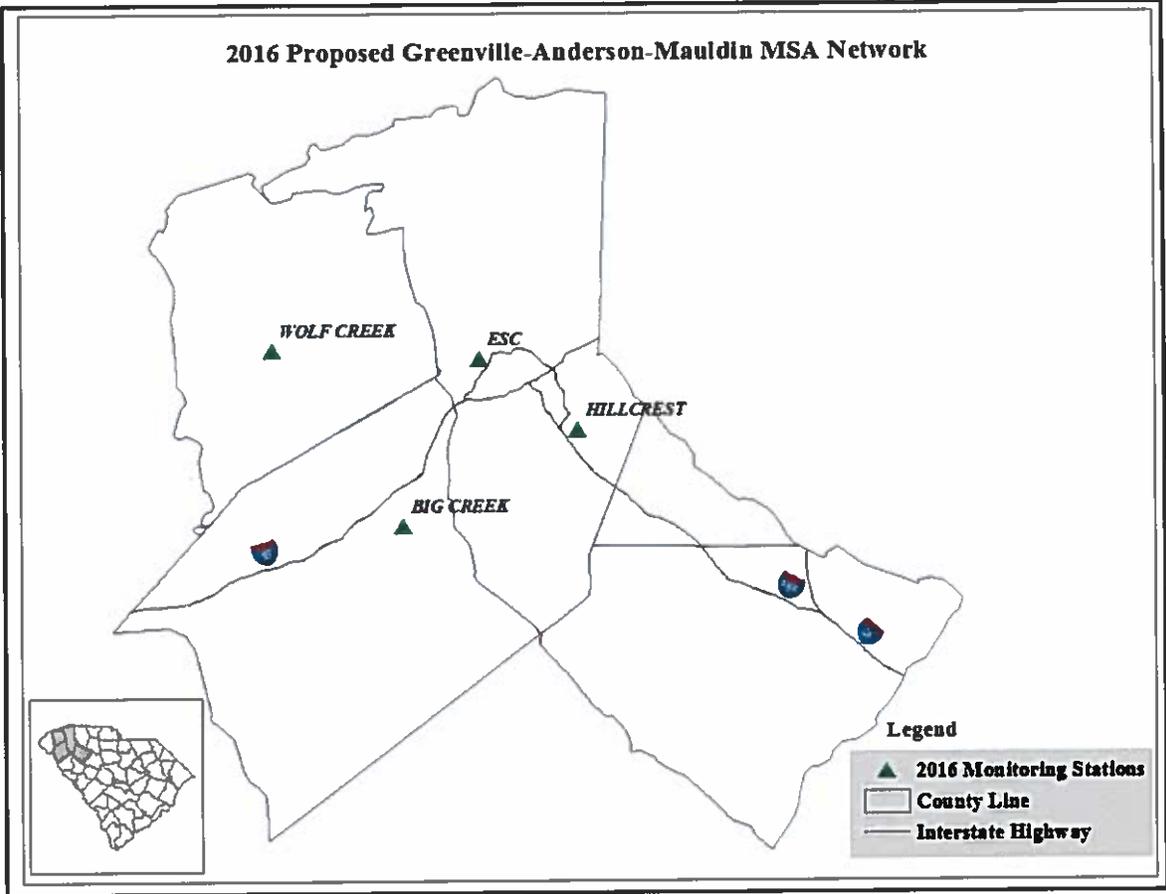
**Changes for 2016:**

Site assess was lost to the York CMS site. This is the replacement ambient air monitoring station. It is representative of the same area and monitors the same parameters.

**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

*Greenville-Anderson-Mauldin MSA*



Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	PM <sub>2.5</sub> Cont.	Speciation	PM <sub>10</sub>	Lead / TSP	Ozone	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	● ●					●												
<del>45-045-0003</del>	<del>Famoda Farm</del>						●												
45-077-0003	Wolf Creek						○												
	TOTAL	3	1	0	1	0	4	1	1	0	0	1	0	0	0	0	0	0	1

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

**Famoda Farm (This site will be terminated.)**

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

~~AQS Site ID: 15-015-1003~~

~~Location: 7401 Mountain View Road~~

~~County: Greenville~~

~~Coordinates: +35.05739, -82.37288~~

~~Date Established: October 24, 1969~~

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



*The Famoda Farm site is located in a rural area of northern Greenville County. It 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. This site supports an Ozone monitor. The sample inlet is 24 meters from the nearest road.*

**Changes for 2016:**

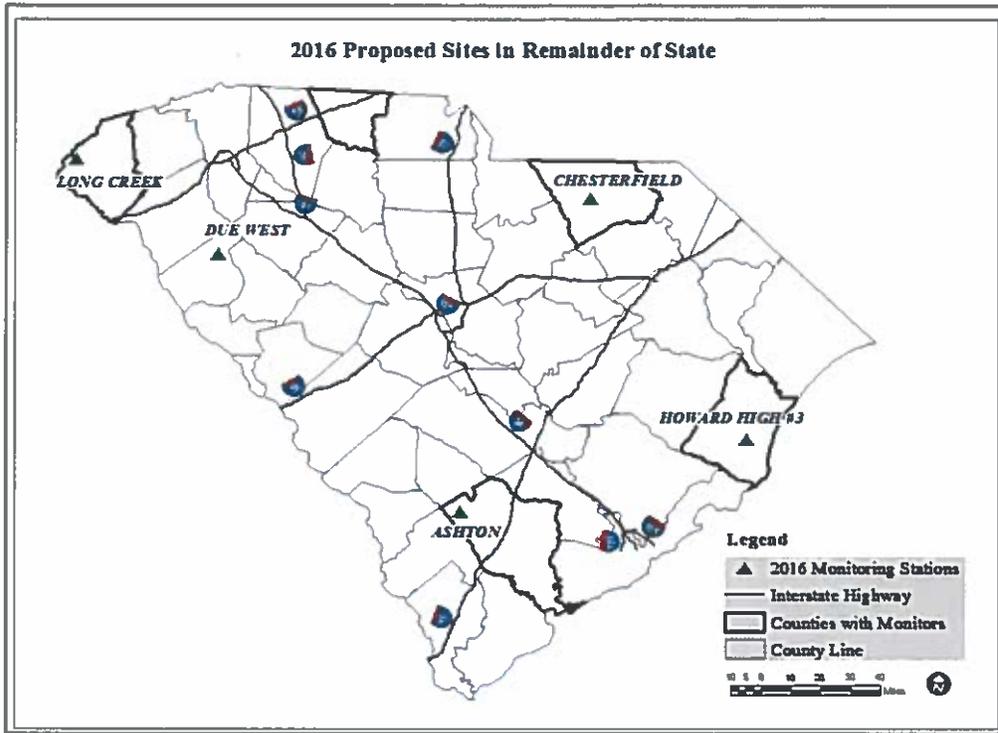
~~There are no changes planned for 2016.~~

~~This site has been found to be duplicative and will be terminated in 2016.~~

**Monitors:**

<u>Parameter</u>	<u>Scale</u>	<u>Objective</u>	<u>Designation</u>	<u>Probe Height (m)</u>	<u>Analysis Method</u>	<u>Sampling Frequency</u>
<u>Ozone</u>	<u>Urban</u>	<u>Max Ozone Concentration</u>	<u>SLAMS</u>	<u>3.43</u>	<u>UFM Ultraviolet Photometry</u>	<u>Continuous</u>

Remainder of State



Classification of Monitoring Type by Site

Site ID	Site Name	PM <sub>2.5</sub>	Cont. Speciation	PM <sub>10</sub>	Lead	Ozone	SO <sub>2</sub>	NO <sub>2</sub>	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip. Chem.	Precip.	MET
45-001-0001	Due West					●										○	○	
<del>45-021-0002</del>	<del>Cowpens</del>					●										●		
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	1	1	0	0	0	1	1	1	1	0	1	1

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

**Cowpens**

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

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

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

**County:** Cherokee

**Coordinates:** +35.13048, -81.81656

**Date Established:** March 29, 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>1</sup> In addition to Ozone, the Cowpens site also supports a precipitation chemistry sampler. The sample inlets are 23 meters from the nearest road.

The monitor will be operated through the 2016 Ozone season to fulfill the Cherokee County Maintenance Plan commitments.

**Changes for 2016:**

There are no changes planned for 2016.

**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	Non- regulatory	1.50	IC	Weekly- Tue-Tue

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

***New and Discontinued Sites***

The Table below contains information on the monitoring **sites** the DHEC has scheduled for discontinuance **and new sites scheduled to begin operation.**

Site	ID	Date Established	Notes
Clemson CMS	45-077-0002	07/14/1979	The DHEC has determined that the Ozone monitoring at this site is duplicative and will be discontinued at the conclusion of the 2015 Ozone season.
<b>Bushy Park Pump Station</b>	<b>45-015-0002</b>	<b>06/20/78</b>	<b>The Bushy Park Pump Station site is being discontinued because access to the location is no longer available. A replacement site will be established when a suitable location has been identified.</b>
<b>Replacement Site for Bushy Park Pump Station</b>	<b>45-015-XXXX</b>		<b>A Replacement Site is being established to replace the Bushy Park Pump Station (45-015-0002) site.</b>
<b>York Continuous Monitoring Site (CMS)</b>	<b>45-091-0006</b>	<b>03/30/93</b>	<b>The York CMS site is being discontinued because access to the location is no longer available. A replacement site location has been selected approximately 3 1/2 miles northeast of the current site and is representative of the same area.</b>
<b>York County Monitoring Site</b>	<b>45-091-0007</b>		<b>The York County Monitoring site is being established to replace the York CMS (45-091-0006) site. It is located approximately 3 1/2 miles northeast of the current site in a rural area in central York County. This location is representative of the same area. The Department is in the process of obtaining the necessary permits for the new site construction.</b>
<b>Famoda Farm</b>	<b>45-045-1003</b>	<b>10/24/69</b>	<b>This site has been found to be duplicative and will be terminated in 2016.</b>
<b>Cowpens</b>	<b>45-021-0002</b>	<b>03/25/88</b>	<b>This site is not required for the minimum monitoring requirements and will be terminated in 2016.</b>

# Appendix B: Technical analysis for Clemson CMS termination

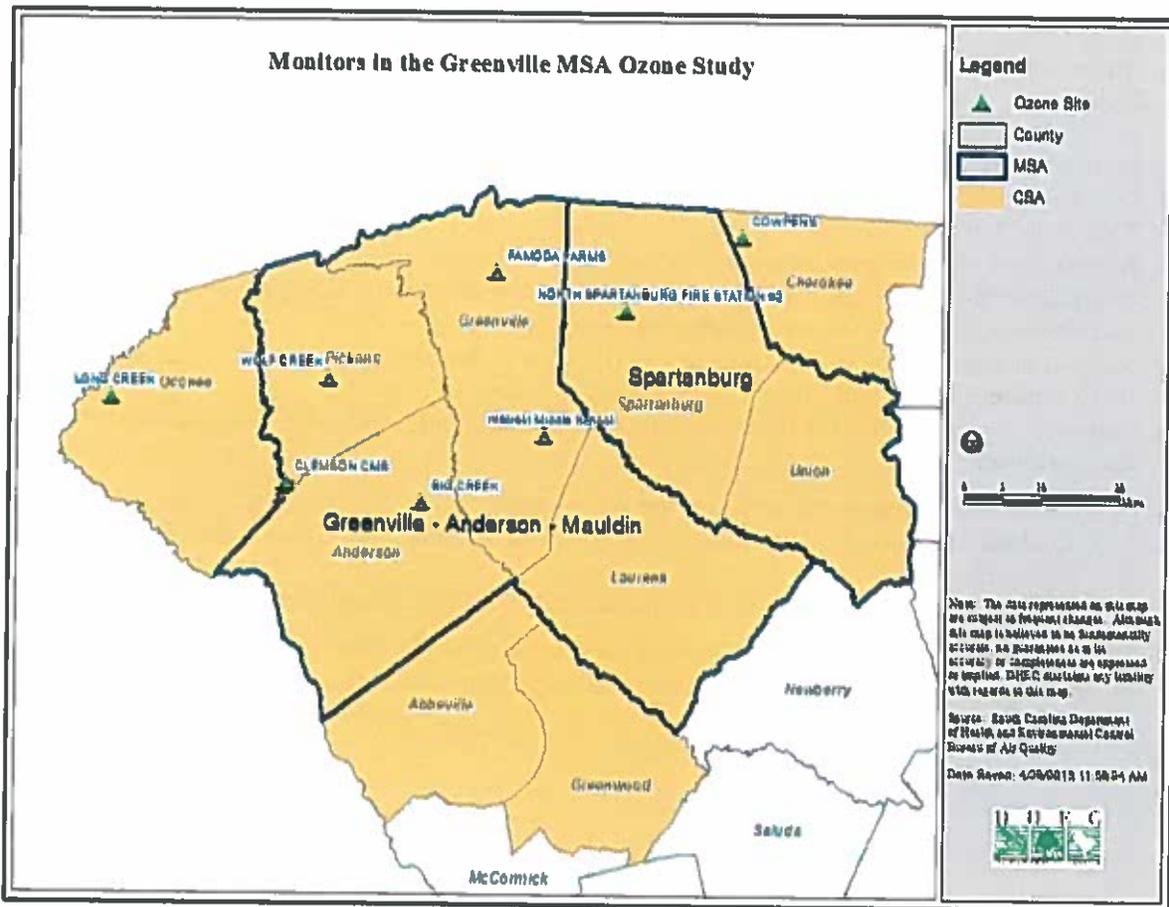
## Major Points

- EPA Technical Systems Audit of SCDHEC ambient air monitoring network has indicated that there are too many monitoring sites being operated and it has been suggested that excess monitoring be terminated so that a focus on core sites will bring about an improvement in data quality.
- SCDHEC has determined that Clemson CMS should be terminated in order to improve data quality at other sites in the Upstate.
- There are two trees near Clemson CMS that may be impacting ambient ozone concentrations. We believe that this site does not meet 40 CFR Part 58, Appendix E siting requirements. Furthermore, we believe that due to the historic nature of the land adjacent to this site we will be unable to secure permission to trim or otherwise remove the trees which violate Appendix E requirements.
- Ozone design values at Big Creek and Clemson are within 1 ppb of each other.
- This is the first year since 2011 when Clemson had a higher design value.
- Hourly ozone concentrations between the two sites are similar once the mixing heights break down.
- Overnight, Wolf Creek measures extremely low ozone concentrations. Supplementary analysis shows that Famoda Farm sees low overnight ozone concentrations as well.
- Analysis of regression slopes shows significant differences between Clemson and Big Creek and suggests that Clemson reads slightly higher ozone concentrations.
- Trajectory analysis indicates that “high” ozone concentrations occur when winds are out of the north and northeast.
  - These trajectories are centered on the I-85 corridor.
  - Analysis suggests that Clemson and Big Creek are now “downwind” sites for Charlotte and Greenville.
  - Less evidence that Upstate is being impacted by “Atlanta plume” on high ozone days.
- Evidence from this analysis does not conclusively point to Big Creek being the “design value” site. Some suggestion that Big Creek may adequately represent Clemson.

## 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 (Map 1). Table 1 lists the site name, site ID, county, page in the 2016 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 2016 Plan.

Map 1: Location of monitoring stations used in this analysis



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. The 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 the 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.

The DHEC is signaling our intention to terminate monitoring at Clemson CMS (45-077-0002) at the conclusion of the 2015 Ozone Monitoring Season. The Clemson CMS (45-077-0002) monitoring site for several years in a row has not had the highest ozone design value site in the MSA. The 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.

The 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.” The 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 to 40 CFR Part 58 will continue to be met or exceeded for the MSAs.

### Background on Monitoring Configuration in the Upstate and Top-down Assessment

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>1</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.

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. The ozone design values for 2014 are based on uncertified data at the time of this writing and are subject to change.

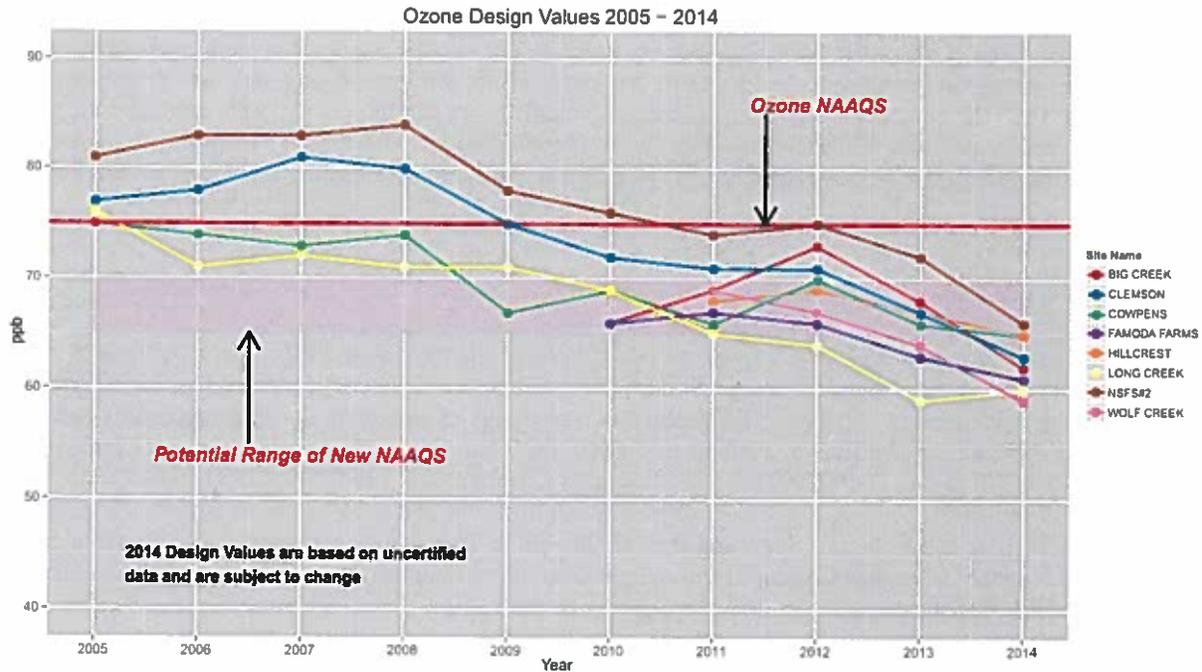
Table 1: Table 1: Listing of monitors used in this analysis

Site Name	Site ID	County	2014 Ozone DV (ppb)	Appendix D?	Start Date	Page in Plan
Long Creek	450730001	Oconee	60	Exceeds	5/4/1989	69
Wolf Creek	450770003	Pickens	59	Exceeds	8/10/2010	56
Clemson CMS	450770002	Pickens	63	NA	7/20/1979	72
Famoda Farms	450451003	Greenville	61	Meets	8/7/2008	55
Hillcrest	450450016	Greenville	65	Meets	3/4/2009	54
Big Creek	450070005	Anderson	62	Exceeds	6/6/2008	51
North Spartanburg	450830009	Spartanburg	66	Meets	4/10/1990	60
Cowpens	450210002	Cherokee	65	Meets	4/21/1988	64

Figure 1 contains the 10-year ozone design value trends for the monitors in the Upstate of South Carolina. Ozone concentrations have been steadily declining across the region since 2008 and have accelerated this decline between 2012 and 2014.

<sup>1</sup> <http://www.census.gov/population/metro/files/lists/historical/99mfips.txt>

Figure 1: Ozone Design Value trends 2005 - 2014



In October, 2006, the United States Environmental Protection Agency (EPA) published ambient air monitoring regulations<sup>2</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.

In June 2003<sup>3</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. This change in the monitoring requirements was not driven by air quality planning needs, but by dynamic boundaries delineated by the Office of Management and Budget (OMB) for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics. The DHEC believes that a monitoring network based on the air flow within and through the airshed is more appropriate to capture the evolution and transport of ozone in the area and indicate potential 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>4</sup>. The new definitions recombined the Anderson MSA with the Greenville-Mauldin-Easley MSA

<sup>2</sup>71 FR 61236, October 17, 2006

<sup>3</sup>Office of Management and Budget Bulletin No. 03-01, 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>4</sup><http://www.census.gov/population/metro/>

forming the Greenville-Anderson-Mauldin MSA. Based on the Network Design Criteria provided in Part 58 Appendix D and the rich ozone data set available for the Upstate, this area has significantly more than the minimum or needed number of monitors necessary to characterize ozone concentrations in the area. The Clemson CMS (45-007-0002) site no longer has the highest ozone design value in the MSA. The 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>5</sup> Nowhere in the OMB bulletin does it suggest that the MSA definitions are appropriate for, or are based on important data elements applicable to the definition of an ambient air monitoring network. While the DHEC understands the need for establishing minimum monitoring requirements, the EPA appropriately has mechanisms included in 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 the necessity that the EPA use the discretion available in the monitoring regulations to afford states flexibility to implement appropriate monitoring design that meets or exceeds the requirements and the needs of the state air programs.

### Clemson CMS Termination Request Background

In July 2007, the DHEC submitted their first annually required<sup>6</sup> Network Description and Ambient Air Monitoring Plan (2008 Plan)<sup>7</sup>. In the 2008 Plan, the DHEC stated that monitoring at the Clemson CMS site (45-077-0002) would be maintained through the 2008 ozone season as part of the Greenville MSA Ozone Study<sup>8</sup>. On October 24, 2007, the EPA conditionally approved the establishment of two ozone monitoring sites as part of the Greenville MSA Ozone Study.

In 2008, the 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. The 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, the DHEC determined that it would terminate all monitoring at the Clemson CMS site (45-077-0002)<sup>9</sup>, establish the Famoda Farm site (45-045-1003)<sup>10</sup> and establish a site in Southeastern Greenville County<sup>11</sup> in execution of the 2008 Plan. In their October 27, 2008 response, the EPA denied the request to discontinue ozone monitoring at the Clemson site because “The sites above that are currently violating the NAAQS<sup>12</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 the EPA submitted a follow-up letter as a confirmation of discussions between the DHEC and the EPA staff

<sup>5</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.

<sup>6</sup>40 CFR 58.10(a)(1)

<sup>7</sup>State of South Carolina: Network Description and Ambient Air Network Monitoring Plan for Calendar Year 2008 (2008 Plan) at page 21

<sup>8</sup>*Id.*, at page 32

<sup>9</sup>State of South Carolina: Network Description and Ambient Air Network Monitoring Plan for Calendar Year 2009 (2009 Plan) at page 65

<sup>10</sup>*Id.*, at page 23

<sup>11</sup>*Id.*, at page 24

<sup>12</sup>On March 27, 2008, the EPA finalized a revised Ozone NAAQS set at 0.075 ppm, 73 FR 16435.

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, the DHEC submitted an amendment to the 2011 Monitoring Plan establishing the Wolf Creek monitoring site. In the cover letter to the amendment, the 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, the 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 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 the DHEC contends is representative data and ozone design values for the MSA. Termination of monitoring at Clemson CMS would have allowed the DHEC to redirect limited resources to more pressing and informative program monitoring priorities. The 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>13</sup>

Finally, in July 2013, the DHEC provided a technical analysis of ambient ozone concentrations and trajectory analysis illustrating our position that the Big Creek monitoring site was comparable to the Clemson CMS. On November 6, 2013, the EPA rejected our analysis and offered to consider shutdown another site in the MSA that was of lower value to the EPA than the Clemson CMS site.

Before and after the recent MSA definition changes, the Greenville-Anderson-Mauldin MSA has had more monitoring than is necessary to meet National and State Monitoring objectives. The 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 Big Creek (45-007-0005) site and the EPA’s original concern that the DHEC is requesting termination of the MSA’s design value site is now moot. As demonstrated below, the 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.

## Conclusions

A technical analysis of ambient ozone monitoring concentrations and meteorological analysis can be found in the appendix below. An analysis of daily maximum ozone concentrations, 1-hour ozone concentrations (Appendix Section 1.0) and 36-hour back trajectories (Appendix Section 2.0) on days with daily maximum concentrations greater than 60 ppb all show that Big Creek and Clemson exhibit similar ozone concentrations and are certainly exposed to the same air mass (especially on peak ozone days). While it appears that there are certain times when the Clemson monitor is slightly higher than Big Creek, the DHEC believes that this

<sup>13</sup> 40CFR §58.14 (c)

is well within the error of the instrument. The DHEC believes that discontinuation of the Clemson CMS site will not result in a loss of a design value site for the Greenville MSA. The Big Creek site has similar design values to Clemson and has been regularly within 3-5 ppb of the Clemson design value. As to the EPA's concerns about data longevity, the DHEC believes that the number of design values measured at both Clemson and Big Creek concurrently allows us to confidently measure the long term changes in air quality for the Upstate of at Big Creek instead of Clemson.

In light of this evidence and the current minimum monitoring requirements, the DHEC signaling its intention to terminate ozone monitoring at the Clemson CMS (45-077-0002) site after the conclusion of the 2015 Ozone Monitoring Season. Based on the data collected and data needs for the air program and area, the 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

### 1.0 Data Evaluation and Bottom-up Assessment

For this evaluation, the DHEC focused the bottom-up assessment of the three ozone monitoring sites, including the Clemson CMS monitoring site, that represent air quality generally upwind of the South Carolina Upstate urban areas. After establishing relationships with Clemson, Wolf Creek and Big Creek, we further refined our analysis to focus only on the Clemson and Big Creek monitoring sites.

In order to conduct this analysis, the R Statistics Package along with several community developed packages were utilized to import, prepare and analyze ambient ozone monitoring data obtained from the EPA's Air Quality System database. The most extensively used community developed package was `openair`. This package was developed with specific functions aimed at the analysis of ambient air monitoring data. Please see the References & Citations section for a full listing of the packages and versions that were used.

**1.1 Boxplots** Boxplots give a general overview of the way the data is distributed without having to plot every single point in the data set. The thick line in the middle of the "box" is the median, which means that half of the data lies below the thick line, and half lies above. The lines below and above the median (which form part of the box) are the 25th and 75th percentiles of the data, respectively. The middle 50% of the data falls between these two lines, so the tighter the box is, the less variability the middle 50% of the data has. Any dots below or above the lines extending from the box are potential outliers.

Boxplots of hourly concentrations (Figure 2) for the Clemson area monitors shows that Big Creek and Clemson median concentrations are very similar with some higher concentrations occurring at Big Creek, mainly in 2012 (Figure 3).

Figure 2: Boxplots of hourly ozone concentrations

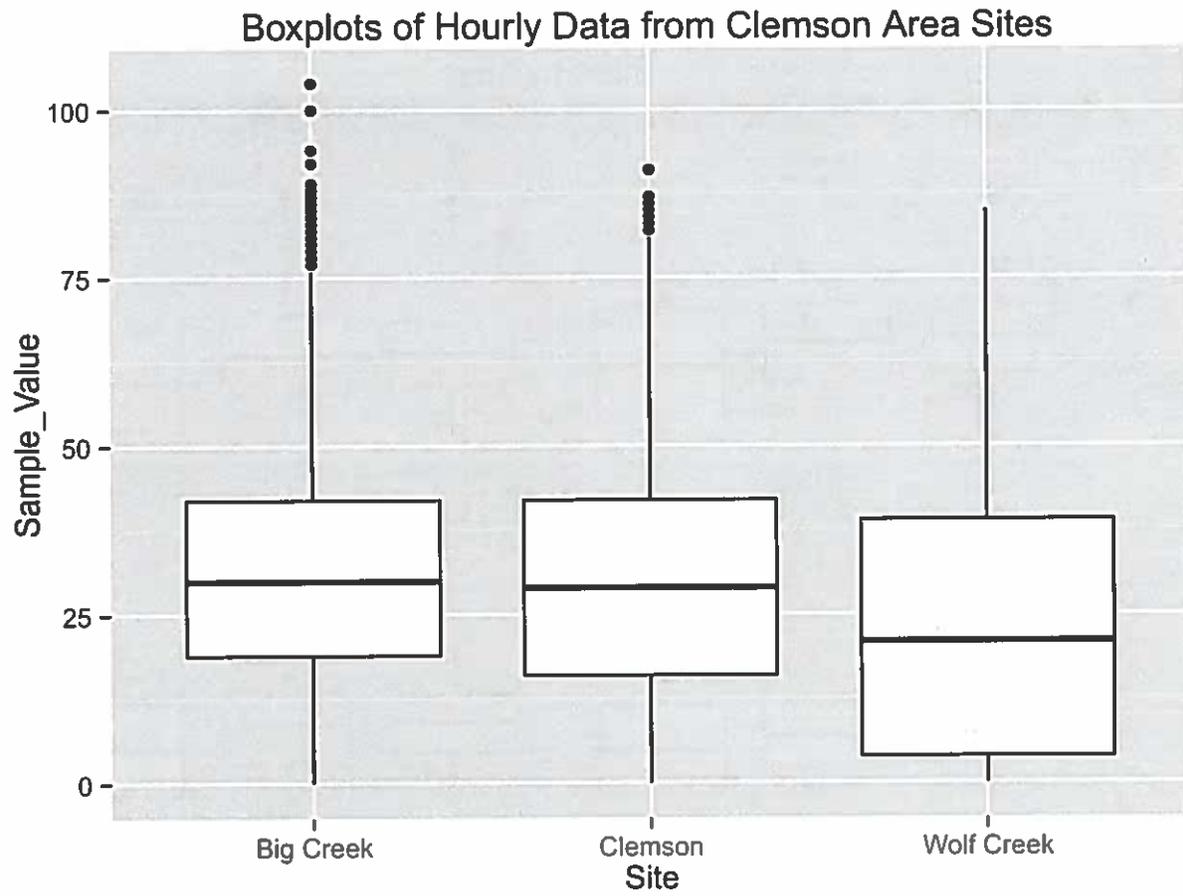
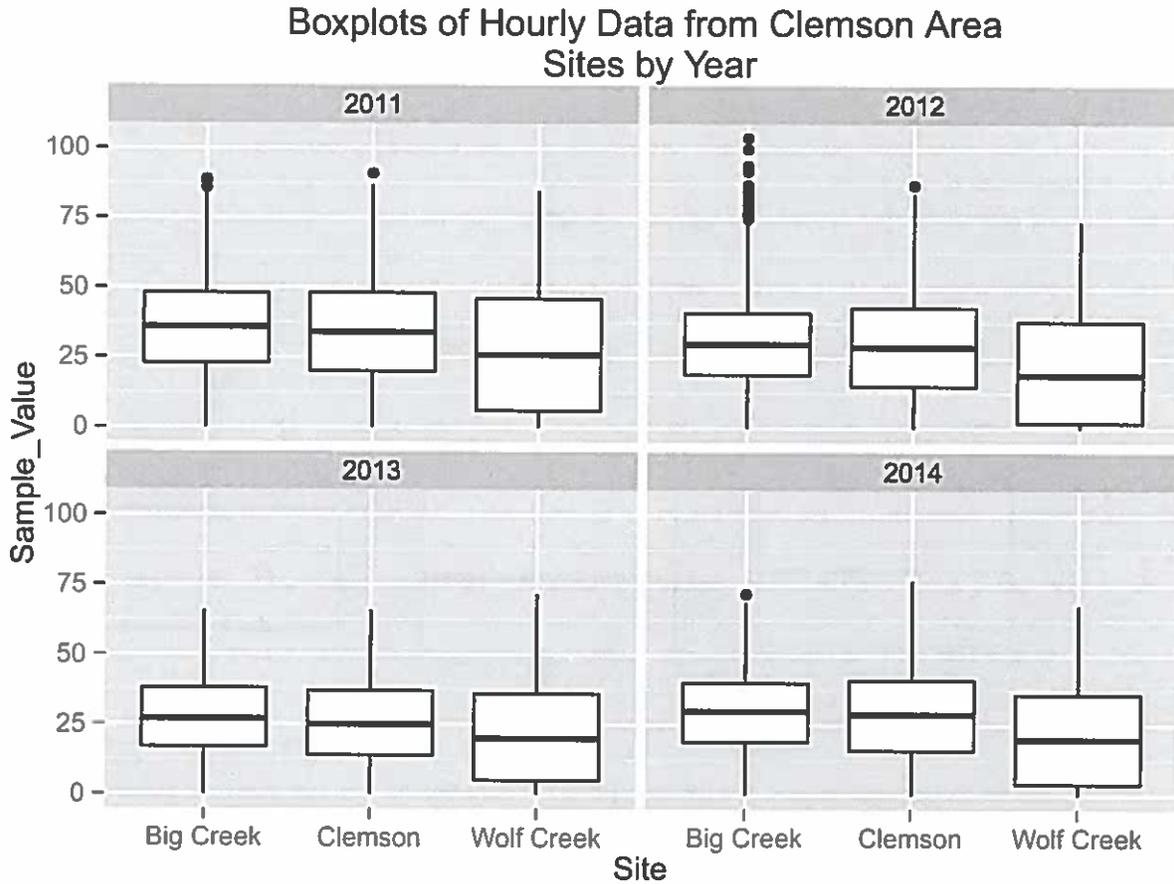


Figure 3: Boxplots of hourly ozone concentrations by year



**1.2 Density Plots** Density plots are similar to histograms, but instead of bars that show a count for each “bin” of numbers, the estimates are shown as a smooth curve representing the distribution of the data. Like most estimations in statistics, the accuracy of these estimations depends a good deal on the sample size: the more observations you have, the more accurate of a picture you will get. A count of valid samples by four year study period, year and month are provided in Tables 2-4.

An examination of Table 2 shows that Clemson and Big Creek have similar numbers of valid samples. Wolf Creek has approximately 2000 less samples, which could impact the shape of the density graphs.

Table 2: Table 2: Valid Samples by Site 2011 - 2014

Site Name	Valid Samples
Big Creek	20309
Clemson	20377
Wolf Creek	18253

On a year-by-year basis (Table 3), Clemson and Big Creek have similar number of valid samples. Wolf Creek had fewer samples than the other two monitoring sites. Wolf Creek had significantly fewer samples than the other sites in 2013.

Table 3: Table 3: Valid Samples by Site and Year

Site Name	Year	Valid Samples
Big Creek	2011	5073
Big Creek	2012	5038
Big Creek	2013	5102
Big Creek	2014	5096
Clemson	2011	5079
Clemson	2012	5102
Clemson	2013	5100
Clemson	2014	5096
Wolf Creek	2011	4702
Wolf Creek	2012	4627
Wolf Creek	2013	3940
Wolf Creek	2014	4984

On a month-by-month basis (Table 4), Clemson and Big Creek have similar number of valid samples. Wolf Creek has a lower number of valid samples except for the months of July and October.

Table 4: Table 4: Valid Samples by Site and Month

Site Name	Month	Valid Samples
Big Creek	4	2838
Big Creek	5	2950
Big Creek	6	2857
Big Creek	7	2922
Big Creek	8	2958
Big Creek	9	2828
Big Creek	10	2956
Clemson	4	2859
Clemson	5	2961
Clemson	6	2830
Clemson	7	2953
Clemson	8	2956
Clemson	9	2856
Clemson	10	2962
Wolf Creek	4	2661
Wolf Creek	5	2666
Wolf Creek	6	2019
Wolf Creek	7	2954
Wolf Creek	8	2372
Wolf Creek	9	2631
Wolf Creek	10	2950

An examination of the density plots (Figure 4) shows that Big Creek has a higher frequency of hourly concentrations in the mid-range of concentrations. However, Clemson has a slightly higher frequency of higher concentrations. The DHEC believes that this is well within the error of the instruments and does not indicate a systemic bias in concentrations at Big Creek. This pattern is repeated in Figures 5-7.

One note of interest in these graphs is the high frequency of low concentrations of ozone at Wolf Creek indicated in Figures 4-7. This pattern is only seen at two ozone sites in South Carolina, Wolf Creek and Famoda Farm in Pickens and neighboring Greenville County respectively, both located in rural areas, near the

foothills north of I-85. An examination of audit data indicates both monitoring sites are operating correctly. The DHEC believes that this pattern is indicative of current very low night and early morning concentrations in the relatively clean areas along the Appalachian foothills north of the I-85 corridor.

Figure 4: Density plot for study period (2011 - 2014)

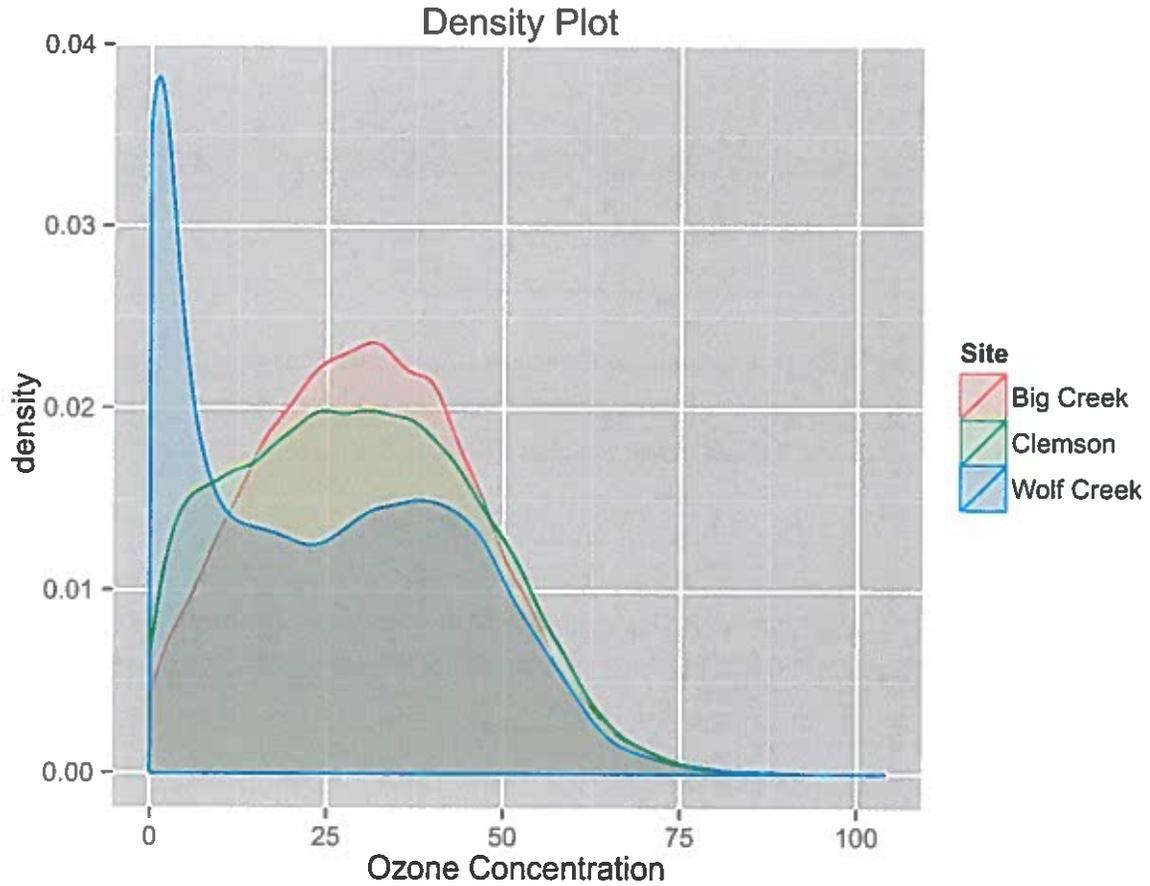


Figure 5: Density plot by year

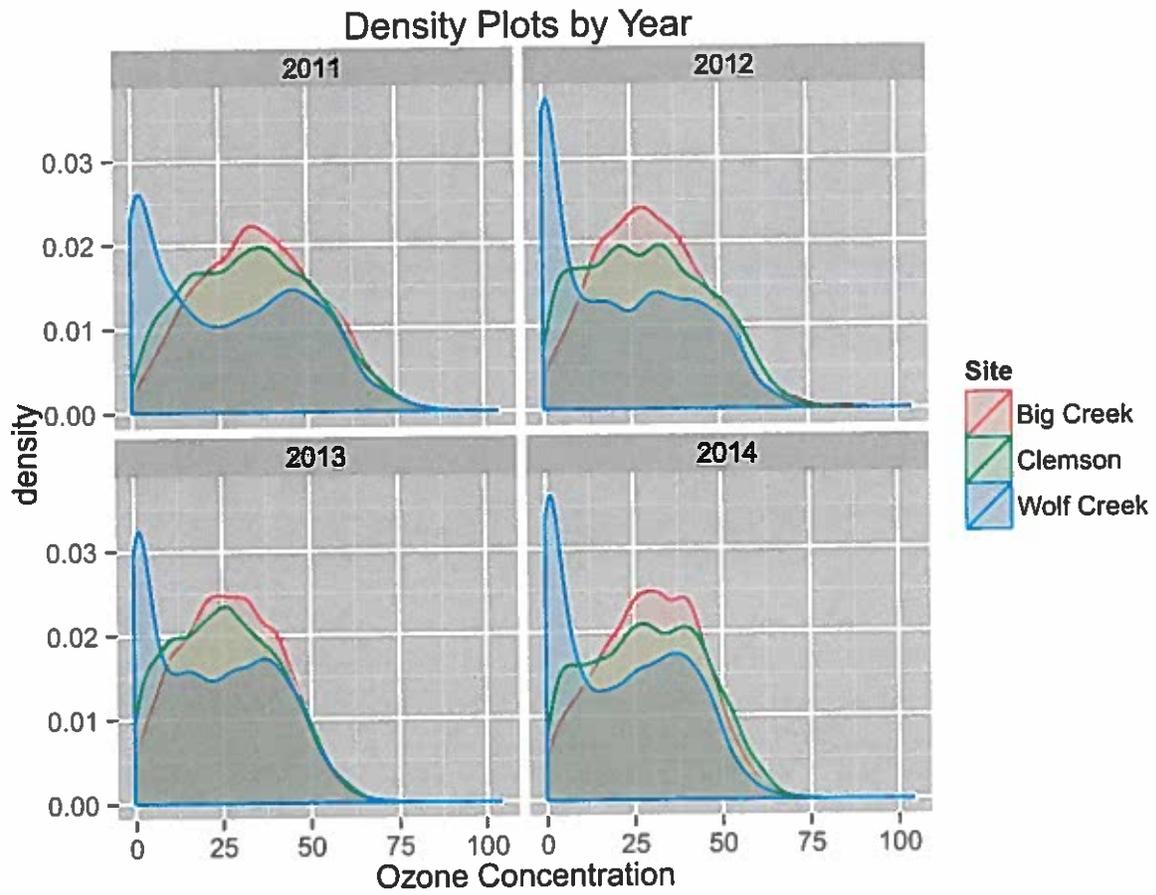


Figure 6: Density Plot by month

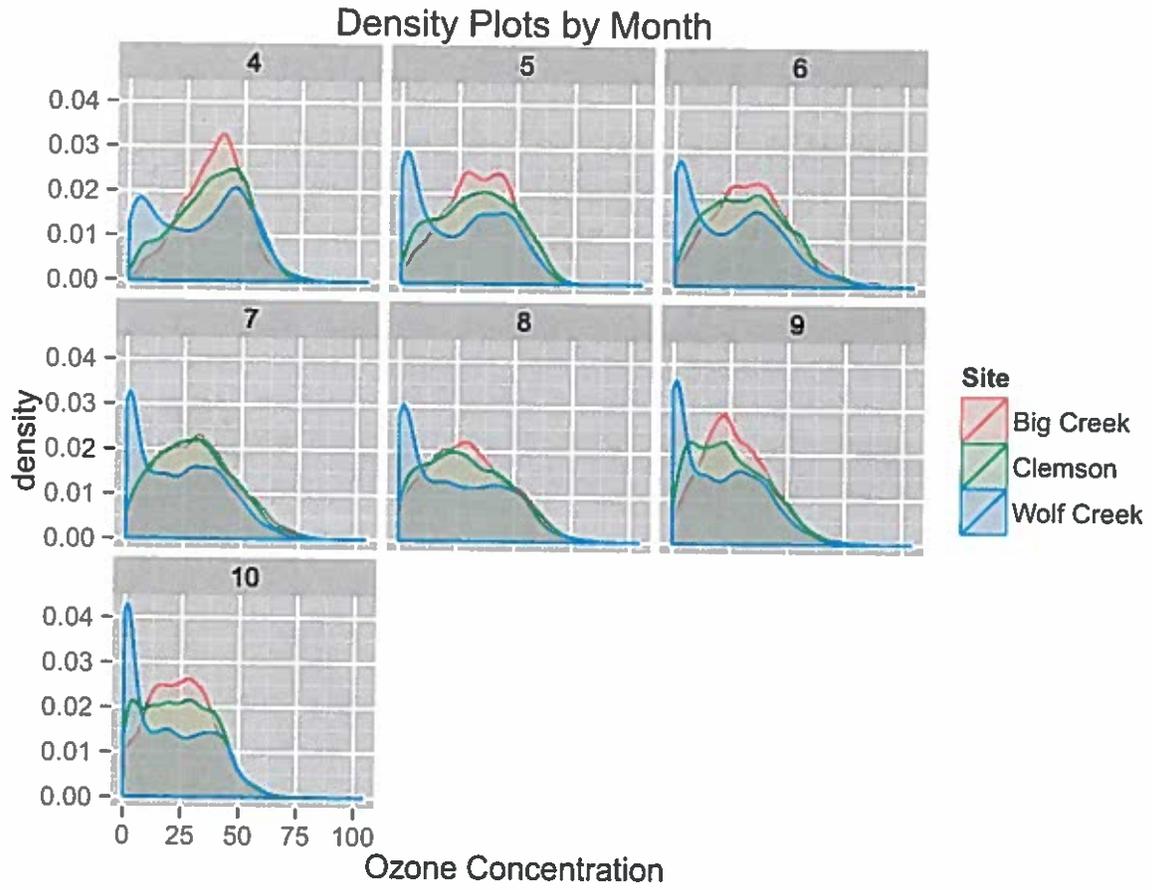
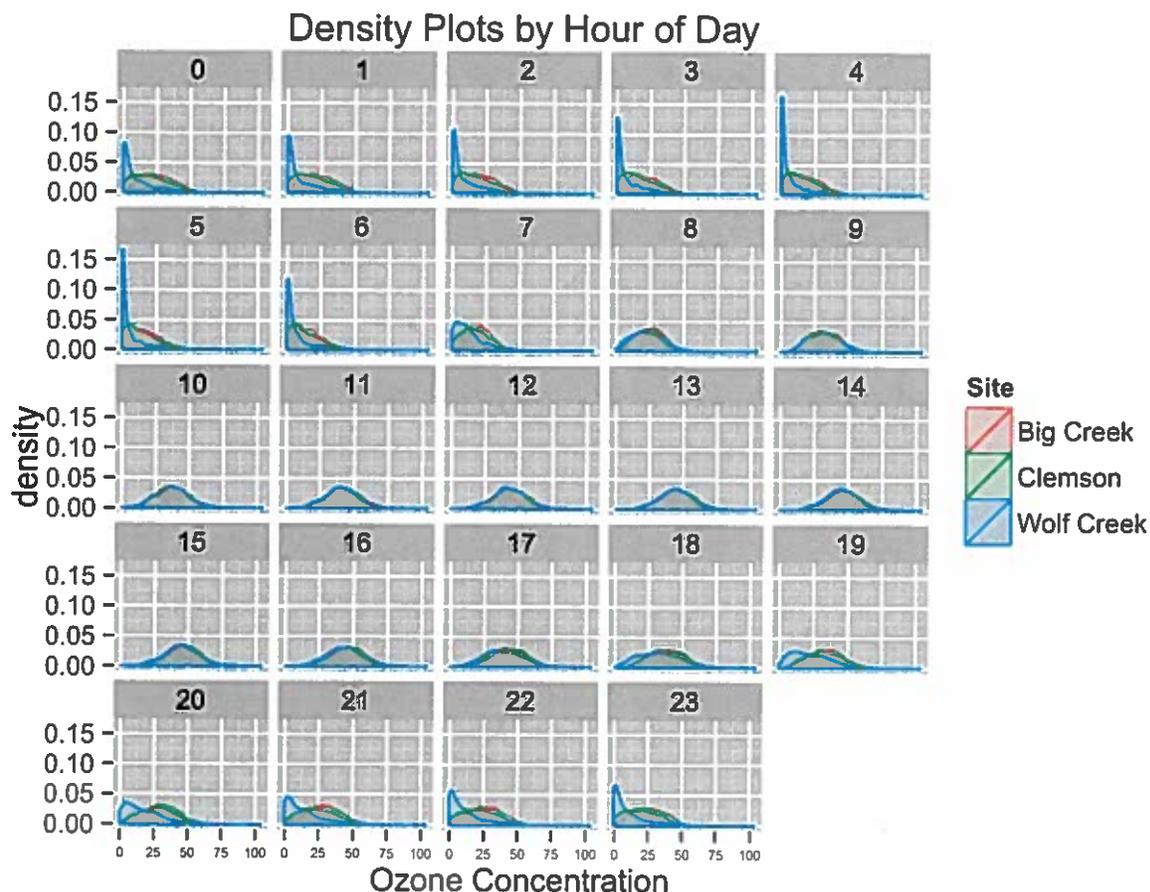


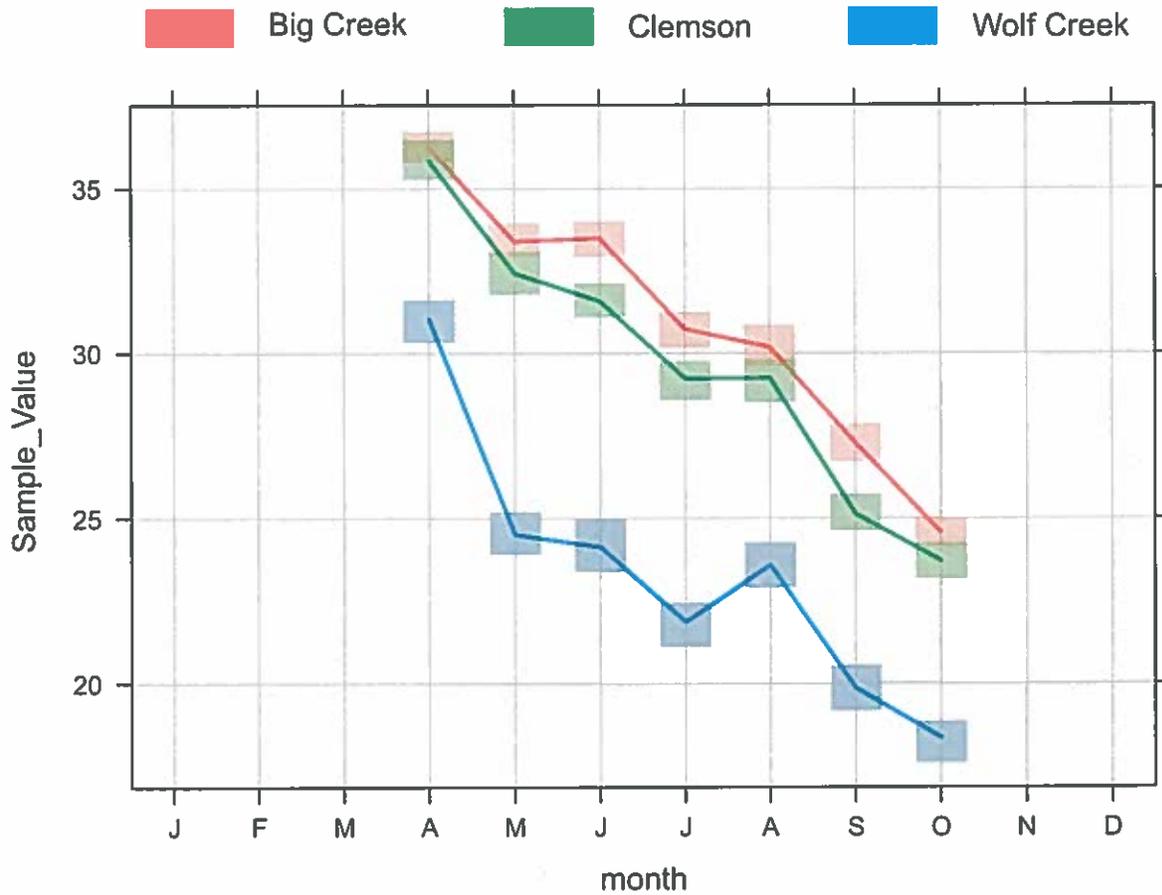
Figure 7: Density plot by hour of day



**1.3 Diel/Time Variation Plots** Diel plots (produced by the timeVariation function in openair) provide an indication of how pollutant concentrations vary by the month or hour of day. The thin, dark line on the graph connects the mean monthly or hourly concentrations for each site, and the lighter bands around the mean show the 95% confidence interval for the mean concentrations.

The highest daily maximum 8-hour ozone average concentrations during 2011 – 2014 were examined in order to ensure that the monitors exhibited similar behaviors in the highest values measured (Figure 8). The DHEC selected these years because they cover the time period in which all monitoring stations shown in Map 1 were operating for full ozone monitoring season. The Big Creek, Clemson and Wolf Creek sites exhibited similar hourly average monthly concentrations throughout the study period providing evidence that they are measuring similar peak concentrations.

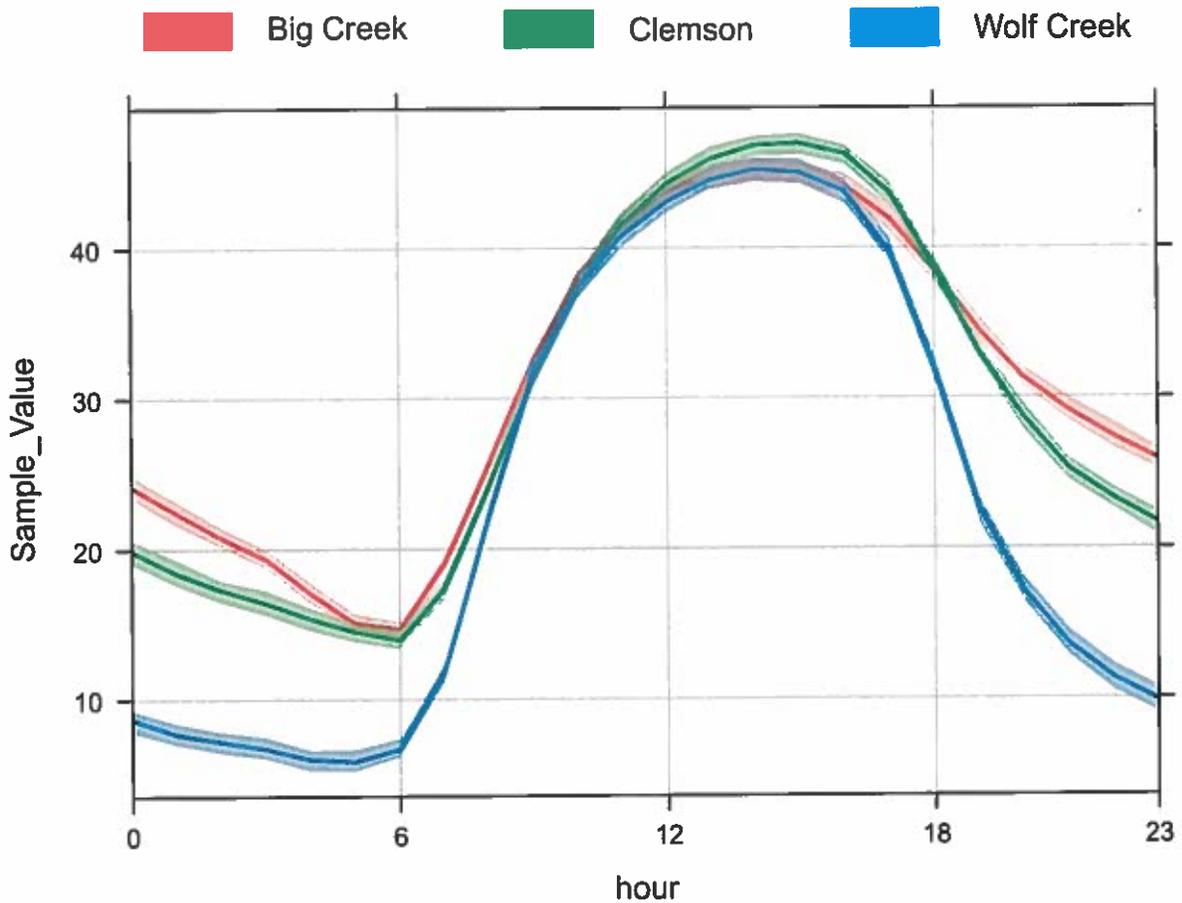
Figure 8: Average Upstate Ozone Concentrations by Month



The DHEC examined diel patterns in the three monitoring sites to determine if there was a time of day in which the monitors were dissimilar. As can be seen in Figure 9, diel patterns are very similar for Big Creek and Clemson. There is a distinct difference between the three monitors during the overnight hours, but once the mixing heights start to break down in the mornings, all three sites increase at a similar rate. Clemson does appear to be slightly higher during the peak of the curve, but the DHEC believes that this is well within the uncertainty of the measurement systems and not due to a significant difference in the air quality between Big Creek and Clemson. During the peak in the curve in Figure 9 (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 impacting implementation or actions to maintain attainment of the NAAQS in the MSA.

At this point in the analysis, the DHEC focused on the relationship between Clemson and Big Creek since it had become obvious that Wolf Creek is representing a different regime within the MSA having much lower overnight ozone concentrations than seen in the areas nearer to the I-85 corridor and the more urbanized portions of the MSA.

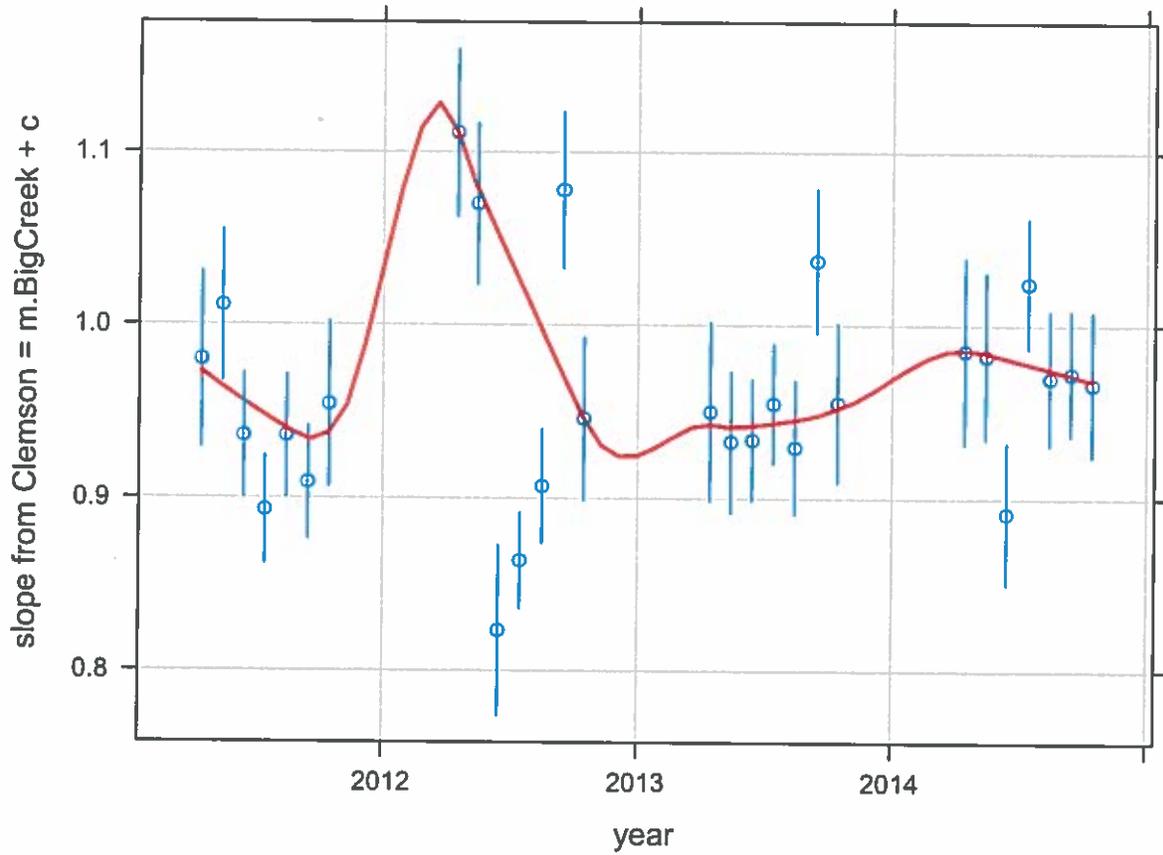
Figure 9: Average Upstate Ozone Concentrations by Hour



**1.4 Quantile Tests** The quantile test is used to test whether or not the specified quantile is equal to a pre-specified number. In our case, we wanted to perform a test on the median, so our quantile is 0.5.

The initial goal was to test whether or not the median of the slopes from the simple linear regression lines between Clemson and Big Creek for each month was equal to 1 (Figure 10). A value of 1 would mean a perfect linear relationship between the two monitors; however this is almost never achievable in real data. Therefore, the test was used to determine whether there is a significant deviation from 1. A monthly slope term greater than 1.0 means that Big Creek tended to be higher than Clemson. Conversely, a monthly slope term less than 1.0 means that Clemson tended to be higher than Big Creek.

Figure 10: Timeseries graph of Big Creek vs. Clemson regression slopes by month



First, though, we needed to establish whether we could use a parametric test or not. If the data are non-normal a nonparametric test gives the best results. Two graphical ways to look at the distribution of the test were used: a histogram (Figure 11) and a q-q (quantile-quantile) plot (Figure 12). The histograms for the two data sets we analyzed were both skewed, and the q-q plots did not fit their theoretical lines.

Figure 11: Histogram All Hours

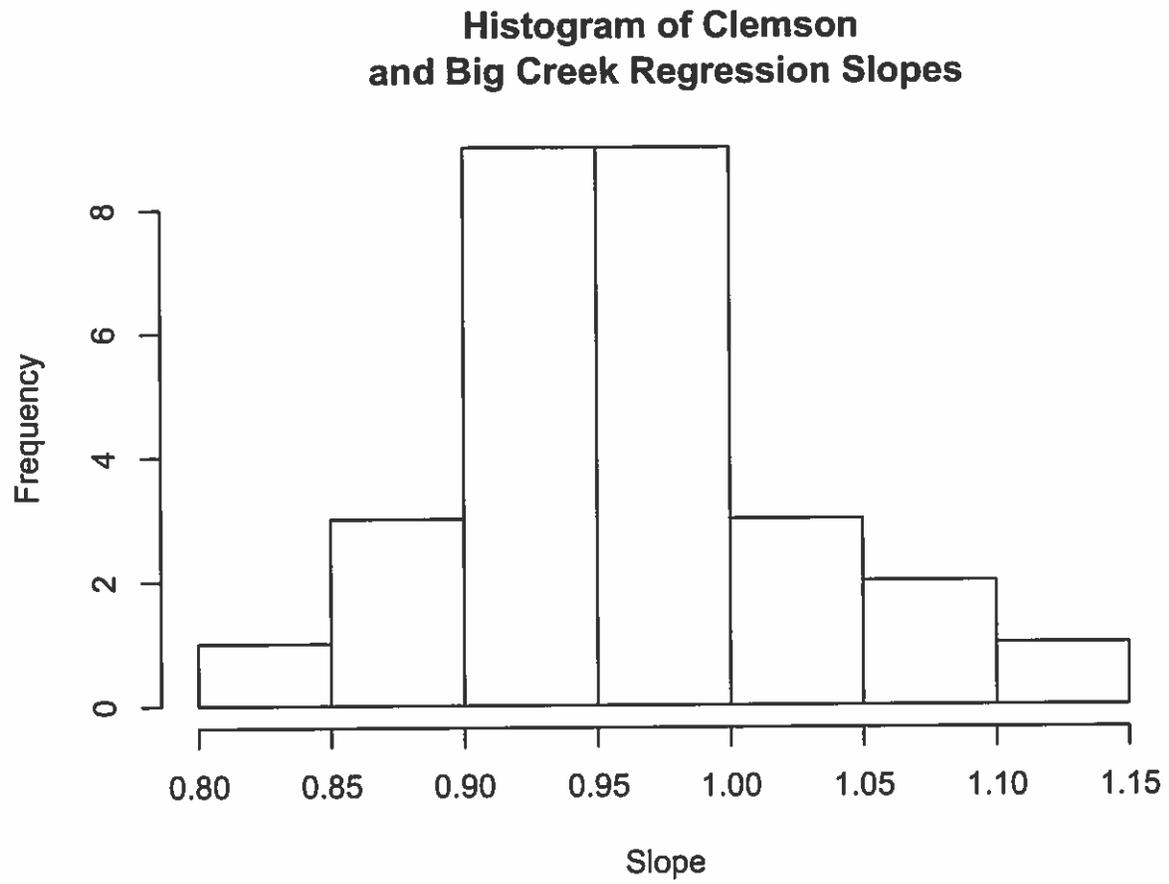
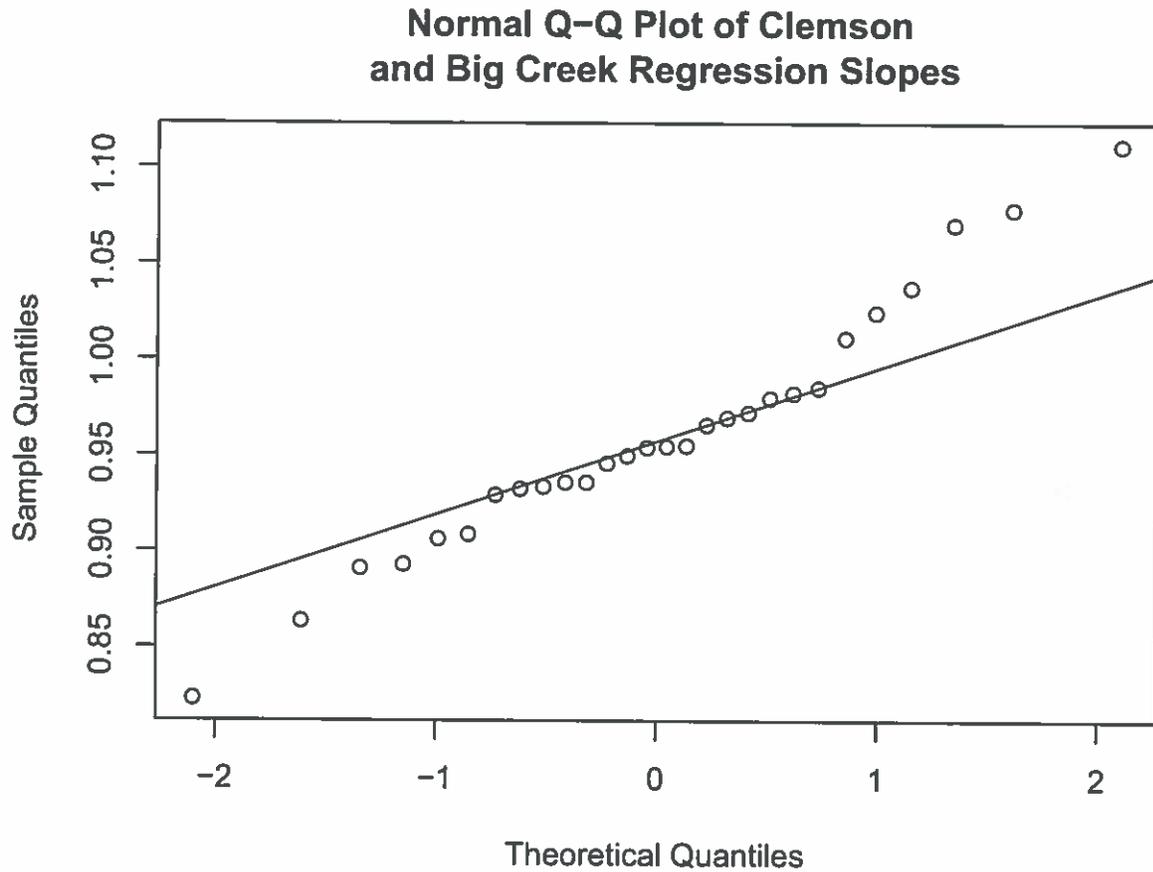


Figure 12: Normal Q-Q Plot All Hours



Thus, instead of performing a normal t-test, we used the quantile test. For both the entire Clemson-Big Creek data set and the Clemson-Big Creek data set to only “peak” hours (8 AM-7PM, as shown by a histogram of the times in which 8-hour daily maxes occurred) (Figure 13). A histogram (Figure 14) and q-q plot (Figure 15) confirmed that the distributions were not normally distributed and that the quantile test would be appropriate to use. The test showed that the median slope was significantly different than 1 (Table 5), meaning that Clemson’s hourly data and Big Creek’s hourly data do not necessarily correspond during those time periods.

Figure 13: Histogram of Hour when daily maximum ozone concentration occurred

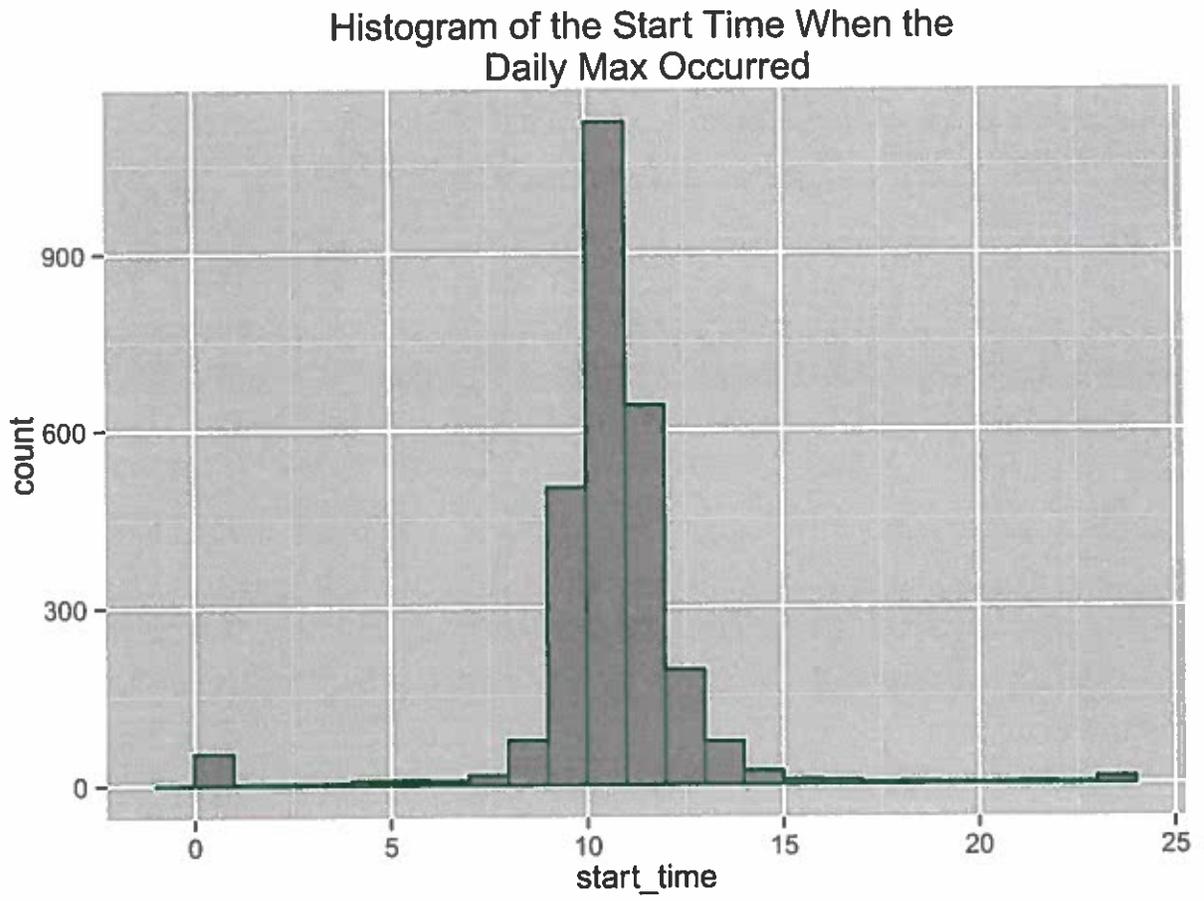


Figure 14: Histogram 0800 - 1900 EST

### Histogram of Clemson and Big Creek Regression Slopes 0800 - 1900

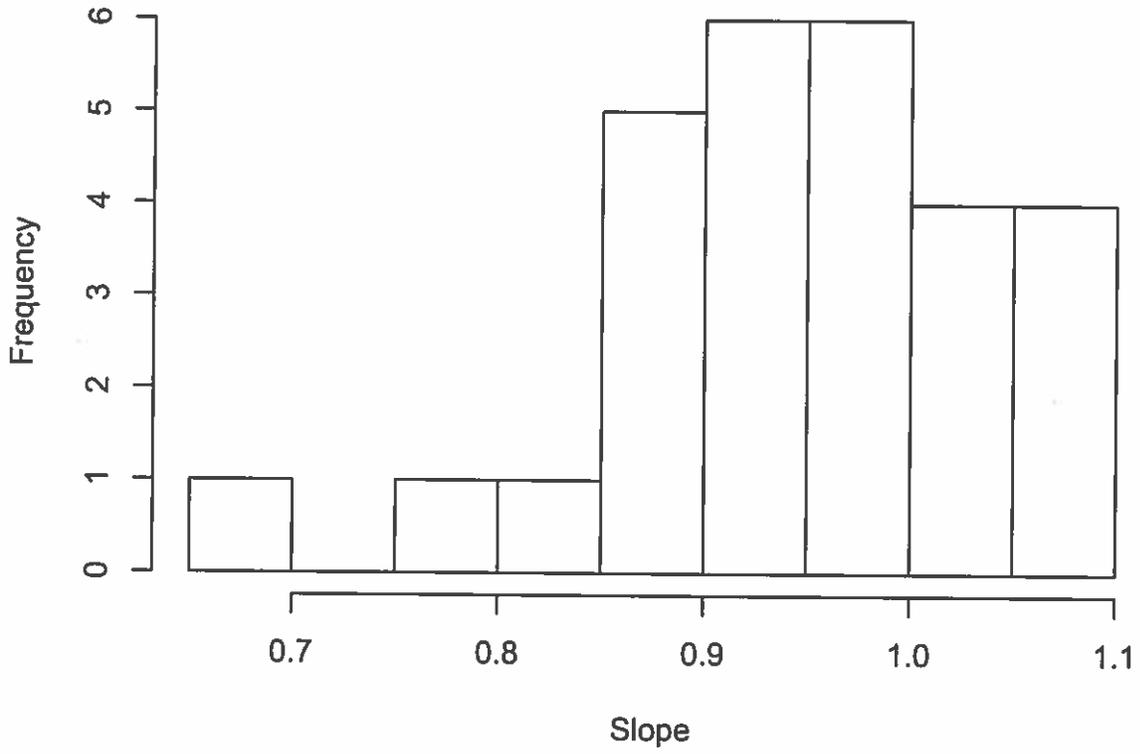
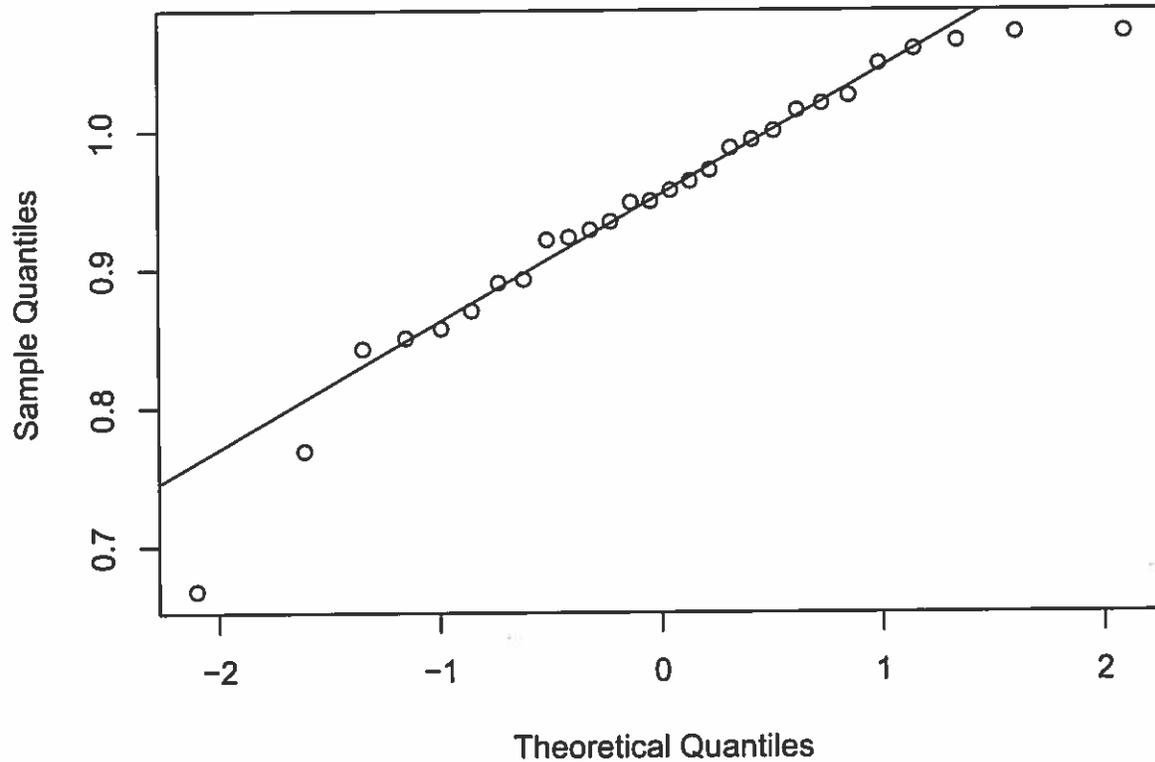


Figure 15: Normal Q-Q Plot 0800 - 1900 EST

### Normal Q-Q Plot of Clemson and Big Creek Regression Slopes 0800 – 1900



The r user function used to perform the quantile test:

```
quantile.test<-function(x,eta=0,quantile=.5,alternative="two.sided"){
  n<-length(x); p<-quantile; T1<-sum(x<=eta); T2<-sum(x< eta)
  if (alternative=="less") {
    p.value<-1-pbinom(T2-1,n,p)}
  if (alternative=="greater"){
    p.value<-pbinom(T1,n,p)}
  if (alternative=="two.sided"){
    p.value<-2*min(1-pbinom(T2-1,n,p),pbinom(T1,n,p))}
  list(eta=eta,alternative=alternative,T1=T1,T2=T2,p.value=p.value)}
```

Table 5: Table 5: Quantile Test

eta	alternative	T1	T2	p.value	test.name
1	two.sided	22	22	0.0037	hrs: all
1	two.sided	20	20	0.0357	hrs: 0800-1900

## 2.0 Meteorological and Trajectory Analysis

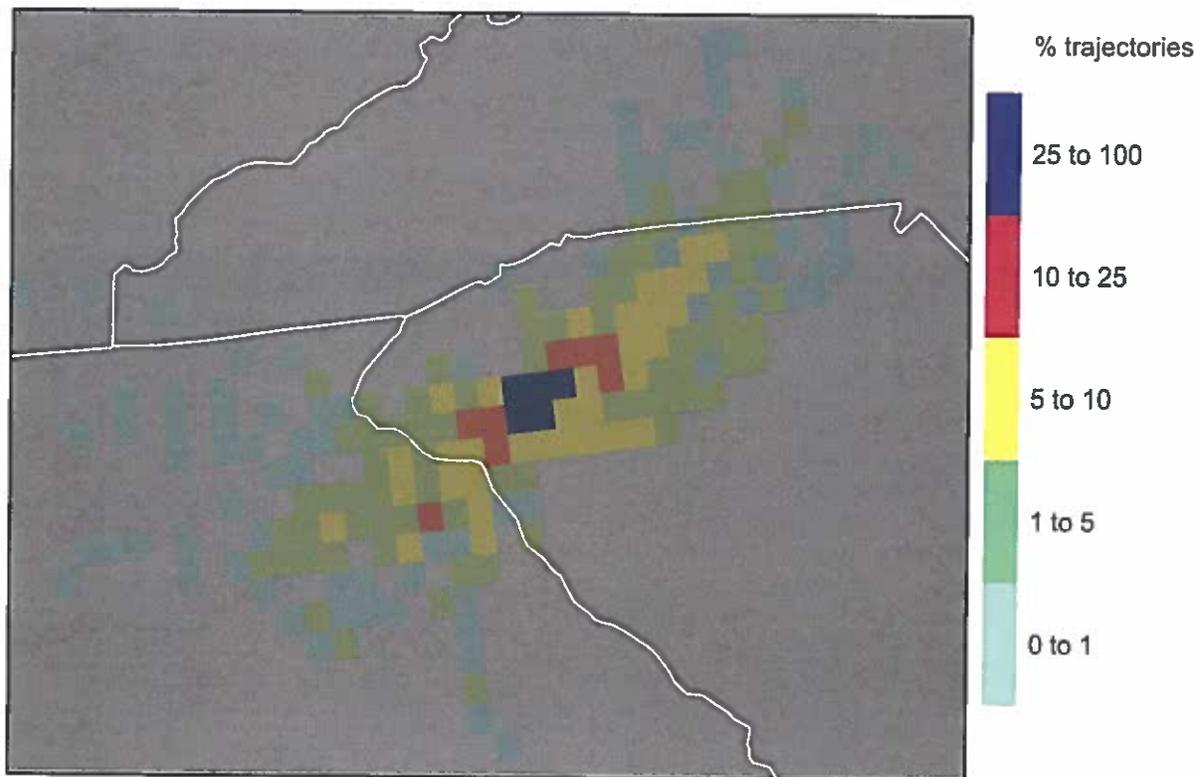
A trajectory analysis was conducted for all ozone monitoring season days from 2011 to 2014 with daily maximum 8-hour ozone averages greater than or equal to 60 ppb. The trajectories help visualize the areas the air masses originated and where they traveled before ending up at the impact location. Thirty-six hour back trajectories were run using the HYSPLIT (Hybrid Lagrangian Integrated Trajectory) model<sup>14</sup> for Big Creek and Clemson CMS. 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) and reset every three hours per day.

**2.1 Gridded trajectories** Due to the grid resolution with the NAM EDAS model (40 km X 40 km grid resolution), a single representative point in the middle of the three sites (Clemson and Big Creek centered latitude: 34.6874, longitude: -82.6667) was selected to originate the back trajectories. Ozone data from each site was then merged with the trajectories to produce the graphics. Due to the large grid cell size, the DHEC believes that this is the most straight forward way to analyze the trajectories.

Figures 16 and 17 show the frequency of backtrajectories on days with daily maximum ozone concentrations greater than or equal to 60 ppb for Clemson, Wolf Creek and Big Creek, respectively. All three figures reveal that days greater than or equal to 60 ppb have trajectories which roughly follow the I-85 corridor with most originating from the north-east.

Figure 16: Clemson CMS backtrajectory frequency

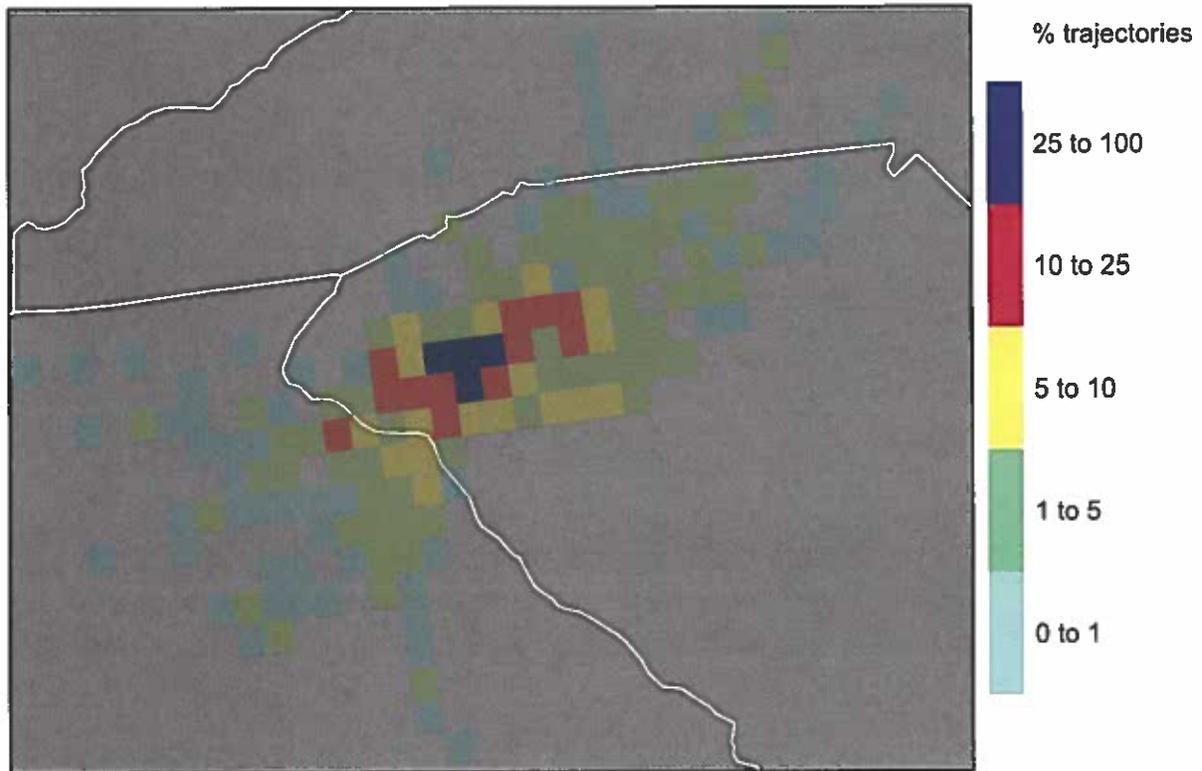
### Backtrajectory frequency for Clemson CMS when Daily Max $\geq$ 60 ppb 2011 – 2014



<sup>14</sup>[http://www.arl.noaa.gov/HYSPLIT\\_info.php](http://www.arl.noaa.gov/HYSPLIT_info.php)

Figure 17: Big Creek backtrajectory frequency

Backtrajectory frequency for Big Creek  
when Daily Max  $\geq$  60 ppb 2011 – 2014



One analysis type taken from the `openair` package is looking at the origin of high concentrations for ozone. The difference argument in the `trajLevel` function allows us to look at the percent difference between ozone monitoring season and the 90<sup>th</sup> percentile ozone concentration. Figures 18 and 19 show the percent difference for the two monitoring stations. Figures 18 and 19 shows that compared to the monitoring season, high ozone concentrations are more prevalent when the backtrajectories originate from the north (red grid cells in the figures). This is consistent with the trajectory frequency maps found in Figures 16 and 17 suggesting that the majority of trajectories are originating from the Charlotte area. The proximity of the the “high” cells in Figures 18 and 19 also suggest that high levels of ozone are also associated with relatively low wind speeds.

Figure 18: Trajectory frequencies showing percent difference in occurrence for high  $O_3$  concentrations at Clemson CMS

### Percent difference in occurrence for high $O_3$ concentrations at Clemson CMS

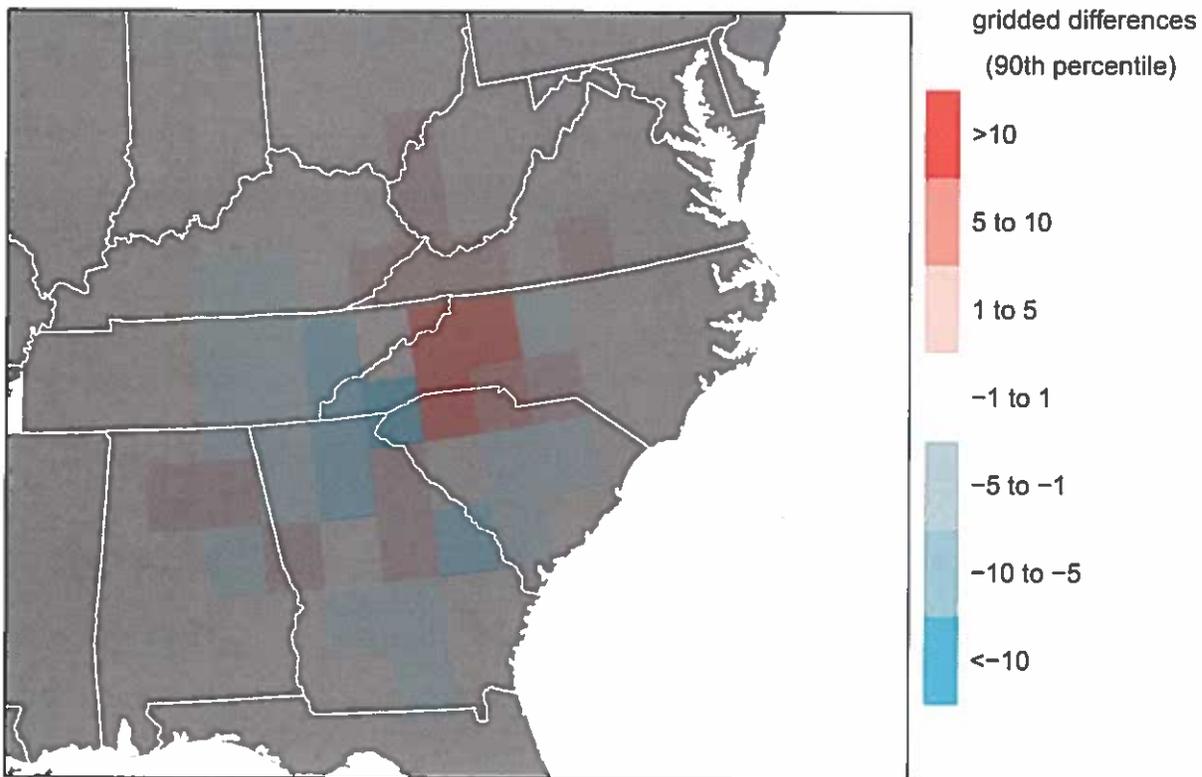
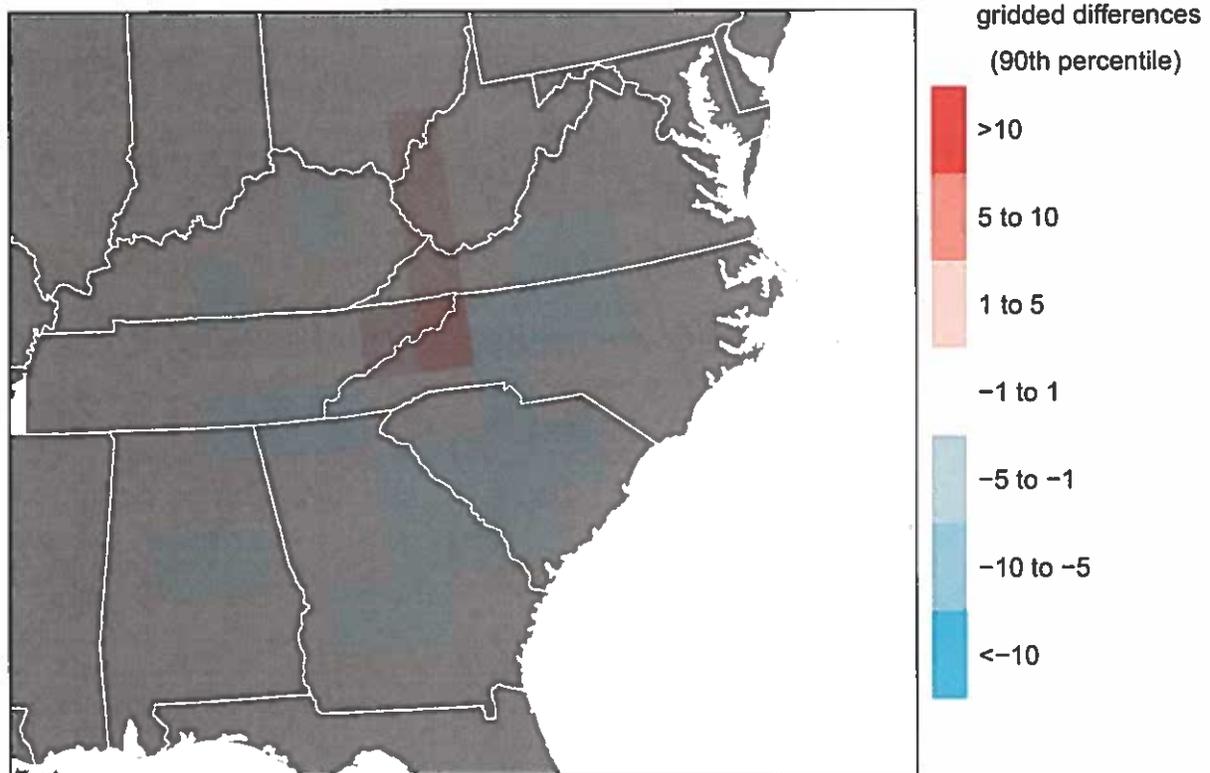


Figure 19: Trajectory frequencies showing percent difference in occurrence for high  $O_3$  concentrations at Big Creek

### Percent difference in occurrence for high $O_3$ concentrations at Big Creek



**2.2 Trajectory cluster analysis** Finally, the DHEC undertook a cluster analysis on the backtrajectory data. Cluster analysis is used to group similar air masses together. The `openair` clustering algorithm is based on the same methodology as HYSPLIT. Backtrajectory data for the Clemson area was imported along with the hourly average ozone concentration. Before we can conduct the cluster analysis, we need to determine an appropriate number of clusters to calculate. One method of determining the appropriate number of clusters is to compare the sum of squared error (SSE) for a number of cluster solutions. A plot of the SSE against the number of clusters can then be plotted to determine the appropriate number of clusters<sup>15</sup> (Figure 20). To interpret, the appropriate number of clusters is defined where the rate of change in SSE between clusters starts to level out.

The script used to calculate the SSE and generate the “scree” plot is:

```
#Determine the appropriate number of clusters
clemstest<-clemsonstudy
clemstest<-clemstest[,-c(1,2,3,4,5,6,9,10,11,12,13),drop=FALSE]

n<-nrow(clemstest)
#find within group ss for all the data
wssl<-(n-1)*sum(apply(clemstest,2,var))
```

<sup>15</sup><http://www.mattpeoples.net/kmeans.html>

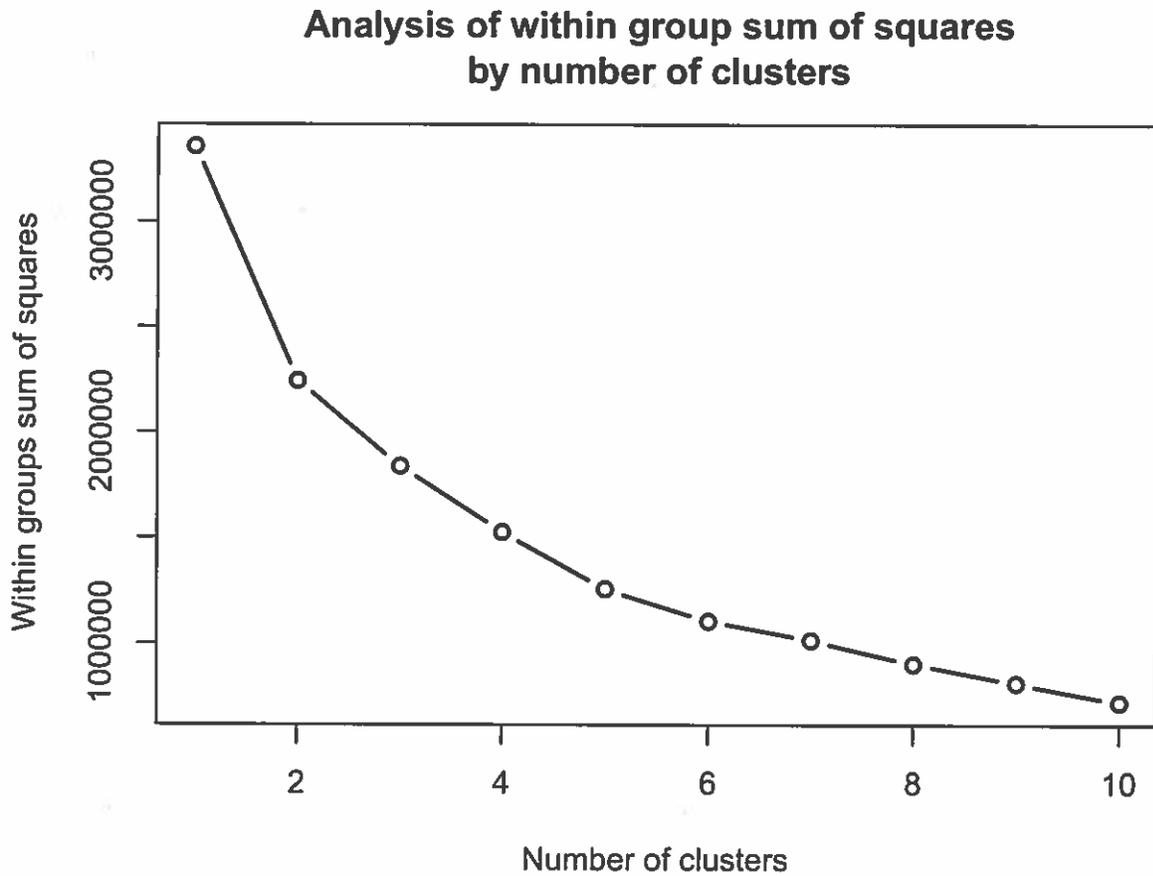
```

wss<-numeric(0)
#calculate within group ss for 2 to 6 group partitions given by k-means clustering
for(i in 2:10){
  W<-sum(kmeans(clemsclust,i)$withinss)
  wss<-c(wss,W)
}
wss<-c(wss1,wss)

plot(1:10,wss,type="b",xlab="Number of clusters",
     ylab="Within groups sum of squares",
     main="Analysis of within group sum of squares\nby number of clusters",
     lwd=2)

```

Figure 20: Scree plot to determine appropriate number of clusters for analysis



The percent difference between number of clusters added indicates that five clusters minimize the within groups sum of squares.

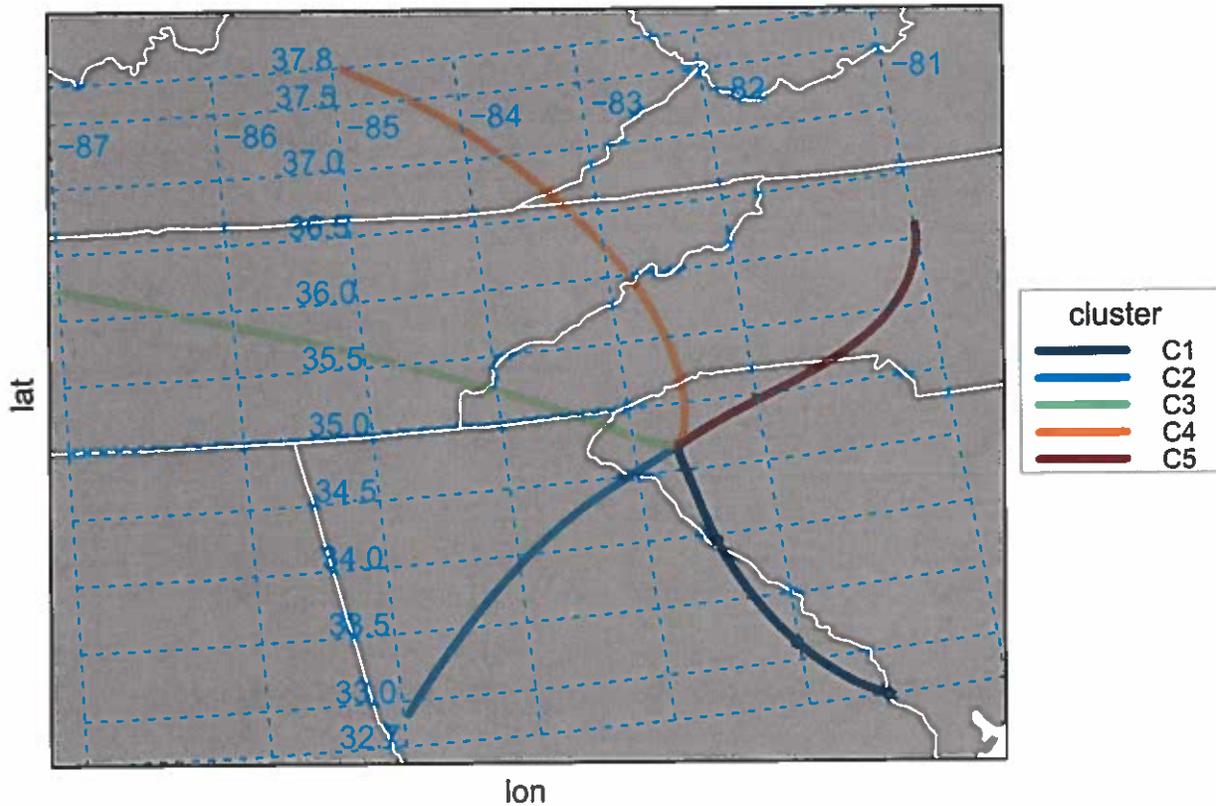
Table 6: Table 6: Percent Change in Within Sum of Squares Per Cluster Added

perchlags	clustnumber	wss
NA	1	3359787.5
-33.2	2	2244170.1
-18.1	3	1838483.4
-17.0	4	1526701.3
-17.7	5	1257219.2
-12.0	6	1106387.8
-8.1	7	1016818.3
-11.1	8	904257.4
-10.1	9	813146.8
-11.0	10	723471.1

Based on this analysis, the DHEC estimates that five clusters adequately minimize the SSE and are the most appropriate division of the data available for the analysis. Figure 21 shows the areas represented by the five clusters.

Figure 21: Cluster Analysis for Clemson Area Monitors

### Clusters identified for Clemson area monitors: 2011–2014



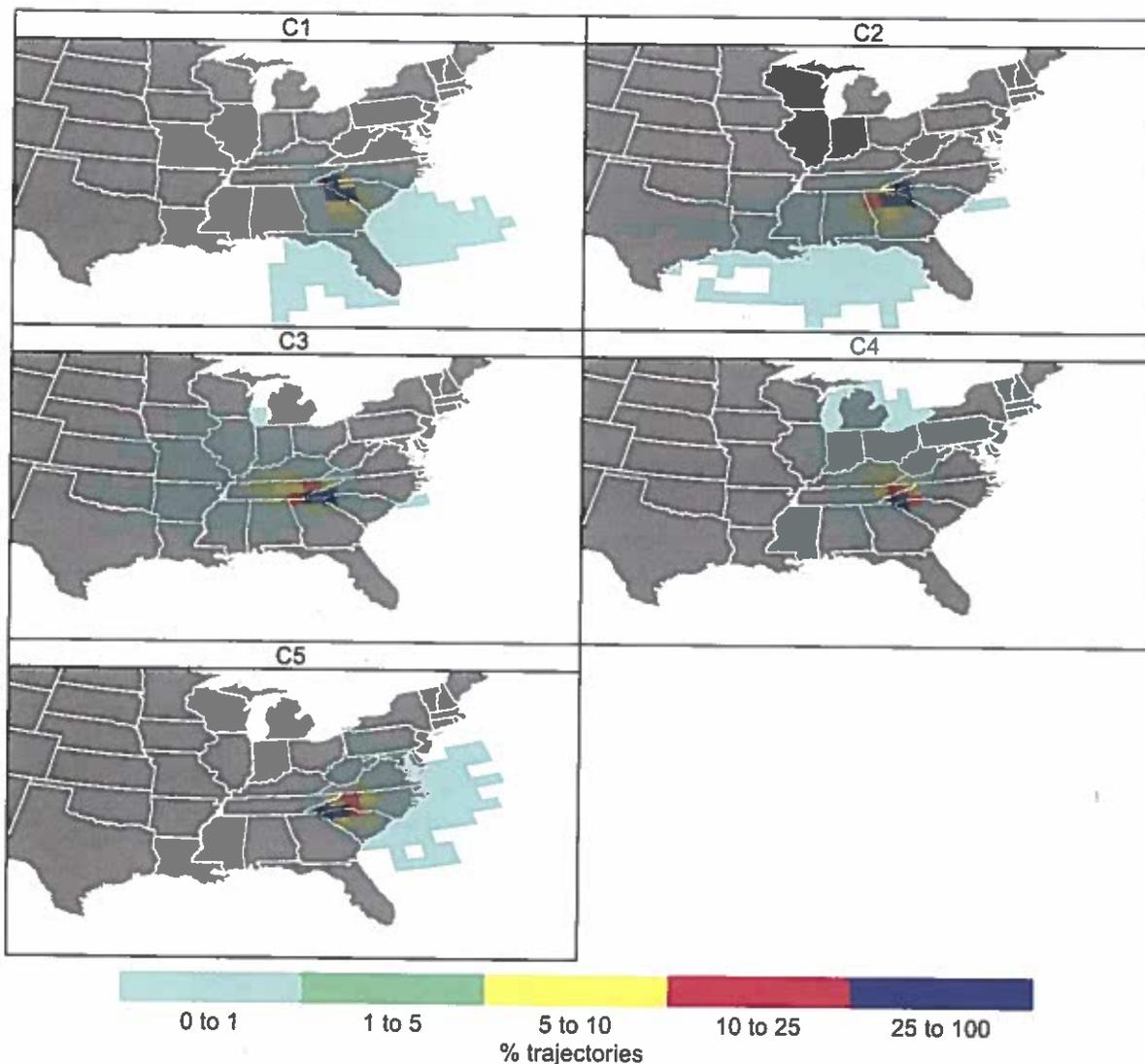
Next, we gridded the trajectories by cluster (Figure 22) to determine the percent of trajectories that passed through each grid square. Cluster 1 contains trajectories approaching along the Savannah River valley and

is normally associated with cleaner air masses. Cluster 2 is from the southwest, centered between Atlanta and Macon, Georgia. Cluster 3 contains trajectories that generally approach the Clemson area from the west through the southern Appalachians. Cluster 4 contains trajectories that approach the Clemson area from the northwest from what appears to be the Midwest and Ohio River valley. Finally, Cluster 5 includes trajectories primarily from the Northeast passing through the Charlotte area and along the I-85 corridor.

Figure 22: Percent of trajectories for five identified clusters

### Percent of trajectories for each cluster identified

Clemson area monitors: 2011–2014



Figures 23 - 24 presents the average ozone concentration by cluster, month and hour for this study. Based on the DHEC's analysis, it appears that Clusters 3, 4 and 5 have the highest ozone averages for the study period at Clemson and Big Creek. Examination of these graphs indicates that the highest average ozone concentrations throughout the monitoring season is most likely on days in which the wind is approaching the area from the northeast. Combine this with Figure 25 which shows that the highest peak one hour ozone concentrations occurs during the summer months (June - August). These graphics along with the fact that both Clemson and Big Creek lie on the western edge of the monitoring area, suggests that both monitors are

generally seeing the same air mass, especially on high ozone days.

Figure 23: Clemson CMS average ozone concentrations by cluster

### Average O<sub>3</sub> concentrations for Clemson CMS (45-077-0002) by Cluster, Month and Hour: 2011-2014

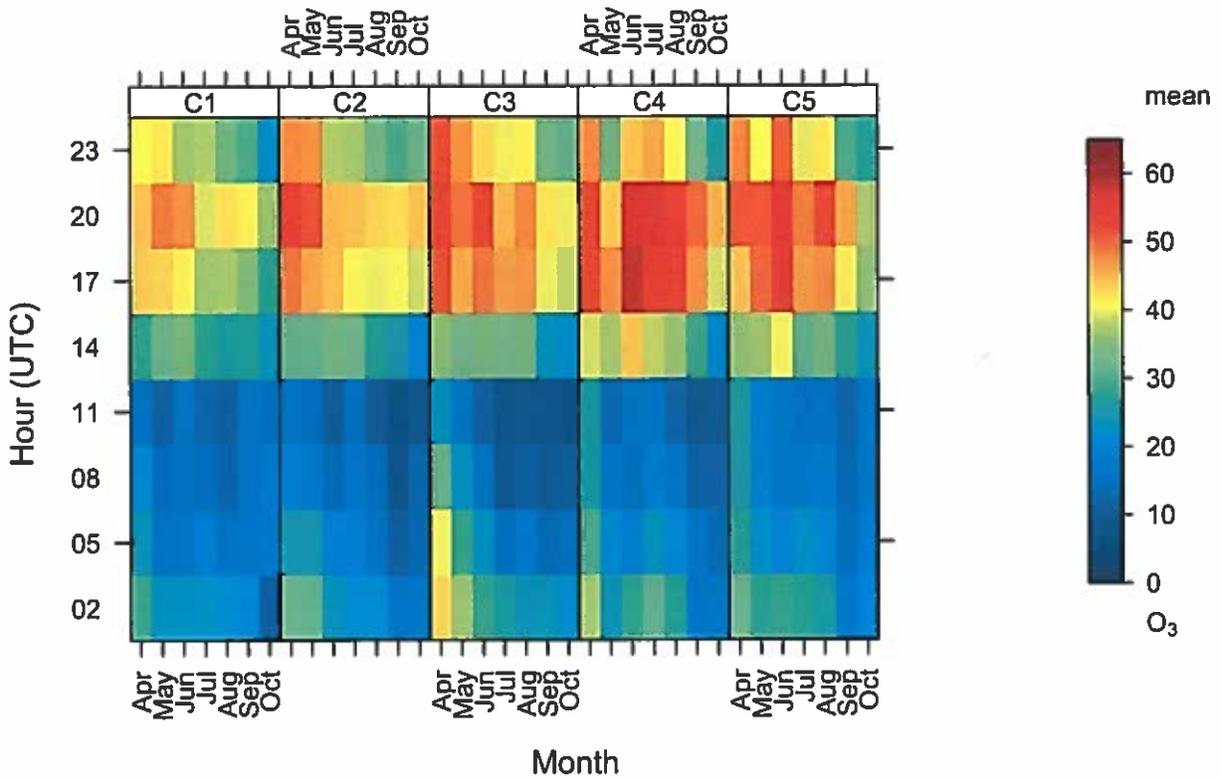


Figure 24: Big Creek average ozone concentrations by cluster

Average O<sub>3</sub> concentrations for Big Creek  
(45-007-0005) by Cluster, Month and Hour: 2011-2014

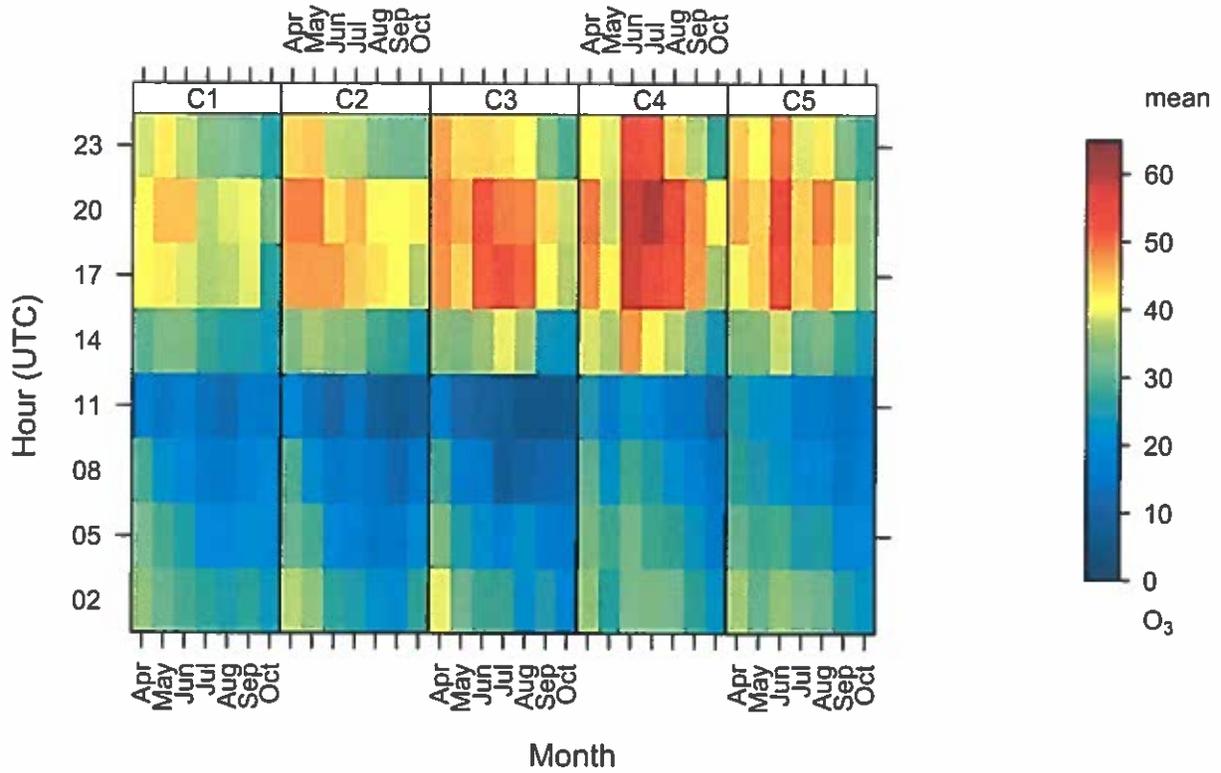
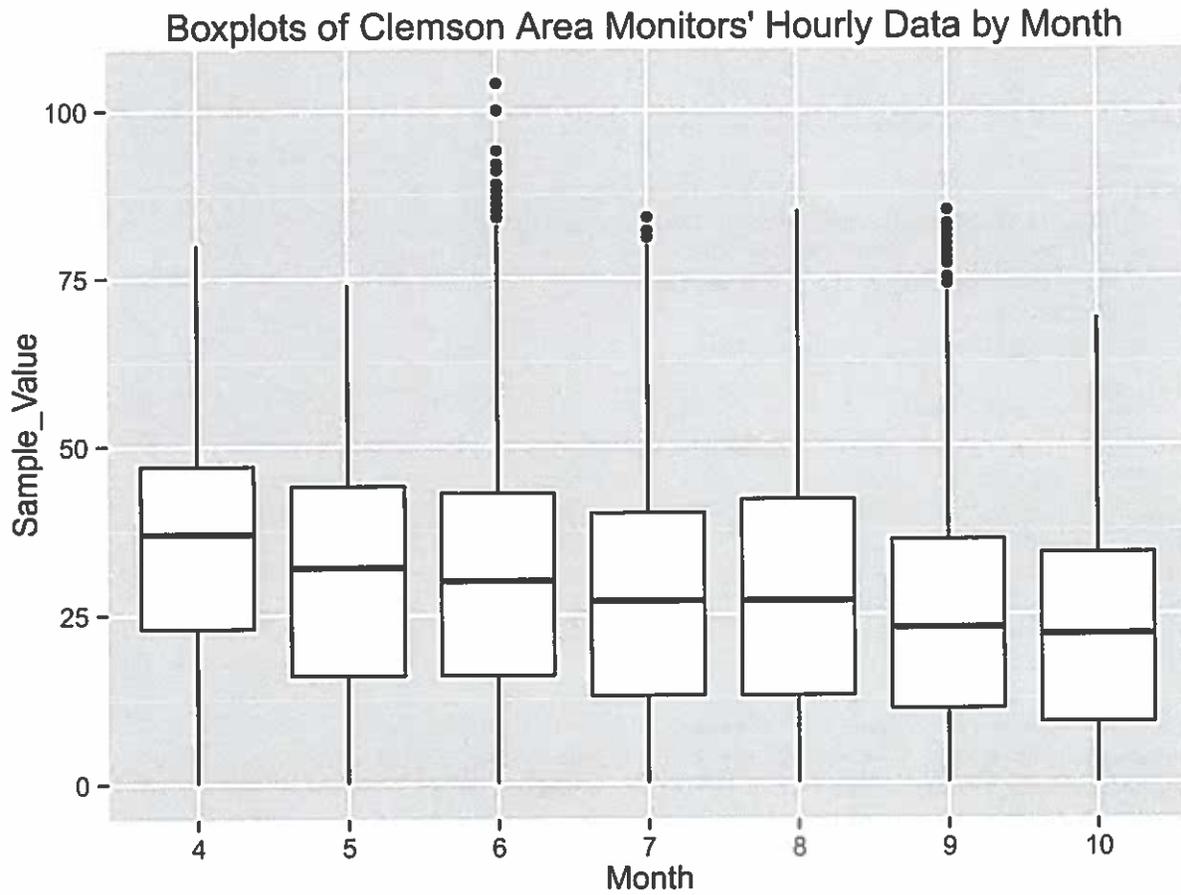


Figure 25: Boxplots of Clemson Area Monitors' Hourly Data by Month



After merging the trajectory and ozone data together, each trajectory was allocated to one of eight wind sectors (ie, NE,E,SE,S,SW,W,NW,N). Average ozone concentrations and proportion of the winds for each monitoring site were then calculated. The results are depicted in Table 7.

Table 7: Table 7: 98<sup>th</sup> Percentile Ozone Concentration (ppb) by Wind Sector

	Big Creek	Clemson
NE	75	71
E	68	71
SE	64	66
S	66	66
SW	65	65
W	66	63
NW	66	62
N	70	69

## References and Citations

R version 3.1.2 along with RStudio Version 0.98.1102 was used to analyze the ambient monitoring and meteorological data. Session information containing the R packages used and the versions are given below.

R version 3.1.2 (2014-10-31)

Platform: x86\_64-w64-mingw32/x64 (64-bit)

locale:

```
[1] LC_COLLATE=English_United States.1252
[2] LC_CTYPE=English_United States.1252
[3] LC_MONETARY=English_United States.1252
[4] LC_NUMERIC=C
[5] LC_TIME=English_United States.1252
```

attached base packages:

```
[1] grid      stats      graphics  grDevices  utils      datasets  methods
[8] base
```

other attached packages:

```
[1] mapproj_1.2-2  knitr_1.10.5  png_0.1-7     mapdata_2.2-3
[5] plyr_1.8.2    RODBC_1.3-11  reshape2_1.4.1 openair_1.5-2
[9] maps_2.3-9    dplyr_0.4.1   lazyeval_0.1.10 lubridate_1.3.3
[13] ggplot2_1.0.1
```

loaded via a namespace (and not attached):

```
[1] assertthat_0.1  cluster_2.0.1  codetools_0.2-11
[4] colorspace_1.2-6 DBI_0.3.1      digest_0.6.8
[7] evaluate_0.7    formatR_1.2    gtable_0.1.2
[10] hexbin_1.27.0   highr_0.5      htmltools_0.2.6
[13] labeling_0.3    lattice_0.20-31 latticeExtra_0.6-26
[16] magrittr_1.5    MASS_7.3-40    Matrix_1.2-1
[19] memoise_0.2.1  mgcv_1.8-6     munsell_0.4.2
[22] nlme_3.1-120   parallel_3.1.2 proto_0.3-10
[25] RColorBrewer_1.1-2 Rcpp_0.11.6    RgoogleMaps_1.2.0.7
[28] RJSONIO_1.3-0  rmarkdown_0.6.1 scales_0.2.4
[31] stringi_0.4-1  stringr_1.0.0  tools_3.1.2
[34] yaml_2.1.13
```

To cite R in publications use:

R Core Team (2014). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>.

A BibTeX entry for LaTeX users is

```
@Manual{,
  title = {R: A Language and Environment for Statistical Computing},
  author = {{R Core Team}},
  organization = {R Foundation for Statistical Computing},
  address = {Vienna, Austria},
  year = {2014},
```

```
url = {http://www.R-project.org/},  
}
```

We have invested a lot of time and effort in creating R, please cite it when using it for data analysis. See also 'citation("pkgname")' for citing R packages.

To cite package 'openair' in publications use:

Carslaw, D. C. and K. Ropkins, (2012) openair --- an R package for air quality data analysis. Environmental Modelling & Software. Volume 27-28, 52-61.

Carslaw D and Ropkins K (2015). \_openair: Open-source tools for the analysis of air pollution data\_. R package version 1.5-2, <URL: <http://CRAN.R-project.org/package=openair>>.



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

MAY 26 2016

Ms. Rhonda Banks Thompson  
Chief  
Bureau of Air Quality Control  
South Carolina Department of Health and  
Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

Dear Ms. Thompson:

On March 16, 2016, the South Carolina Department of Health and Environmental Control (SC DHEC) notified the U.S. Environmental Protection Agency Region 4 that the comment period had ended for the Network Plan Addendum to the state of South Carolina's 2015 annual ambient air monitoring network plan (Network Plan Addendum). The Network Plan Addendum provided further information and proposed changes to the 2015 annual ambient air monitoring network plan (Network Plan), which was approved with three exceptions by the EPA on November 19, 2015. The Network Plan Addendum was received as two separate documents. One document proposed changes to the SC DHEC monitoring network and the other document requested waivers for monitoring siting requirements.

The EPA understands that the SC DHEC provided the public a 30-day review period for its draft Network Plan Addendum and that no comments were received.

The Network Plan Addendum proposes a number of changes to the SC DHEC's ambient air monitoring network, including:

- shutdown of four ozone (O<sub>3</sub>) monitoring sites,
- relocation of one O<sub>3</sub> monitoring site,
- startup of one O<sub>3</sub> monitoring site,
- shutdown of one multipollutant (PM<sub>2.5</sub> and PM<sub>10</sub>) site,
- a waiver of siting requirements at an O<sub>3</sub> and SO<sub>2</sub> site, and
- renewal of an existing waiver at a multi-pollutant site.

The EPA approves the requests in the Network Plan Addendum, with the following exceptions:

- The EPA is deferring making a decision on the proposed shut down of the Clemson O<sub>3</sub> site (AQS ID 45-072-0002) in order to allow more time for consideration and discussion with the SC DHEC.
- The EPA does not approve the discontinuation of O<sub>3</sub> monitoring at the Bushy Park Pump Station site (AQS ID 45-015-0002), since this site is required for the Charleston area to meet the O<sub>3</sub> minimum monitoring requirements found in 40 CFR Part 58, Appendix D. The EPA understands that the SC DHEC is currently looking for nearby property to move this monitor to. Once a suitable replacement site is found, the SC DHEC should request a relocation of the Bushy Park Pump Station O<sub>3</sub> monitor.

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- The EPA conditionally approves the establishment of the Coastal Carolina O<sub>3</sub> monitoring site, once the SC DHEC has resolved any monitor siting issues. This site will meet the requirements for O<sub>3</sub> monitoring in the Myrtle Beach-Conway-North Myrtle Beach, SC-NC Metropolitan Statistical Area. The SC DHEC should include in the next ambient air monitoring network plan evidence that the Coastal Carolina site meets air monitoring siting requirements found in 40 CFR Part 58, Appendix E.
- The EPA supports the proposed relocation for the York CMS O<sub>3</sub> monitoring site (AQS ID 45-091-0006) to the proposed York O<sub>3</sub> site (AQS ID 45-091-0007). However, the Network Plan Addendum does not provide sufficient information to approve the new location at the proposed York O<sub>3</sub> site. In addition to the information provided in the Network Plan Addendum, the SC DHEC should submit to the EPA information to demonstrate that monitoring siting criteria are met, including: zoomed in aerial photo or a site location map; site photo(s) facing from the site in each direction (N, S, E, W); applicable measurements to any obstructions, trees or roadways; and the proposed probe height for the site.

All of the approved ambient air monitoring network changes, requested in the Network Plan Addendum should also be documented in the next annual ambient air monitoring network plan, due July 1, 2016.

Details regarding the EPA's review of the Network Plan Addendum are provided in the enclosed comments.

Thank you for working with us to monitor air pollution and promote healthy air quality in South Carolina. If you have any questions or concerns, please contact Gregg Worley at (404) 562-9141 or Ryan Brown at (404) 562-9147.

Sincerely,



Carol L. Kemker  
Acting Director  
Air, Pesticides and Toxics Management Division

Enclosure

cc: Mr. Robert Brown  
Division Director, Air Planning Development SC DHEC

Mr. Scott Reynolds  
Director, Division of Air Quality Analysis, SC DHEC

The Honorable William Harris  
Chief of the Catawba Indian Nation

Mr. Darin Steen  
Director, Environmental Services, Catawba Indian Nation

Ms. Sheila Holman, Director, Division of Air Quality, NCDEQ

## 2015 State of South Carolina Ambient Air Monitoring Network Plan Addendum The U. S. EPA Region 4 Comments and Recommendations

This document contains the U.S. Environmental Protection Agency Region 4 comments and recommendations on the state of South Carolina’s 2015 ambient air monitoring network plan addendum (Network Plan Addendum). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58.

### Proposed Monitoring Discontinuations

The Network Plan Addendum proposes to discontinue five monitoring sites. The EPA is deferring the decision for the proposed shut down of the Clemson O<sub>3</sub> site (AQS ID 45-072-0002), in order to allow more time for consideration and discussion with the SC DHEC on this issue. The EPA acknowledges the discontinuation of O<sub>3</sub> monitoring at the Cowpens (AQS ID 45-021-0002) site, and approves the discontinuation of O<sub>3</sub> monitoring at the Famoda Farms (AQS ID 45-045-1003) site, as well as the discontinuation of PM<sub>2.5</sub> and PM<sub>10</sub> monitoring at the Bates House site (AQS ID 45-079-0019). See Table 1 for a summary of these requests with the EPA’s comments.

The O<sub>3</sub> minimum monitoring requirements are found in 40 CFR Part 58, Appendix D, Table D-2. These minimum requirements are based on metropolitan statistical area (MSA) boundaries as defined by the U.S. Office of Management and Budget, population estimates from the U.S. Census Bureau for these MSAs, and historical ambient air monitoring data.

**Table 1: Monitors Proposed for Discontinuation**

AQS ID	Site Name	MSA	Pollutant	Type	Comments
45-072-0002	Clemson	Greenville-Anderson-Mauldin, SC	O <sub>3</sub>	SLAMS	Deferred for further discussion with the SC DHEC.
45-021-0002	Cowpens National Battlefield	Gaffney, SC	O <sub>3</sub>	SPM	Approval not required for SPM - shutdown acknowledged. <sup>1</sup>
45-015-0002	Bushy Park Pump Station	Charleston-North Charleston-Summerville, SC	O <sub>3</sub>	SLAMS	Not Approved. A suitable replacement site should be found in the MSA.
45-045-1003	Famoda Farms	Greenville-Anderson-Mauldin, SC	O <sub>3</sub>	SLAMS	Approved
45-079-0019	Bates House	Columbia, SC	PM <sub>2.5</sub> , PM <sub>10</sub>	SLAMS	Approved. The SC DHEC will lose site access. Collocated PM <sub>2.5</sub> sampler will be moved to Parklane site (AQS ID 45-079-0007) to meet PM <sub>2.5</sub> collocation requirements.

<sup>1</sup> The Cowpens National Battlefield O<sub>3</sub> site is in a MSA that meets minimum O<sub>3</sub> monitoring requirements and is classified as a special purpose monitor (SPM). The SC DHEC does not require EPA approval to shut down this monitor since it is a SPM. The EPA acknowledges the discontinuation of this monitor and that the monitoring requirements for O<sub>3</sub> in Appendix D to 40 CFR Part 58 will continue to be met after this monitor is shutdown.

The SC DHEC requested to discontinue O<sub>3</sub> monitoring at the Famoda Farms monitoring site (AQS ID 45-045-1003). The EPA approves the shutdown of this site. The Famoda Farms monitor is one of four O<sub>3</sub> monitors operating in the Greenville-Anderson-Mauldin, SC MSA. This area is required at a minimum to have two O<sub>3</sub> monitors. Additionally, Famoda Farms has consistently recorded lower O<sub>3</sub> concentrations than the Clemson and Hillcrest Middle School monitoring sites, which are also in the Greenville area. The monitoring requirements in Appendix D to 40 CFR Part 58 will continue to be met in the Greenville area after the Famoda Farms monitor is shutdown.

At this time, the EPA does not approve the shutdown of the O<sub>3</sub> monitor at Bushy Park Pump Station. The Charleston MSA would not meet minimum O<sub>3</sub> monitoring requirements if O<sub>3</sub> monitoring at this site were discontinued. At a minimum, the Charleston MSA is required to have two regulatory O<sub>3</sub> monitors and would only have one regulatory O<sub>3</sub> monitor if monitoring at Bushy Park Pump Station were discontinued. The EPA recommends that the SC DHEC find a suitable replacement monitoring location for Bushy Park. In the meantime, the SC DHEC should continue to flag in the Air Quality System (AQS) the Bushy Park Pump Station O<sub>3</sub> data as not meeting siting requirements.

The SC DHEC expects to lose access to the property where the Bates House PM<sub>2.5</sub> and PM<sub>10</sub> monitoring site (AQS ID 45-079-0019) is located. For PM<sub>2.5</sub>, the Bates House monitoring has recorded daily and annual PM<sub>2.5</sub> design values below the national ambient air quality standards (NAAQS) for the last five years. Additionally, PM<sub>2.5</sub> concentrations recorded at the Irmo site (AQS ID 45-063-0008), which is also in the Columbia, SC MSA, have been typically higher than Bates House. Over the last five years, Irmo has had annual design values higher than Bates House, as well. The PM<sub>10</sub> levels recorded at Bates House have been well below the applicable standard for more than ten years. The EPA understands that the SC DHEC will move the collocated PM<sub>2.5</sub> sampler from Bates House to the Parklane site (AQS ID 45-079-0007) to still meet the PM<sub>2.5</sub> collocation requirements. After the Bates House monitoring site is shutdown and the PM<sub>2.5</sub> collocation requirements are met by establishing a collocated PM<sub>2.5</sub> sampler at the Parklane site, the Columbia, SC MSA will still meet monitoring requirements in Appendix D to 40 CFR Part 58 for PM<sub>10</sub> and PM<sub>2.5</sub>. Thus, EPA approves the discontinuation of monitoring at Bates House.

### Proposed Monitor Startups or Relocations

The Network Plan Addendum also proposes to relocate one O<sub>3</sub> monitor and startup one O<sub>3</sub> monitor. See Table 2 for a summary of these requests.

**Table 2: Monitors Proposed for Startup or Relocation**

AQS ID	Site Name	MSA	Pollutant	Type	Comments
45-091-0006	York	Charlotte-Gastonia-Concord NC-SC	O <sub>3</sub>	SLAMS	The EPA supports this relocation to the new site, but requests additional information in the next network plan.
45-051-0008	Coastal Carolina	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	O <sub>3</sub>	SLAMS	EPA Conditionally approves site startup. The Myrtle Beach MSA will meet minimum monitoring requirements once this site is established. Site must meet siting criteria.

In its response to the 2015, Network Plan EPA approved a temporary shutdown of the York CMS monitoring site (AQS ID 45-091-0006). The SC DHEC stated in the Network Plan that it expects to lose access to the site and was looking for a replacement location. The Network Plan Addendum proposes to restart O<sub>3</sub> monitoring at a new site, York (AQS ID 45-091-0007), which is 3.5 miles northeast of the York CMS site. The EPA understands that the York CMS site is currently still operational even though the temporary shutdown was approved, and that The SC DHEC hopes to operate O<sub>3</sub> monitors concurrently at both the York CMS and York sites before discontinuing monitoring at York CMS. The York CMS monitor is an upwind location for the Charlotte-Concord-Gastonia NC-SC Core Based Statistical Area (CBSA) and typically reads lower than the other O<sub>3</sub> monitors in the CBSA. The EPA believes that the proposed York location would be representative of the same air shed as the previous York CMS monitoring site. The EPA supports the proposed location for the York O<sub>3</sub> monitoring site. However, the Network Plan Addendum does not provide sufficient information to fully approve the proposed York O<sub>3</sub> site. In addition to the information provided in the Network Plan Addendum, the SC DHEC should submit to the EPA information to demonstrate that monitoring siting criteria are met including: zoomed in aerial photo or a site location map; site photo(s) facing from the site in each direction (N, S, E, W); applicable measurements to any obstructions, trees or roadways; and the proposed probe height for the site. This information should be included in the next ambient air monitoring network plan.

The Network Plan Addendum proposes to establish a new O<sub>3</sub> monitoring site, Coastal Carolina (AQS ID 45-051-0008), in the Myrtle Beach-Conway-North Myrtle Beach, SC-NC CBSA to meet O<sub>3</sub> minimum monitoring requirements for this area. The SC DHEC provided 2011 Community Multiscale Air Quality (CMAQ) modeling output for this area in the Network Plan Addendum. The CMAQ model output indicates that the proposed Coastal Carolina site is in the area of the maximum predicted O<sub>3</sub> for the CBSA.

During the 2015 EPA technical systems audit (TSA), the EPA staff visited the proposed location for the Coastal Carolina site. The EPA noted that there was a tree dripline within ten meters of the expected monitoring probe location. This configuration would not meet the monitoring siting criteria found in 40 CFR Part 58, Appendix E, Section 5 siting requirements, "Spacing from Trees." The EPA conditionally approves the Coastal Carolina site; however, full approval is withheld until the monitoring siting criteria issue has been resolved. The SC DHEC should provide evidence that the Coastal Carolina site meets the monitoring siting criteria requirements found in Appendix E to 40 CFR Part 58 in the next ambient air monitoring network plan.

### **Proposed Waivers of Monitor Siting Criteria**

The Network Plan Addendum requests one waiver of 40 CFR Part 58, Appendix E siting requirements and the extension of an existing waiver of siting requirements. Table 3 summarizes these requests.

Under 40 CFR Part 58, Appendix E, Section 10, waivers of siting criteria for existing sites can be granted if either of the following criteria are met:

- 10.1.1 The site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met.

10.1.2 The monitor or probe cannot reasonably be located to meet the siting criteria because of physical constraints (e.g., inability to locate the required type of site the necessary distance from roadways or obstructions).

**Table 3: Waivers of Siting Criteria**

AQS ID	Site Name	MSA	Pollutant	Type	Comments
45-079-0021	Congaree Bluff	Columbia, SC	O <sub>3</sub> , SO <sub>2</sub>	SPM	Waiver of siting criteria approved for the identified trees obstructing the monitor. Waiver through 2020.
45-045-0015	Greenville ESC	Greenville-Anderson-Mauldin, SC	SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>2.5</sub> , PM <sub>10</sub> , O <sub>3</sub>	SLAMS	Existing waiver of siting requirements extended through 2018.

The Network Plan Addendum requests a waiver of monitoring siting requirements for the Congaree Bluff monitoring site (AQS ID 45-079-0021). The objective of the Congaree Bluff site is to measure O<sub>3</sub> and SO<sub>2</sub> within the Congaree National Park boundaries. Within the national park boundaries, this monitor cannot be reasonably located to meet the siting criteria because of physical constraints. The EPA staff visited the Congaree Bluff site on January 25, 2016, and agree that this is the best monitoring location within the park boundaries. However, there are over forty trees surrounding the probe that do not meet the spacing from obstructions discussed in 40 CFR Part 58, Appendix E, Section 4 (a)”... The distance from the obstacle to the probe, inlet, or monitoring path must be at least twice the height that the obstacle protrudes above the probe, inlet, or monitoring path...”

The configuration of obstructing trees is such that the monitor probe siting does not meet Table E-4 of 40 CFR Part 58, Appendix E, Section 11, which states that monitor location “must have unrestricted airflow 270 degrees around the probe or sampler.” The Congaree Bluff monitors have 180 degrees of unobstructed airflow due to the obstructing trees.

However, the EPA understands that the SC DHEC has trimmed the dripline of trees so that all tree driplines are no closer than ten meters from the monitoring probes, in order to comply with 40 CFR Part 58, Appendix E, Section 5 siting requirements, “Spacing from Trees.” The SC DHEC has taken reasonable steps to meet many of the siting monitoring requirements, and the EPA believes that removing over 40 trees from a national park to meet all of the siting requirements is not necessary.

The EPA waives the requirements of 40 CFR Part 58, Appendix E, Section 4 (a) and Table E-4 to 40 CFR Part 58, Appendix E, Section 11 in regards to the trees identified by The SC DHEC in the Network Plan Addendum for the Congaree Bluff site. This site must still meet all other siting requirements found in Appendix E to 40 CFR Part 58. The EPA waives these specific requirements for a period of five years. This waiver should be re-evaluated in the 2020 South Carolina network assessment.

Similarly, the Network Plan Addendum requests to renew a waiver of siting criteria for the Greenville ESC monitoring site (AQS ID 45-045-0015). In 2009, the EPA granted a waiver of siting requirements for this site based on concurrent monitoring with the previous site. The Network Plan Addendum identifies two trees that are closer than twice the distance between the top of the tree and the height of the monitoring probe. At this time, the tree configuration and spacing at the site is close to meeting siting criteria such that the EPA believes that the monitoring data is representative of data if the siting criteria were met. Also, restrictions at the location prevent a reconfiguration of equipment or removal of trees.

The EPA waives the requirements of 40 CFR Part 58, Appendix E, Section 4 (a) and Section 11 (Table E-4) in regards to the trees identified by the SC DHEC in the Network Plan Addendum for the Greenville ESC site. The EPA waives these specific requirements for a period of two years. The EPA and the SC DHEC will continue to reevaluate the waiver of these requirements and alternative solutions in upcoming ambient air monitoring network plans. The Greenville ESC site must still meet all of the other siting requirements found in Appendix E to 40 CFR Part 58.

