2016-2017 Annual Monitoring Network Plan - Mecklenburg County Air Quality

Mecklenburg County Air Quality
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CERTIFICATION

By the signatures below, Mecklenburg County Air Quality (MCAQ) certifies that the information contained in the "2016-2017 Annual Monitoring Network Plan for Mecklenburg County Air Quality" is complete and accurate, to the best of our knowledge, at the time of submittal to USEPA Region 4. However, due to circumstances that may arise during the sampling year, network information may change. A notification of change and a request for approval will be submitted to USEPA Region 4 at that time.

Print Name: Jeff Francis Signature: Jeff Francis Date: 6/29/2016

Air Quality Monitoring Manager, MCAQ

Print Name: Leslie Rhodes Signature: Leslie Rhodes Date: 6/29/2016

Director, MCAQ

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2016 ANNUAL MONITORING NETWORK PLAN
MECKLENBURG COUNTY AIR QUALITY
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I. INTRODUCTION

The Mecklenburg County Air Quality (MCAQ) monitoring program, a division of the Mecklenburg County Land Use and Environmental Services Agency (LUESA); provides air quality monitoring services in Mecklenburg County, North Carolina. Mecklenburg County Air Quality is a state "certified local air pollution program" whose purpose is to improve and maintain ambient air quality and reduce exposure to unhealthy levels of air pollution.

MCAQ has operated an air quality monitoring program since the 1960's. The air monitoring services provided by the program are conducted to measure concentrations of criteria air pollutants (carbon monoxide - CO, nitrogen dioxide - NO_2, sulfur dioxide - SO_2, particulate matter - PM, lead - Pb, and ozone - O_3) in accordance with USEPA regulatory requirements.

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards or NAAQS (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. *Primary standards* set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. *Secondary standards* set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, known as "criteria" pollutants. They are listed in Table 1:

National Ambient Air Quality Standards

Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)), A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Table 1.

The MCAQ air monitoring program operates a network of state and local air monitoring stations (SLAMS) in Mecklenburg County. The current network configuration consists of six monitoring stations that measure concentrations of criteria air pollutants. The SLAMS network operated by MCAQ includes monitoring for criteria pollutants, meteorological parameters, NCore multi-pollutant parameters, and speciation trends network (STN) monitoring. Occasionally, special purpose monitoring (SPM) is conducted.

The annual monitoring network plan, as stated in 40 CFR Part 58.10(b)(1-13), *Annual Monitoring Network Plan and Periodic Network Assessment;* must contain the following information for each existing and proposed site:

(1) The AQS site identification number.
(2) The location, including street address and geographical coordinates.
(3) The sampling and analysis method(s) for each measured parameter.
(4) The operating schedules for each monitor.
(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.
(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part.
(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS as described in §58.30.
(8) The MSA, CBSA, CSA or other area represented by the monitor.
(9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.
(10) Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.
(11) Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM_{10} monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.
(12) The identification of required NO_2 monitors as near-road, area-wide, or vulnerable and susceptible population monitors in accordance with Appendix D, section 4.3 of this part.
(13) The identification of any $PM_{2.5}$ FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS. For required SLAMS where the agency identifies that the $PM_{2.5}$ Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in §58.12 or other Class III $PM_{2.5}$ FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in appendix D to this part.

This report constitutes the Mecklenburg County Air Quality "annual monitoring network plan" and continues in the following sections as outlined below:

II. Site Description Background Information and Definitions: This section provides an overview of the designations, parameters, monitoring methods, and the basis for site selection.

III. Network Summary: This section presents an overview of the sites and monitors in Mecklenburg County. Also included is a listing of all proposed changes to the current network.

IV. Air Monitoring Station Description: In this section each air monitoring station is described in detail.

II. SITE DESCRIPTION BACKGROUND INFORMATION AND DEFINITIONS

1. Site Description

Specific information is provided to show the location of the monitoring equipment at the site, if the site is located in a CSA/CBSA/MSA, the AQS identification number, the GPS coordinates, and evidence that monitors and monitor probes conform to the siting criteria.

2. Date Established

The date when each existing monitoring station was established is shown in the description. For those stations, which are proposed, a date is provided when it is expected for the station to be in operation.

3. Site Approval Status

Each monitoring station in the existing network has been reviewed with the purpose of determining whether it meets all design criteria for inclusion in the SLAMS network.

4. Monitoring Objectives

Per 40 CFR 58 Appendix D, Section 1.1: "The ambient air monitoring networks must be designed to meet three basic monitoring objectives. These basic objectives are listed below. The appearance of any one objective in the order of this list is not based upon a prioritized scheme. Each objective is important and must be considered individually." The objectives are listed below:

(a) Provide air pollution data to the general public in a timely manner. Data can be presented to the public in a number of attractive ways including through air quality maps, newspapers, internet sites, and as part of weather forecasts and public advisories.

(b) Support compliance with ambient air quality standards and emissions strategy development. Data from FRM (Federal Reference Method), FEM (Federal Equivalent Method), and ARM (Approved Regional Method) monitors for NAAQS pollutants will be used for comparing an area's air pollution levels against the NAAQS. Data from monitors of various types can be used in the development of attainment and maintenance plans. SLAMS, and especially NCore station data, will be used to evaluate the regional air quality models used in developing emission strategies, and to track trends in air

pollution abatement control measures' impact on improving air quality. In monitoring locations near major air pollution sources, source-oriented monitoring data can provide insight into how well industrial sources are controlling their pollutant emissions.

(c) Support for air pollution research studies. Air pollution data from the NCore network can be used to supplement data collected by researchers working on health effects assessments and atmospheric processes, or for monitoring methods development work.

5. Monitoring Station Designations

Most stations described in the air quality surveillance network are designated as State and Local Air Monitoring Stations (SLAMS). The SLAMS include the ambient air quality monitoring sites and monitors that are required by 40 CFR 58 Appendix D. The SLAMS includes NCore, PAMS, CSN, and all other state or locally operated criteria pollutant monitors. In addition, some of these stations fulfill other requirements, which must be identified. In the description of the network, designations may also be made for Special Purpose Monitors (SPM). The following are descriptions of the SLAMS (including NCore, PAMS, and STN) and SPM station designations.

(A) SLAMS: The SLAMS make up the ambient air quality monitoring sites that are primarily needed for NAAQS comparisons, but may serve other data purposes. SLAMS exclude special purpose monitor (SPM) stations and include NCore, PAMS, and all other State or locally operated stations that have not been designated as SPM stations. These stations must meet requirements that relate to four major areas: quality assurance, monitoring methodology, sampling interval and siting of instruments and instrument probes.

(B) SPM: Not all monitors and monitoring stations in the air quality surveillance network are included in the SLAMS network. In order to allow the capability of providing monitoring for various reasons such as: special studies, modeling verification and compliance status, and other objectives; certain monitors are designated as Special Purpose Monitors (SPM). These monitors are not committed to any one location or for any specified time period. They may be located as separate monitoring stations or be included at SLAMS locations. Monitoring data may be reported, provided that the monitors and stations conform to all requirements of the SLAMS network. Specific regulations regarding SPM's are contained in 40 CFR 58 §58.20.

(C) NCore: The NCore multipollutant sites are a subset of SLAMS sites that measure multiple pollutants in order to provide support to integrated air quality management data needs. NCore sites include both neighborhood and urban scale measurements in general, in a selection of metropolitan areas and a limited number of more rural locations.

The NCore sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter-based samplers, speciated $PM_{2.5}$, $PM_{10-2.5}$ particle mass, O_3, SO_2, CO, NO/NO_Y, wind speed, wind direction, relative humidity, and ambient temperature.

(D) Speciation Trends Network (STN): Speciation Trends Network stations are those stations designated to be part of the speciation trends network. These stations collect

samples that are analyzed to determine the chemical makeup of $PM_{2.5}$. The STN is part of the chemical speciation network (CSN).

6. Monitoring Methods

Sampling and analytical procedures for criteria air pollutant monitoring performed in the MCAQ ambient air monitoring network are conducted in accordance with applicable USEPA Designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) unless otherwise noted. Analytical techniques for non-criteria air pollutant monitoring (methods employed that are not USEPA Designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM)) are documented in the applicable MCAQ Quality Assurance Project Plan (QAPP) and/or the applicable MCAQ Standard Operating Procedure (SOP). Methods used by MCAQ for criteria pollutant monitoring and selected non-criteria monitoring are listed below:

(A) Particulate Matter 10 microns in size (PM_{10})

All PM_{10} samplers operated by MCAQ are operated as federal reference method (FRM) or federal equivalent method samplers and are operated according to the requirements set forth in 40 CFR 50 and 40 CFR 53. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Sierra-Andersen/GMW 1200	RFPS-1287-063	063
R & P Partisol-Plus 2025 PM-10 Seq.	RFPS-1298-127	127

(B) Particulate Matter ($PM_{2.5}$, PM_{10} lo-vol, PM_C)

With the exception of continuous samplers and speciation samplers, all $PM_{2.5}$ samplers operated by MCAQ are either FRM or FEM samplers. Listed below are the applicable USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
R & P Partisol-Plus 2025 PM-2.5 Seq.	RFPS-0498-118	145
R & P Partisol-Plus 2025 PM-10 Seq.	RFPS-1298-127	127
R & P TEOM (Continuous)	NA	716,717
MetOne Beta Attenuation Sampler ($PM_{2.5}$) (Continuous)	EQPM-0308-170	733
MetOne Beta Attenuation Sampler (PM_{10}) (Continuous)	EQPM-0798-122	122
MetOne Beta Attenuation Sampler ($PM_{2.5}$) (Continuous)	EQPM-1013-209	171
$PM_{10-2.5}$		176, 185

(C) $PM_{2.5}$ Speciation sampling and analysis

In addition to operating $PM_{2.5}$ samplers that determine only $PM_{2.5}$ mass values, MCAQ also operates $PM_{2.5}$ speciation samplers that collect samples that are analyzed to determine the chemical makeup of $PM_{2.5}$. Data collected using these methods cannot be compared to the NAAQS. Listed below is the method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
MetOne SuperSASS	NA	810
URG-3000N (Carbon Channel)	NA	Various

(D) Sulfur Dioxide

Instruments used to continuously monitor sulfur dioxide levels in the atmosphere employ the pulsed UV fluorescence method. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Electron 43A, 43C-TLE, 43i, 43i-TLE	EQSA-0486-060	560

(E) Carbon Monoxide

Continuous monitoring for carbon monoxide is performed using the non-dispersive infrared (gas filter correlation) method. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Electron or Thermo Environmental Instruments 48, 48C, 48i, 48i-TLE	RFCA-0981-054	554

(F) Ozone

Ozone is monitored using the UV photometry method. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Electron or Thermo Environmental Instruments 49, 49C, 49i	EQOA-0880-047	047

(G) Nitrogen Dioxide

The chemiluminescence method is used to monitor the nitrogen dioxide level in ambient air. Listed below are the USEPA Designated Reference or Equivalent Methods used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Environmental Instr. 42, 42C, 42i, 42i-TLE	RFNA-1289-074	074
Teledyne API, T200UP	EQNA-0512-200	200

(H) Reactive Oxides of Nitrogen

The chemiluminescence method is used to monitor the reactive oxides of nitrogen levels in ambient air. Listed below is the instrumentation used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Environmental Instr. 42C-Y, 42i-Y	NA	674

(l) Lead (Pb)

The Pb-PM_{10} lo-vol method was used for monitoring lead. Analysis for lead in PM_{10} collected on the filters was conducted in accordance with 40 CFR 50, Appendix Q. Listed below is the instrumentation that was used in the MCAQ monitoring network:

Method	Designation Number	Method Code
R & P Partisol-Plus 2025 PM-10 Seq.	RFPS-1298-127	811

7. Quality Assurance Status

MCAQ operates according to EPA approved Quality Assurance Project Plans (QAPP) and Standard Operating Procedures. The MCAQ QAPP was approved by US EPA on 03/17/2011. A revised MCAQ QAPP was submitted to USEPA Region 4 on January 12, 2016. USEPA Region 4 submitted comments to MCAQ on March 24, 2016. A response to those comments is in process. The MCAQ QAPP will be re-submitted to USEPA Region 4 upon completion of the response. The MCAQ QMP was approved by US EPA on 01/23/2012.

MCAQ has an extensive quality assurance program to ensure that all air monitoring data collected meets established criteria for precision and bias. Staff members perform independent audits of instrumentation on a regularly scheduled basis to ensure that each instrument is calibrated and operating properly. Data validation is performed monthly to ensure data reported by each instrument is recorded accurately in the air quality monitoring database.

8. Scale of Representativeness

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

(a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

(b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.

(c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.

(d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.

(e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

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

(a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.

(b) Sites located to determine representative concentrations in areas of high population density.

(c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.

(d) Sites located to determine general background concentration levels.

(e) Sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards.

(f) Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts.

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

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

Table 2.

9. Data Processing and Reporting

All ambient air quality data are stored in the Agilaire AirVision SQL database located at 2145 Suttle Avenue, Charlotte, North Carolina. On a weekly basis the AirVision data are backed up to the Mecklenburg County Land Use and Environmental Services Agency local area network (LAN) server. After all monthly data validation procedures are successfully completed, data is transmitted to the USEPA's national Air Quality System

(AQS) database. The AQS database is maintained by USEPA as the official repository of the fully quality assured ambient air quality dataset.

III. NETWORK SUMMARY

1. Site Table and Criteria Pollutants Monitored

Station Name	EPA AQS ID	CO	NO_2	O_3	PM_{10} -Pb	$PM_{2.5}$	PM_{10}	SO_2	$PM_{10-2.5}$
#11 Fire Station	37-119-0003						1		
Garinger	37-119-0041	X	X Area-wide	X	2	X	X	X	X
Montclaire	37-119-0042					X	X		X
Oakdale	37-119-0043					3			
Remount	37-119-0045	4	X Near-road			3			
University Meadows	37-119-0046			X					

1) PM_{10} proposed to be discontinued on June 30, 2016.
2) PM_{10}-Pb discontinued April 30, 2016.
3) $PM_{2.5}$ to be moved from Oakdale (end December 31, 2016) to Remount on January 1, 2017.
4) CO to begin at Remount on January 1, 2017.

Table 3.

2. Site Map

AIR QUALITY MONITORING STATIONS
MECKLENBURG COUNTY, NC 2016

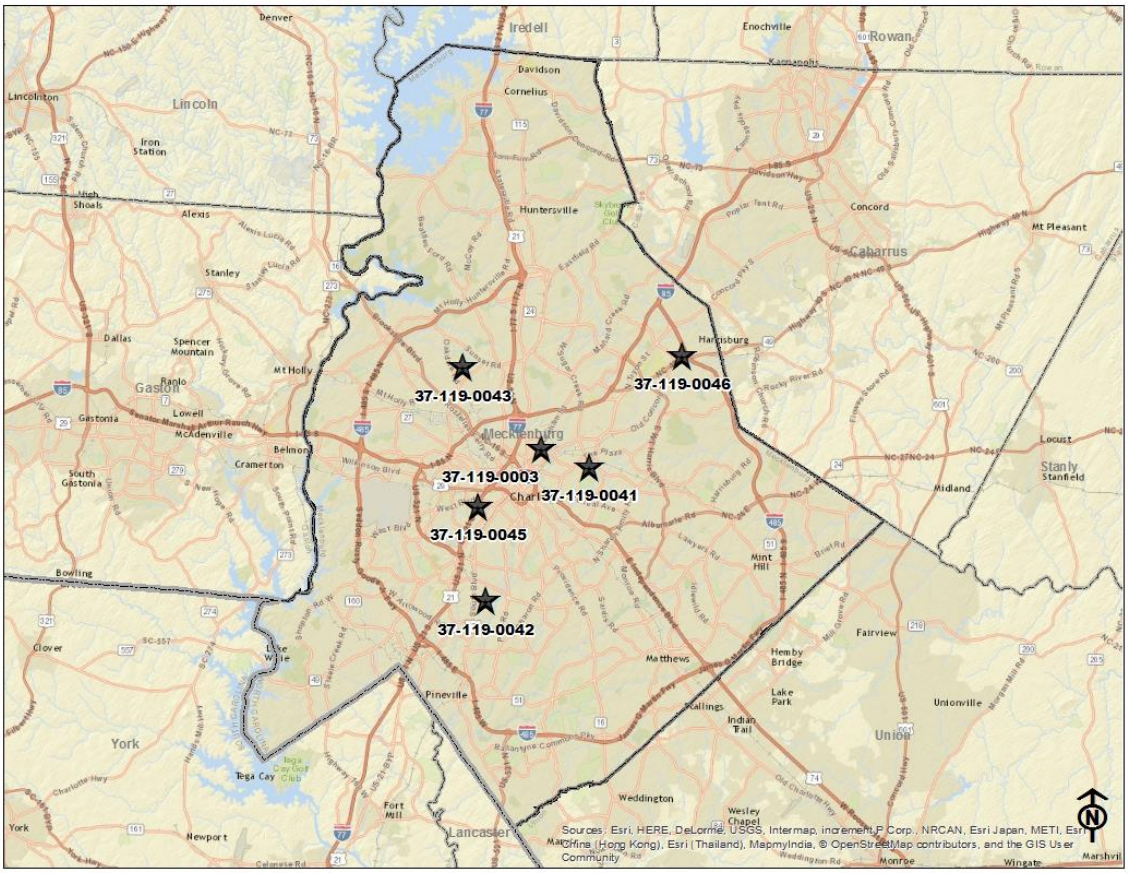

Figure 1.

3. Monitoring Methods

Site	Parameter	Instrument / Method	Meth. Num.[1]	Param. Num.[2]	MT[3]
37-119-0003	PM10	FRM-Hi Vol	063	81102	SLAMS
37-119-0041	Barometric Pressure	R. M. Young	011	64101	SLAMS
37-119-0041	CO, POC 4	Gas Filter Correlation	554	42101	SLAMS NCore
37-119-0041	NO-NO2-NOx Area-wide	Chemi-luminescence	074	42601, 42602, 42603	SLAMS
37-119-0041	NO-Dif-NOy POC 2	Chemi-luminescence	674	42601, 42612, 42600	SLAMS NCore
37-119-0041	Outdoor Temperature	R. M. Young	020	62101	SLAMS NCore
37-119-0041	Ozone	UV Photometric	047	44201	SLAMS NCore
37-119-0041	PM2.5	FRM	145	88101	SLAMS NCore
37-119-0041	PM2.5	Speciation-MetOne/URG	810	Multiple	CSN NCore
37-119-0041	Precipitation	R. M. Young	011	65102	SLAMS
37-119-0041	Relative Humidity	MetOne	012	62201	SLAMS NCore
37-119-0041	SO2, POC 2	Pulsed UV Fluorescent	560	42401	SLAMS NCore
37-119-0041	Solar Radiation	Matrix	011	63301	SLAMS
37-119-0041	PM10-2.5 Coarse	FRM-Lo Vol (LC)	176	86101	SLAMS NCore
37-119-0041	PM10	FRM-Lo Vol (LC)	127	85101	SLAMS
37-119-0041	PM10	FRM-Lo Vol (STP)	127	81102	SLAMS
37-119-0041	Wind Direction-Resultant	MetOne	061	61104	SLAMS NCore
37-119-0041	Wind Speed-Resultant	MetOne	061	61103	SLAMS NCore
37-119-0041	Wind Direction-Scalar	MetOne	061	61101	SLAMS NCore

Site	Parameter	Instrument / Method	Meth. Num.[1]	Param. Num.[2]	MT[3]
37-119-0041	Wind Speed-Scalar	MetOne	061	61102	SLAMS NCore
37-119-0041	PM2.5, POC 4	MetOne (BAM)	733	88502	SPM
37-119-0041	Lead (Pb)	Pb-PM10	811	85129	SLAMS NCore
37-119-0042	PM2.5	TEOM	716	88501	SLAMS
37-119-0042	PM2.5	TEOM	717	88502	SLAMS
37-119-0042	PM2.5	FRM	145	88101	SLAMS
37-119-0042	PM10-2.5 Coarse	FRM-Lo Vol (LC)	176	86101	SLAMS
37-119-0042	PM10	FRM-Lo Vol (LC)	127	85101	SLAMS
37-119-0042	PM10	FRM-Lo Vol (STP)	127	81102	SLAMS
37-119-0043	PM2.5	FRM	145	88101	SLAMS
37-119-0045	NO-NO2-NOx Near-road	FEM	200	42601, 42602, 42603	SLAMS
37-119-0045	Relative Humidity	MetOne	012	62201	SLAMS
37-119-0045	Outdoor Temperature	R. M. Young	020	62101	SLAMS
37-119-0045	Wind Direction-Resultant	MetOne	061	61104	SLAMS NCore
37-119-0045	Wind Speed-Resultant	MetOne	061	61103	SLAMS NCore
37-119-0046	Ozone	UV Photometric	047	44201	SLAMS

Table 4.

1- Meth. Num. = Method Number
2- Param. Num. = Parameter Number
3- MT = Monitor Type: SLAMS – State and Local Air Monitoring Station, NCore – National Core, SPM – Special Purpose, NON – Non-regulatory, CSN – Chemical Speciation Network

4. Network Modifications

(A) Monitoring Station Siting Modifications

1. Discontinuation of #11 Fire Station (37-119-0003) PM_{10}
PM10 high-volume sampling at the #11 Fire Station monitoring station (37-119-0003) will be discontinued on June 30, 2016. The #11 Fire Station monitoring station is one of three (3) PM-10 monitoring stations operating in the Charlotte-Gastonia-Concord (CBSA Code – 16740) Metropolitan Statistical Area (MSA). 40 CFR 58 Appendix D, Table D-4 requires 2 – 4 PM_{10} monitoring stations in MSA's with population >1,000,000 and with measured ambient data less than 80 percent of the PM_{10} NAAQS.

PM10 monitoring at this station has indicated concentrations are well below the NAAQS (150 $\mu g/m^3$). During the previous 5-year period (2011-2015) the maximum concentration measured at the station was 55 $\mu g/m^3$, <37% of the NAAQS.

The maximum annual arithmetic mean during the previous 5-year period at the station was 19.8 $\mu g/m^3$, <14% of the NAAQS.

Safety concerns have been identified at the monitoring location which will require significant investments in infrastructure. Considering the relatively low concentrations recorded at this monitoring station; and that monitoring requirements can be met by other monitoring stations within the network, monitoring will be terminated at this location on June 30, 2016.

2. Relocation of Oakdale (37-119-0043) $PM_{2.5}$ to Remount (37-119-0045)
The $PM_{2.5}$ FRM monitor at the Oakdale monitoring station will be relocated to the Remount near-road monitoring station per the 2015 Annual Monitoring Network Plan. The Oakdale $PM_{2.5}$ station will be discontinued on December 31, 2016. The Remount $PM_{2.5}$ will begin operation on January 1, 2017.

(B) Instrumentation Operation Modifications

1. Lead (Pb) monitoring at the Garinger High School NCore monitoring station (37-119-0041) will be discontinued on April 30, 2016 in accordance with revisions to 40 CFR 58, Appendix D(3). Concentrations of Pb measured at the station have been well below the NAAQS (0.15 μg/m3). The maximum rolling three (3) month average for the period January 1, 2012 through December 31, 2015 was 0.003 μg/m3, approximately 2% of the NAAQS.

2. Integration of Continuous Particulate Matter (PM) Monitoring Methods
MCAQ plans to integrate continuous PM monitoring instruments at filter-based (FRM) $PM_{2.5}$ and filter-based PM_{10} monitoring stations as resources become available. Implementation is contingent upon receipt of a MCAQ request for funds from EPA Region 4. During the transitional period (2017-2019) $PM_{2.5}$ data collected using continuous methods are not to be compared to the NAAQS. Integration of the continuous

methods will enhance data collection and improve efficiency. The target date for the installation of these instruments is January 1, 2017.

The planned implementation will result in the following configurations at the monitoring stations as listed in Table 5 below:

Site	**Primary $PM_{2.5}$ Instrument Model** (filter-based sampling frequency)	**Filter-based Collocation Requirements**	**Continuous $PM_{2.5}$ Instrument Model**	**Continuous PM_{10} Instrument Model**
Garinger 37-119-0041 (NCore)	Thermo (R&P) 2025 (1/3) $PM_{2.5}$ - 88101	Not Applicable (NA)	Met One BAM 1020 (a) $PM_{2.5}$ - 88502	Met One BAM 1020 (a) PM_{10} – 85101 PM_{10} – 81102 $PM_{10-2.5}$ - 86101
Montclaire 37-119-0042	Thermo (R&P) 2025 (1/6) $PM_{2.5}$ - 88101	Thermo (R&P) 2025 (1/12)	Met One 1022 (b) $PM_{2.5}$ - 88502	Met One BAM 1020 (b) PM_{10} – 81102
Oakdale 37-119-0043	Sampling Ends 12/31/2016 per approved 2015 Network Plan	NA	NA	NA
Remount 37-119-0045 (near-road)	Thermo (R&P) 2025 (1/6) $PM_{2.5}$ - 88101 Sampling begins January 1, 2017	NA	Met One 1022 (c) $PM_{2.5}$ - 88502	NA

Table 5.

(a) Filter-based coarse particulate ($PM_{10-2.5}$) monitoring at the Garinger High School NCore monitoring station will be converted from a filter-based monitoring method to a continuous monitoring method after December 31, 2016, if funded.

(b) Primary and collocated filter-based PM_{10} and $PM_{10-2.5}$ monitoring at the Montclaire monitoring station (37-119-0042) will be discontinued on December 31, 2016. The filter-based samplers will be replaced with a continuous PM_{10} instrument, if funded. The continuous PM_{10} sampler will serve as the primary PM_{10} monitor at the station. Continuous PM_{10} methodology will not require collocation. A continuous $PM_{2.5}$

instrument will be installed to facilitate a planned transition from filter-based $PM_{2.5}$ sampling to continuous $PM_{2.5}$ sampling over the next 2 years, if funded.

The continuous PM_{10} sampler will operate as one of two required PM_{10} monitoring stations in the MSA.

(c) A continuous $PM_{2.5}$ instrument will be installed at the Remount near-road monitoring station to facilitate a planned transition from filter-based $PM_{2.5}$ sampling to continuous $PM_{2.5}$ sampling over the next 2 years, if funded.

3. Sampling frequency of filter-based PM2.5 FRM's will be revised to the frequencies listed in table 5 of this section and as follows:

PM2.5 FRM Sample Frequency Per Station:

Station Name	AQS ID	Frequency
Garinger	37-119-0041	1/3
Montclaire	37-119-0042	1/6
Montclaire Collocated	37-119-0042	1/12
Remount near-road	37-119-0045	1/6

4. Carbon monoxide monitoring will begin at the Remount (37-119-0045) near-road monitoring station on January 1, 2017.

(C) Waivers

1. MCAQ makes requests for the following waivers from the specific minimum requirements for meteorological monitoring at NCore sites and near-road NO2 monitoring sites. Wind Speed / Wind Direction obstructions to air flow over terrain exist at each of the meteorological monitoring stations operated by MCAQ at 37-119-0041 and 37-119-0045. Each is addressed below.

(a) MCAQ has been measuring meteorological parameters at site 37-119-0041 for more than 10 years. Site terrain characteristics influence the wind speed / wind direction sensor at this site. Given this knowledge and taking into consideration the difficulty in Mecklenburg County with meeting the 10x siting criteria in the EPA Volume 4 Meteorological guidance document (EPA-454/B-08-002), MCAQ maintains that wind speed / wind direction (WS/WD) measurements at this site are adequate when considered with knowledge of the site terrain. MCAQ requests renewal of the previously approved waiver of 10x standard exposure siting criteria for WS/WD meteorological sensors located at 37-119-0041, thus allowing continued monitoring of meteorological parameters (wind speed / wind direction) at the station.

(b) MCAQ has been measuring meteorological parameters at site 37-119-0045 since January 13, 2015. Site terrain characteristics and local obstructions influence the wind speed / wind direction sensor at this site. A billboard near the SW exposure of the sensor is within 5X differential object height. Given this knowledge and taking into consideration the difficulty in Mecklenburg County with meeting 10x siting criteria in the EPA Volume 4 Meteorological guidance document (EPA-454/B-08-002), MCAQ maintains that wind speed / wind direction measurements at this site are adequate when

considered with knowledge of the site terrain. MCAQ requests a waiver of 10x standard exposure siting criteria for WS/WD meteorological sensors located at 37-119-0045, thus allowing continued monitoring of meteorological parameters (wind speed / wind direction) at the near-road station.

2. MCAQ requests a waiver per 40CFR58 Appendix D §3(b)(1) to allow substitution of NOx monitoring for the required NOy monitoring at the Garinger (37-119-0041) NCore monitoring station.

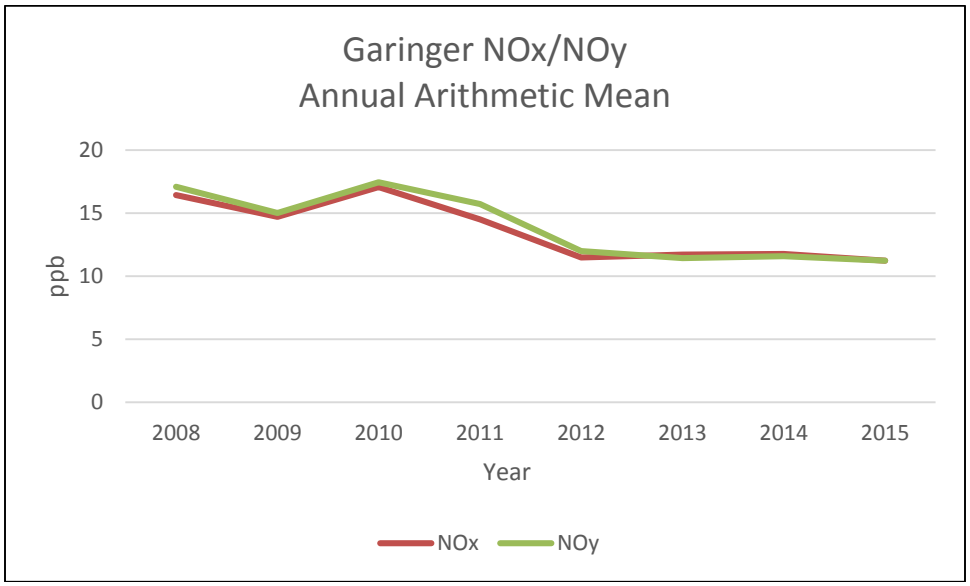

Figure 2.

Table 6 below is a statistical comparison of summary data collected from 2008 – 2015 at the Garinger (37-119-0041) monitoring station. A review of summary data for the period indicate differences between hourly measurements of NOy and NOx are not significant.

Statistic	NOx (ppb)	NOy (ppb)	Difference (ppb)
Annual Mean	13.6	14.0	0.4
Mean 4th Max	189.6	190.4	0.8
Mean 98th %tile	78.9	79.6	0.7

Table 6.

IV. AIR MONITORING STATION DESCRIPTIONS

1. #11 Fire Station

(A) #11 Fire Station Site Table

Site Name: #11 Fire Station				
AQS Site Identification Number: 37-119-0003				
Location: 620 West 28th Street				
Charlotte, NC 28206				
Latitude: N35.251717º		Datum: WGS84		
Longitude: W80.824717º				
Elevation: 223 meters				
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
PM10	Gravimetric	63	6	1 in 6 day
PM10 Collocated	Gravimetric	63	6	1 in 6 day
Date Monitor Established:	PM10	October 1, 1992		
Date Monitor Terminated:	PM10	June 30, 2016		
Date Monitor Established:	PM10 Collocated	June 8, 1996		
Date Monitor Terminated:	PM10 Collocated	June 30, 2016		
Nearest Road: Bancroft Street		Distance to Road: 25 meters		
Traffic Count: 300		Year of Count: 2001		
MSA: Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2012)			MSA #: 16740	
2011 Population (Census blocks within 1 mile of property)		Projected 2016 Population (Census Blocks within 1 mile of property)		
13155		14997		

Table 7.

(B) #11 Fire Station Site Description and Statement of Purpose

A PM_{10} monitor has been located on the roof of #11 Fire Station (620 W. 28th Street) since 10/01/1992. A collocated sampler has been located 2.9 m NE of the reporting sampler since 06/08/1996. The site is located 3.2 kilometers NE of the central business district at latitude N35.251717º and longitude W80.824717º. The site elevation is 223 meters above sea level. The nearest road is Bancroft Street (ADT=300, 2001) at a distance of 25.3 meters from the sample inlet. Prior to the installation of the PM_{10} sampler, a TSP sampler was located at this site (11/03/1966 to 10/01/1992).

The inlet of the sampler is 6.4 meters above ground level and 1.5 meters above roof level. The area is a transition zone of business (≈50%) to residential (≈50%) within a 1 km radius. The PM_{10} sampler is a SLAMS.

A motor vehicle emissions evacuation device exhaust stack is located 8.8 meters from the PM_{10} sampler and 10.0 meters from the collocated sampler. This device activates when vehicles are operated for emergency response and routine maintenance. The device exhausts tailpipe emissions from vehicles to protect personnel from exposure to exhaust gases that might otherwise be trapped in the garage. Operation is intermittent.

The sampling frequency for PM_{10} is 1 in 6 day sampling. The sampling interval is 24 hours, from midnight to midnight every sixth day.

The site complies with the siting requirements of 40CFR58 for criteria air pollutants.

OBJECTIVE AND SPATIAL SCALE

The #11 Fire Station sampling site is representative of particulate concentrations in a mixed industrial, commercial, and residential area. The PM_{10} monitoring site objective is to determine representative concentrations in an area of high population density (population exposure) and to measure potential maximum PM10 concentrations in the network. #11 Fire Station is a neighborhood scale site. Data is used to assess compliance with the particulate NAAQS.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC. The US Census population estimate for the MSA on July 1, 2015 was 2,426,363.

STATUS AND RECOMMENDATION

PM10 high-volume sampling at the #11 Fire Station monitoring station (37-119-0003) will be discontinued on June 30, 2016.

PM10 monitoring at this station indicates concentrations well below the NAAQS (NAAQS=150 $\mu g/m^3$). During the previous 5-year period (2011-2015) the maximum concentration measured at the station was 55 $\mu g/m^3$, <37% of the NAAQS.

The maximum annual arithmetic mean during the 5-year period 2011-2015 was 19.8 $\mu g/m^3$, <14% of the NAAQS.

Safety concerns have been identified at the monitoring location which will require significant investments in infrastructure. Considering the relatively low concentrations recorded at this monitoring station; and that monitoring requirements can be met by other monitoring stations within the network, monitoring will be terminated at this location on June 30, 2016.

(C) #11 Fire Station Aerial Photograph

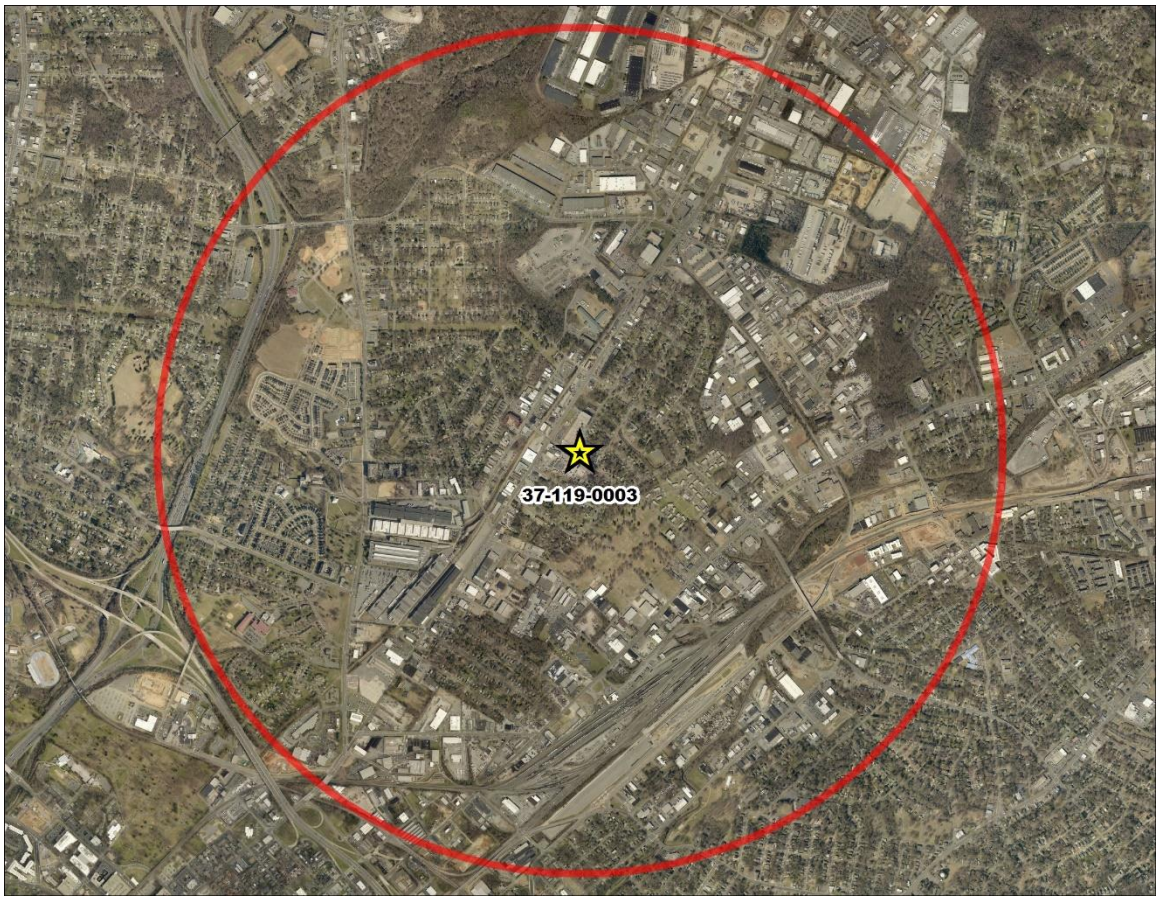

Figure 3. #11 Fire Station aerial photograph with 4 km diameter circle.

(D) #11 Fire Station Site Photographs

NORTH

NORTHEAST

EAST

SOUTHEAST

SOUTH

SOUTHWEST

WEST

NORTHWEST

2. Garinger

(A) Garinger Site Table

Site Name: Garinger				
AQS Site Identification Number: 37-119-0041				
Location: 1130 Eastway Drive				
Charlotte, NC 28205				
Latitude: N35.240100º			Datum: WGS84	
Longitude: W80.785683º				
Elevation: 232 meters				
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
Ozone	UV Photometry	47	5	Continuous
$PM_{2.5}$	FRM Gravimetric	145	5	1 in 3 day
$PM_{2.5}$	MetOne, Speciation	810	5	1 in 3 day
$PM_{2.5}$	URG-3000n, Carbon Speciation		5	1 in 3 day
$PM_{2.5}$	BAM	733	5	Continuous
PM_{10} FRM	FRM Lo-Vol Gravimetric	127	5	1 in 3 day
$PM_{10\text{-}2.5}$ Coarse	FRM difference	176	5	1 in 3 day
NO_2	Chemiluminescence	74	5	Continuous
CO	NDIR, GFC	554	5	Continuous
SO_2 Pre-cursor Gas	UV Pulsed Fluorescence	560	5	Continuous
NOy Pre-cursor Gas	Chemiluminescence	674	5	Continuous
Wind Speed	MetOne	61	10	Continuous
Wind Direction	MetOne	61	10	Continuous
Pressure	R. M. Young	11	2	Continuous
Outdoor Temperature	R. M. Young	20	3	Continuous
Solar Radiation	Matrix	11	3	Continuous
Precipitation	R. M. Young	11	4	Continuous
Relative Humidity	MetOne	12	3	Continuous

Date Monitor Established:	Ozone	March 3, 2000
Date Monitor Established:	$PM_{2.5}$ FRM	July 30, 1999
Date Monitor Established:	$PM_{2.5}$ Speciation (MetOne)	January 13, 2001
Date Monitor Established:	$PM_{2.5}$ Speciation (URG)	February 27, 2009
Date Monitor Established:	$PM_{2.5}$ TEOM	November 1, 1999
Date Monitor Terminated	$PM_{2.5}$ TEOM	March 31, 2016
Date Monitor Established:	$PM_{2.5}$ BAM (Non-FEM)	January 1, 2010
Date Monitor Established:	PM_{10} FRM	April 1, 2008
Date Monitor Established:	$PM_{10-2.5}$ Coarse	April 1, 2008
Date Monitor Established:	NO_2	November 12, 1999
Date Monitor Established:	CO	November 11, 1999
Date Monitor Established:	SO_2 Precursor Gas	January 1, 2006
Date Monitor Established:	CO Precursor Gas	January 1, 2006
Date Monitor Established:	NOy Precursor Gas	May 4, 2007
Date Monitor Established:	Meteorological Parameters	January 1, 2003 (latest)
Date Monitor Established:	Lead (Pb-PM_{10})	December 29, 2011

Nearest Road:	Shamrock Drive	Distance to Road:	298 meters
Traffic Count:	9700	Year of Count:	2014
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2012)	MSA #:	16740

2011 Population (Census blocks within 1 mile of property)	Projected 2016 Population (Census Blocks within 1 mile of property)
31898	35354

Table 8.

(B) Garinger Site Description and Statement of Purpose

The Garinger High School site is an NCore multi-pollutant site. The monitoring site is located at 1130 Eastway Drive. The site is located in a grassy area at the rear of Garinger High School near the left field line of the baseball field.

The site is located 5.6 kilometers ENE of the Charlotte, NC central business district at latitude N35.240100º and longitude W80.785683º. The site elevation is 232 meters above sea level. All sampler inlet probes are located at a height of 5 meters except for meteorological parameters. There is unrestricted airflow in at least a 270º arc of exposure, including the predominant southwest wind direction. Sample inlets are >20 meters from the nearest trees. The nearest road, Shamrock Drive, is 298 meters from the inlets and has a daily traffic flow of 9700 (ADT 2014). The station is generally oriented along the primary summer wind vector (SW to NE), downwind of the central business district of Charlotte, NC.

A 1/3 day $PM_{2.5}$ sequential monitor (est. 07/30/1999), a 1/3 day PM_{10} sequential monitor (est. 04/01/2008), a $PM_{2.5}$ Speciation monitor (MetOne SuperSASS, est. 01/13/2001), and a URG-3000n carbon sampler (est. 04/01/2009) are located on the roof of the monitoring shelter. Nitrogen Dioxide (est. 11/12/1999), Carbon Monoxide (est. 11/11/1999), Ozone (est.03/03/2000), Sulfur Dioxide (est. 11/15/1999), and continuous TEOM and BAM $PM_{2.5}$ (est. 11/01/1999 and 1/1/2010) monitors are located inside the monitoring shelter. The NO_2 monitor is designated as the area-wide NO_2 monitor for the CBSA. A meteorological station is also located at the site. The meteorological station monitors wind speed (est. 04/12/2000), wind direction (04/12/2000), pressure (04/14/2000), temperature (10/06/2000), solar radiation (09/26/2000), precipitation (1/11/2002), and relative humidity (1/11/2002).

The site is an NCore multi-pollutant monitoring site. Parameters monitored include trace-level CO (<5000 ppb, 1/1/2006), trace-level SO_2 (<200 ppb, 1/1/2006), and trace-level NO and NOy (<200 ppb, 5/4/2007). The NCore gas instruments operate year round.

The ozone and CO monitors used for NAAQS determination were NAMS. USEPA re-designated them to SLAMS on January 1, 2007 in accordance with the revised 40 CFR 58 rules published on October 17, 2006. NCore ozone and CO monitors operate year round. The re-designated SLAMS ozone and CO monitors are used for NAAQS determination. The $PM_{2.5}$-FRM, meteorological parameters, NO_2, trace-level SO_2, trace-level NOy, and trace-level CO are SLAMS. The trace-level SO_2, trace-level NOy, and trace-level CO are also NCore. The $PM_{2.5}$-FRM SLAMS monitor is used for NAAQS determination. The SLAMS NO_2 and SO_2 monitors are used for NAAQS determination. The $PM_{2.5}$-BAM is designated as a SPM for AQI determination and forecasting purposes. The $PM_{2.5}$ speciation monitors are part of the speciation trends network (STN). Data from these monitors (STN – MetOne SuperSASS and URG-3000n) is not used for compliance determination. A MetOne BAM $PM_{2.5}$ monitor (BAM) began operation on 1/1/2010 and was configured to FEM mode on 4/1/2016. Data from the BAM will be reported as parameter 88502.

The Garinger site is an NCore site and as such must meet additional probe siting criteria. The meteorological tower at this site does not comply with the 10x rule for spacing from obstructions for meteorological measurements. Due to terrain features in the Mecklenburg County region it is difficult to locate a site that meets the requirements of the EPA Volume 4 QA/QC guidance for wind speed and wind direction measurements. Large trees are a dominant landscape feature in the area. The closest terrain feature is 2.6x and is to the southeast of the WS/WD instrument. The next closest obstructions (trees) are to the west of the sensor at 3.4x. MCAQ's 2009 NCore Plan was approved as acceptable for WS/WD and included documentation noting the deviation from 10x siting criteria. Therefore, WS/WD monitoring is conducted at the current location as documented in the 2009 NCore Plan as approved by USEPA Region 4 and USEPA Office of Air Quality Planning and Standards (OAQPS).

NCore probe siting guidance for NOy is a probe height of 10 meters. The NOy probe inlet is currently mounted at a height of 8 meters.

A PM_{10} lo-vol sampler was installed at this site on 4/1/2008. The PM_{10} lo-vol sampler is used in tandem with the $PM_{2.5}$ FRM to determine $PM_{10-2.5}$ (lc) as well as PM_{10} (lc and stp).

Lead monitoring began at this site on December 29, 2011. Pb monitoring was discontinued on April 30, 2016. Pb monitoring was conducted using the Pb-PM_{10} lo-vol method (811-parameter 85129). Pb samples were collected on a 1/6 sampling frequency. The Pb-PM_{10} station was a non-source oriented NCore Pb monitor.

The site complies with the siting requirements of 40CFR58 for criteria air pollutants. There are no proposed changes for the siting of this station. It is recommended that the current site status be maintained.

Additional Monitoring at Garinger High School

Monitoring for air toxics is conducted at the Garinger High School site. The North Carolina Division of Air Quality (NCDAQ) maintains a Xontech 911 sampling device at the Garinger High School site. MCAQ operates the sampler on a 1/6 day sampling schedule as specified by NCDAQ. The sampler operates on standard time.

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

Table 9.

Whole air samples are collected in stainless steel 6 liter- pressurized canisters supplied by NCDAQ. Analysis of samples is conducted by NCDAQ. Samples are analyzed by NCDAQ using cryogenic pre-concentration gas chromatography with mass spectrometric detection (GC/MS) via the Compendium Method for Toxic Organics 15 (TO-15) for 68 compounds. The list of compounds is shown in Table 9.

OBJECTIVE AND SPATIAL SCALE
The monitoring objective of the Garinger ozone, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ (FRM) monitors is to determine representative concentrations in areas of high population density (population exposure). Maximum concentrations for ozone and $PM_{2.5}$ may be measured under stagnant meteorological conditions. This site is a neighborhood scale site for all parameters. Data from this site is used to assess compliance with the NAAQS.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATION
The Garinger NCore station meets required monitoring objectives and siting criteria.

(C) Garinger Aerial Photograph

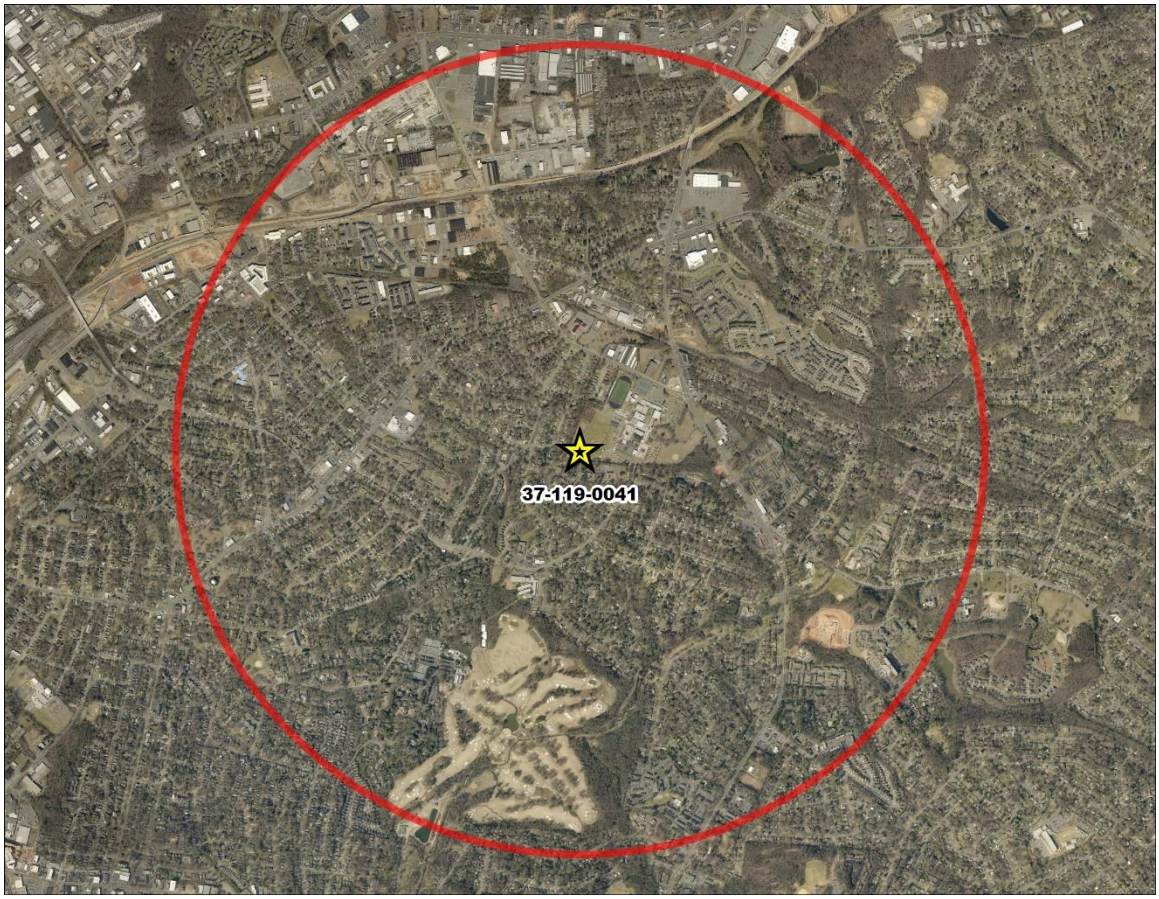

Figure 4. Garinger aerial photograph with 4 km diameter circle.

(D) Garinger Site Photographs

NORTH

NORTHEAST

EAST

SOUTHEAST

SOUTH

SOUTHWEST

WEST

NORTHWEST

3. Montclaire

(A) Montclaire Site Table

Site Name:	Montclaire			
AQS Site Identification Number:		37-119-0042		
Location:	1935 Emerywood Drive			
	Charlotte, NC 28210			
Latitude:	N35.151283º	Datum: WGS84		
Longitude:	W80.866983º			
Elevation:	209 meters			
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
$PM_{2.5}$	FRM	145	2	1 in 3 day
$PM_{2.5}$	FRM - Collocated	145	2	1 in 6 day
$PM_{10-2.5}$	FRM diff.	176	2	1 in 3 day
$PM_{10-2.5}$	FRM diff.- Collocated	176	2	1 in 6 day
$PM_{2.5}$	TEOM, Continuous	716, 717	2	Continuous
PM_{10}	FRM- lo-vol	127	2	1 in 3 day
PM_{10}	FRM- lo-vol - Collocated	127	2	1 in 6 day
Date Site Established:	$PM_{2.5}$	September 15, 2000		
Date Site Established:	$PM_{2.5}$ Collocated	September 15, 2000		
Date Site Established:	$PM_{2.5}$ TEOM	May 13, 2002		
Date Site Established:	PM_{10}	July 1, 2008		
Date Site Established:	PM_{10} Collocated	July 1, 2008		
Nearest Road:	Emerywood Drive	Distance to Road:	70 meters	
Traffic Count:	1700	Year of Count:	2014	
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2012)		MSA #:	16740
2011 Population (Census blocks within 1 mile of property)		Projected 2016 Population (Census Blocks within 1 mile of property)		
26044		27888		

Table 10.

(B) Montclaire Site Description and Statement of Purpose

A federal reference method (FRM) $PM_{2.5}$ sampler and a collocated FRM sampler have been located at 1935 Emerywood Drive since 09/15/2000. The distance between the official and collocated $PM_{2.5}$ FRM samplers is 2.7 meters. A TEOM $PM_{2.5}$ was established 5/13/02. These monitors are situated in a grassy area between the school and a ball field. The site is located 8.6 kilometers SW of the central business district at latitude N35.151283º and longitude W80.866983º. The site elevation is 209 meters above sea level. The nearest road is Emerywood Drive (ADT=1700, 2014) at a distance of 70 meters from the sample inlets. The $PM_{2.5}$ inlets are 2 meters above the ground. The $PM_{2.5}$ is a SLAMS. The $PM_{2.5}$-TEOM is designated as a SLAMS for AQI determination and forecasting purposes. PM_{10} lo-vol samplers (official and collocated) were installed at this site on 7/1/2008. The distance between the official and collocated PM_{10} sampler inlets is 1.4 meters. The PM_{10} lo-vol samplers are used to determine $PM_{10-2.5}$ (lc) and PM_{10} (lc and stp).

OBJECTIVE AND SPATIAL SCALE

The Montclaire PM10 and $PM_{2.5}$ sites are classified as neighborhood scale and the monitoring objective is population exposure in an area of potentially poor air quality. Data is used to assess compliance with the particulate NAAQS.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATIONS

The site complies with the siting requirements of 40CFR58 for criteria air pollutants. Primary and collocated filter-based PM_{10} and $PM_{10-2.5}$ monitoring at the Montclaire monitoring station (37-119-0042) will be discontinued on December 31, 2016. The filter-based samplers will be replaced with a continuous PM_{10} instrument, if funded. The continuous PM_{10} sampler will serve as the primary PM_{10} monitor at the station. Continuous PM_{10} methodology will not require collocation. A continuous $PM_{2.5}$ instrument will be installed to facilitate a planned transition from filter-based $PM_{2.5}$ sampling to continuous $PM_{2.5}$ sampling over the next 2 years, if funded.

The continuous PM_{10} sampler will operate as one of two required PM_{10} monitoring stations in the MSA.

(C) Montclaire Aerial Photograph

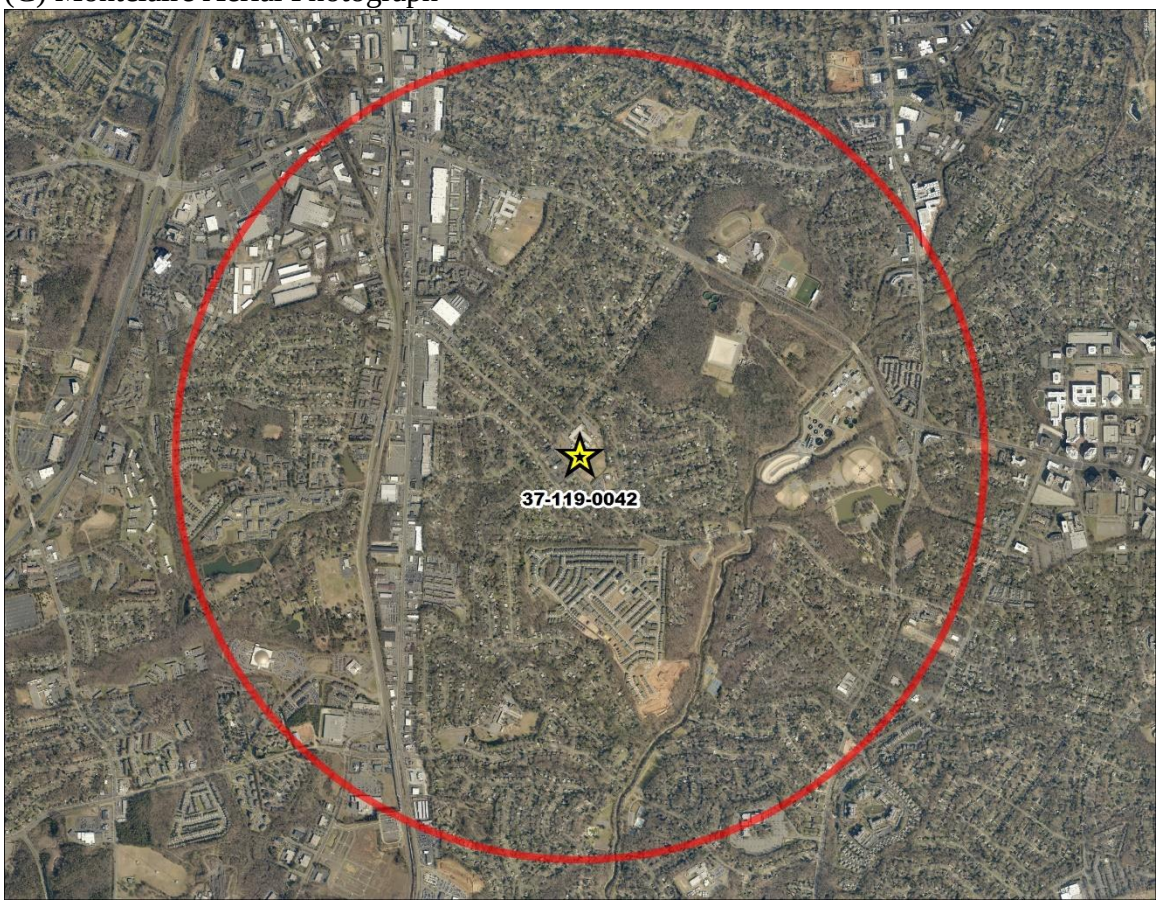

Figure 5. Montclaire aerial photograph with 4 km diameter circle.

(D) Montclaire Site Photographs

NORTH

NORTHEAST

EAST

SOUTHEAST

SOUTH

SOUTHWEST

WEST

NORTHWEST

4. Oakdale

(A) Oakdale Site Table

Site Name:	Oakdale			
AQS Site Identification Number:	37-119-0043			
Location:	513 Radio Road			
	Charlotte, NC 28216			
Latitude:	N35.304100º	Datum: WGS84		
Longitude:	W80.888650º			
Elevation:	245 meters			
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
PM2.5	FRM	145	2	1 in 3 day

Date Site Established:	PM2.5	January 1, 2006	
Date Site Terminated:	PM2.5	December 31, 2016	
Nearest Road:	Radio Road	Distance to Road:	36 meters
Traffic Count:	< 1000	Year of Count:	Estimated
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2012)	MSA #:	16740
2011 Population (Census blocks within 1 mile of property)		Projected 2016 Population (Census Blocks within 1 mile of property)	
24649		28317	

Table 11.

(B) Oakdale Site Description and Statement of Purpose

A federal reference method (FRM) $PM_{2.5}$ sampler is located at the Oakdale monitoring site. The sampler has been in operation at 513 Radio Road since 01/01/2006. The monitor is located in a grass field at the entrance to the Sunset Hills Golf Course. The site is located 9.5 kilometers NW of the central business district at latitude N35.304100º and longitude W80.888650º. The site elevation is 245 meters above sea level. The nearest road is Radio Road (ADT estimated <1000) at a distance of 36 meters from the sample inlet. The $PM_{2.5}$ inlet is 2 meters above the ground.

The sampling frequency for $PM_{2.5}$ at this site is 1 in 3 day sampling. The sampling interval is 24 hours, from midnight to midnight every day.

The site complies with the siting requirements of 40CFR58 for criteria air pollutants. The site will be terminated on December 31, 2016. A new near-road PM2.5 (FRM) monitor will become operational on January 1, 2017 and replace the Oakdale monitoring station.

OBJECTIVE AND SPATIAL SCALE

The monitoring objective of the Oakdale $PM_{2.5}$ site is population exposure and maximum concentration. The $PM_{2.5}$ site is classified as a neighborhood scale. The Oakdale sampling site is representative of particulate concentrations in a residential area downwind of industrial and commercial emission sources west of the Charlotte central business district. Data is used to assess compliance with the particulate NAAQS. The $PM_{2.5}$ monitor is a SLAMS.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATIONS

The $PM_{2.5}$ FRM monitor at the Oakdale monitoring station will be relocated to the Remount near-road monitoring station per the 2015 Annual Monitoring Network Plan. The Oakdale $PM_{2.5}$ station will be discontinued on December 31, 2016. The Remount $PM_{2.5}$ will begin operation on January 1, 2017.

(C) Oakdale Aerial Photograph

Figure 6. Oakdale aerial photograph with 4 km diameter circle.

(D) Oakdale Site Photographs

NORTH

NORTHEAST

EAST

SOUTHEAST

SOUTH

SOUTHWEST

WEST

NORTHWEST

5. Remount

(A) Remount Site Table

Site Name: Remount				
AQS Site Identification Number: 37-119-0045				
Location: 1030 Remount Road				
Charlotte, NC 28208				
Latitude: N35.213171º		Datum: WGS84		
Longitude: W80.874084º				
Elevation: 194 meters				
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
NO2	FEM	200	5	Continuous
Wind Speed	MetOne	61	10	Continuous
Wind Direction	MetOne	61	10	Continuous
Outdoor Temperature	R. M. Young	20	3	Continuous
Relative Humidity	MetOne	12	3	Continuous
Date Site Established: NO2	June 1, 2014			
Nearest Road: I-77 South		Distance to Road: 31 meters		
Traffic Count: 158,000		Year of Count: 2014		
MSA: Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2013)			MSA #: 16740	
2011 Population (Census blocks within 1 mile of property)		Projected 2016 Population (Census Blocks within 1 mile of property)		
14,474		16,788		

Table 12.

(B) Remount Site Description and Statement of Purpose

A federal equivalent method (FEM) NO_2 analyzer is located at the Remount monitoring site. The sampler has been in operation at 1030 Remount Road since 07/17/2014. The monitor is located in a field adjacent to the edge of Interstate77 South (I-77S) between NC Highway 160 and mile marker 8. The site is located 3.2 kilometers SW of the central business district of Charlotte, NC at latitude N35.213171º and longitude W80.874084º. The site elevation is 194 meters above sea level. The nearest road is I-77S (AADT 158,000 (2014)) at a distance of 31 meters from the sample inlet. The NO_2 inlet is 5 meters above the ground.

The site complies with the siting requirements of 40CFR58 for criteria air pollutants. The NO_2 monitor located at this station is designated as a near-road monitoring station

for the CBSA. There are no proposed changes for this site. It is recommended that the current site status be maintained.

OBJECTIVE AND SPATIAL SCALE

The monitoring objective of the Remount NO_2 site is to determine the highest concentrations expected to occur in the area covered by the network. The NO_2 site is classified as a microscale site. The Remount site is representative of nitrogen dioxide concentrations in the near-road environment. Data is used to assess compliance with the nitrogen dioxide NAAQS. The NO_2 monitor is a SLAMS.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATIONS

The $PM_{2.5}$ FRM monitor at the Oakdale monitoring station will be relocated to the Remount near-road monitoring station per the 2015 Annual Monitoring Network Plan. The Oakdale $PM_{2.5}$ station will be discontinued on December 31, 2016. The Remount $PM_{2.5}$ will begin operation on January 1, 2017.

Carbon monoxide monitoring will begin at the Remount (37-119-0045) near-road monitoring station on January 1, 2017.

(C) Remount Aerial Photograph and Map

Figure 7. Aerial Photograph (green arrow denotes site location)

(D) Remount Site Photographs

NORTH

NORTHEAST

EAST

SOUTHEAST

SOUTH

SOUTHWEST

WEST

NORTHWEST

6. University Meadows

(A) University Meadows Site Table

Site Name:	University Meadows			
AQS Site Identification Number:	37-119-0046			
Location:	1660 Pavilion Boulevard			
	Charlotte, NC 28262			
Latitude:	N 35.314158°		Datum: WGS84	
Longitude:	W 80.713469°			
Elevation:	216 meters			
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
Ozone	UV Photometry	47	5	April 1 – Oct. 31, Continuous

Date Monitor Established:	Ozone	April 1, 2016	
Nearest Road:	Pavilion Blvd.	Distance to Road:	50 meters
Traffic Count:	8000	Year of Count:	2012 (9/24/2012)
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2013)	MSA #:	16740

Table 13.

(B) University Meadows Site Description and Statement of Purpose

The University Meadows site is located approximately 325 meters north of the intersection of Highway 49 and Pavilion Boulevard in Mecklenburg County. It began monitoring ozone on 4/1/2016. The site is located 15 kilometers NE of the central business district at latitude N 35.314158° and longitude W 80.713469°. The site elevation is 216 meters. The nearest road is Pavilion Boulevard, which is 50 meters from the probe and has a daily traffic count (adt) of 8000 (2012). The monitoring shelter is located in a large grass field at University Meadows Park. The probe inlet is 5.0 meters above the ground and 2.0 meters from the roof of the monitoring building. There are no obstructions to air flow near the probe.

The site is located 15 kilometers (9.3 miles) downwind of the central business district of Charlotte, NC. It is oriented along the primary summer wind vector (SW to NE) which intersects the central business district. The site should measure peak ozone concentrations in Mecklenburg County.

The ozone monitor is a SLAMS monitoring station. Data will be used to assess compliance with the NAAQS.

The ozone instrument is operated during the North Carolina ozone monitoring season which begins April 1 and ends October 31 in 2016. The ozone monitoring season for the University Meadows station will be revised in accordance with Table D-3 to Appendix D of 40 CFR 58 to operate from March 1 to October 31 beginning on March 1, 2017. The ozone instrument will operate continuously during the seasonal period.

OBJECTIVE AND SPATIAL SCALE

The monitoring objective of the University Meadows ozone station is to determine the highest concentrations expected to occur in the area covered by the network. The site is an urban scale site which represents ozone levels over several kilometers. Data from this site is used to assess compliance with the NAAQS for ozone. The station is located along the primary summer wind vector in the Charlotte area which is predominated by winds from the southwest (prevailing wind direction).

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATIONS

The site complies with the siting requirements of 40CFR58 for criteria air pollutants.

(C) University Meadows Aerial Photograph

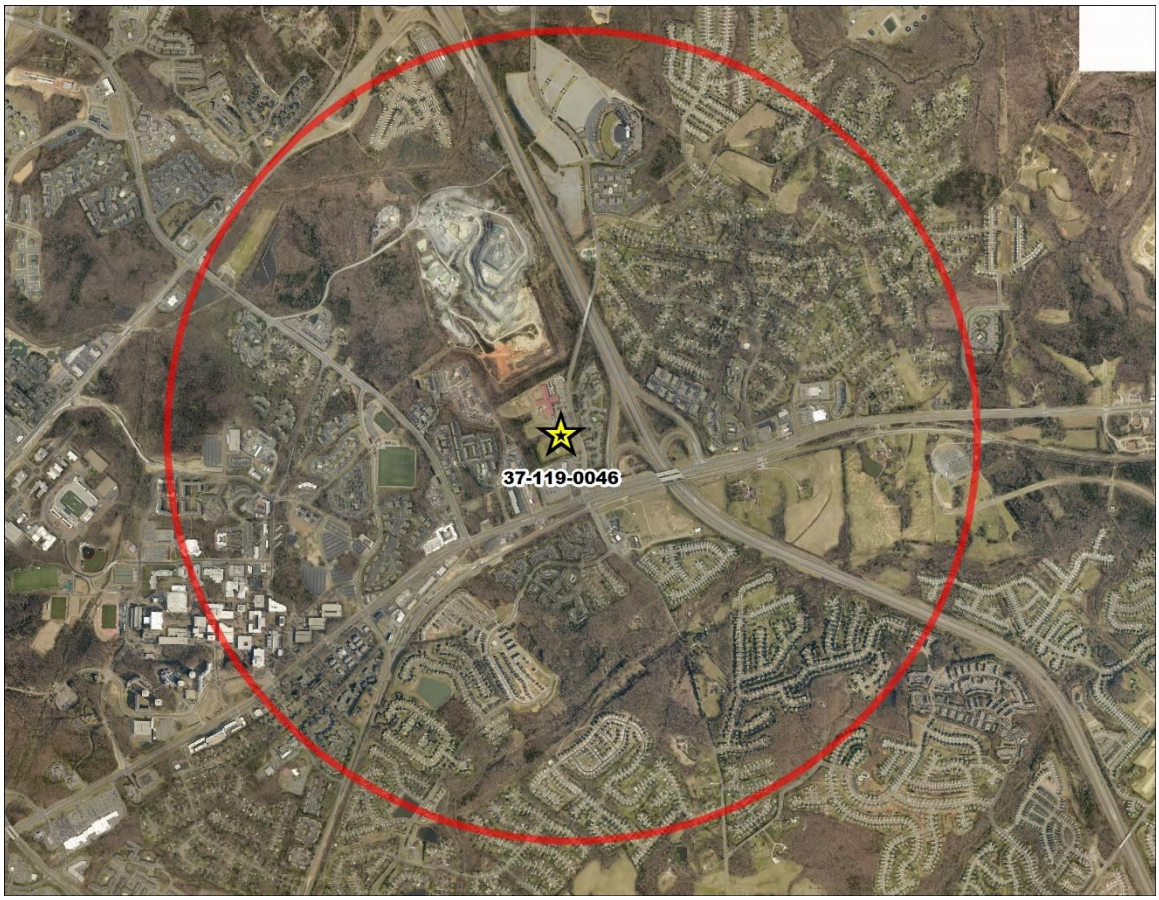

Figure 8. University Meadows aerial photograph with 4 km diameter circle.

(D) University Meadows Site Photographs

NORTH

NORTHEAST

EAST

SOUTHEAST

SOUTH

SOUTHWEST

WEST

NORTHWEST

V. REFERENCES

1. TITLE 40—Protection of Environment CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY, SUBCHAPTER C—AIR PROGRAMS, PART 58—AMBIENT AIR QUALITY SURVEILLANCE, May 18, 2016.

2. Charlotte Department of Transportation. Traffic Counts 2000-2004. **http://www.charmeck.org/Departments/Transportation/Traffic/Traffic+Counts.htm** Charlotte, NC. 2014.

3. State of North Carolina, Department of Transportation. Traffic Count Information. **http://www.ncdot.org/planning/tpb/traffic_survey/**. 1500 Mail Service Center, Raleigh NC, 27699-1500. 2014.

4. U.S. EPA, Office of Air Quality Planning and Standards. Quality Assurance Handbook for Air Pollution Measurement Systems Volume IV: Meteorological Measurements (Draft). EPA-454/D-06-001. Research Triangle Park, NC, October 2006.

VI. APPENDIX A

Monitoring Equipment Replacement Tables

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
PM2.5 FEM Continuous	63263	BAM 1020	1020	H1935	Garinger	Mar-08	Refurbished by MetOne 12/2015.	Good
Dynamic Calibrator	68014	Thermo Calibrator	146i	0717821846	Garinger	Dec-06	Spare	Good
Dynamic Calibrator	72399	Environics Calibrator	6100	6527	Garinger	Apr-15		Good
Dynamic Calibrator	64608	Teledyne Calibrator	T700U	182	Remount	Oct-13		Good
Dynamic Calibrator	67771	Envrionics Calibrator	6103	3170	Suttle Ave	Oct-03		Good
Dynamic Calibrator		Environics Calibrator	6100	4202	Suttle Ave	Apr-08		Good
PM2.5 Non-FEM Continuous	67632	TEOM 1400a	1400a	140ab244570302 Controller 140ab252820408	Montclaire	Nov-01	To be replaced by 1022, if funded.	Good
NOy	72314	Thermo NOy	42i-Y	1213152833	Garinger	May-12		Good
NO2		Thermo NOx	42i	1153170016	Garinger	Dec-15		Good
NO2	69969	Teledyne Nox	T200UP	81	Remount	Oct-13		Good
Data Logger	67773	ESC Data Logger	8832	A0409	Garinger	Oct-03		Good
Data Logger	67667	ESC Data Logger	8832	A0064	Montclaire	Mar-02		Good
Data Logger	64603	ESC Data Logger	8832	A4829K	Remount	Apr-14		Good
Data Logger	67729	ESC Data Logger	8832	A0304	Suttle Ave	Mar-03		Good
Data Logger	67860	ESC Data Logger	8832	A0896	Suttle Ave	Jan-05		Good

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
Data Logger	67967	ESC Data Logger	8832	A0160	Suttle Ave	Oct-02		Good
Data Logger	63292	ESC Data Logger	8832	A233K	University Meadows	Jul-07		Good
O3		Thermo O3	49i	1152660035	Garinger	Dec-15		Good
O3	68048	Thermo O3	49i	0728225131	Garinger	Jul-07		Spare
O3	67966	Thermo O3	49i	0636319877	Suttle Ave	Dec-06		Spare
O3	99068	Thermo O3	49i	0734726810	Suttle Ave	Aug-07	Laboratory QA L2TS	Good
O3	67965	Thermo O3	49i	49i-0636319876	University Meadows	Sep-05		Good
O3 Calibrator		Thermo O3 Calibrator	49i-PS	1027444721	Garinger	Sep-10		Good
O3 Calibrator	67842	Thermo O3 Calibrator	49cps	0432209352	Suttle Ave	Sep-04	Laboratory L2TS	Good
O3 Calibrator	67658	Thermo O3 Calibrator	49cps	49cps-73996-375	Suttle Ave	Feb-02	Audit L3TS to be replaced.	Poor
O3 Calibrator		Thermo O3 Calibrator	49i-PS	1153380012	University Meadows	Dec-15		Good
CO	72356	Thermo CO	48i-TLE	1220753779	Garinger	Oct-12		Good
CO	67861	Teledyne CO	300eu	068	Suttle Ave	Mar-05		Spare
CO	201077 (State)	Thermo CO	48i-TLE	64047	Suttle Ave		On loan from NCDAQ-Near-road CO	Good
SO2	72361	Thermo SO2	43i-TLE	1213152834	Garinger	May-12		Good
Zero Air System	64822	Teledyne Zero Air	M701H	2809	Suttle Ave	Sep-08	Spare	Good
Zero Air System	64609	Teledyne Zero Air	M701H	793	Remount	Apr-14		Good

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
Zero Air System	67370	Teledyne Zero Air	M701H	3033	Garinger	Sep-08		Good
Zero Air System	67371	Teledyne Zero Air	M701H	3035	University Meadows	Sep-08		Good
Zero Air System		Teledyne Zero Air	M701H	0098	Suttle Ave	Oct-11	Audit Zero Air System	Good
Outdoor Shelters	66088	Shelter One Shelter	C1152095 20053	20053-01	Garinger	Dec-11		Good
Outdoor Shelters	66088	Shelter One	C101695 23053	23053-01	Remount	Apr-14		Good
Outdoor Shelters		Ekto Enclosure	432sp	3278-7	Montclaire	Nov-01		Good
Outdoor Shelters	67847	EKTO Enclosure	432SP	3577-8	Suttle Ave	Nov-04		Good
PM2.5 FRM		Thremo 2025	2025B	2025B219590706	Garinger	May-08	Transition to continuous - spare	Good
PM2.5 FRM	66044	Thermo 2025	2025B	2025B226221002	Garinger	May-10		Good
PM2.5 FRM	67701	Thermo 2025	2025a	2025a202869805	Montclaire	Oct-98		Good
PM2.5 FRM	68066	Thermo 2025	2025b	2025b221720804	Montclaire	Jul-07	Transition to continuous - spare	Good
PM2.5 FRM	67843	Thermo 2025	2025b	2025b217200408	Montclaire	Nov-04	End use 12/31/2016 - Spare	Good
PM2.5 FRM	67844	Thermo 2025	2025b	2025b217230408	Montclaire	Nov-04		Good
PM2.5 FRM	67700	Thermo 2025	2025a	2025a202879805	Oakdale	Oct-98	End use 12/31/2016 - Spare	Good

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
PM2.5 FRM	72358	Thermo 2025	2025i	2025i2 02341205	Suttle Ave	Jun-12	For Near-road	Good
PM2.5 FRM	67702	2025a	2025a	2025A204679807	Suttle Ave	Oct-98	Spare	Good
Speciation	72214	MetOne Speciation	Super SASS	N1099	Garinger	Mar-12		Good
Speciation		URG Speciation	URG-3000N	3N-B0400	Garinger	Feb-09		Good
Balance	61749	Sartorius Balance	AC2105	20902085	Suttle Ave	1992		Good
PM10 Hi-Vol		PM-10 High Vol	GMW-1200	54176	FS #11	1991		Good
PM10 Hi-Vol		PM-10 High Vol	GMW-1200	54174	FS #11	1991		Good
Laboratory Compressor		Jun-Air	546919		Suttle Ave	Apr-04	Laboratory zero air compressor.	Good
AirVision Software		Agilaire			Suttle Ave	Nov-10		Good
Alicat-PCU		Alicat	PCU	111448-111449-111450	Suttle Ave	Apr-15		Good