ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL A. ABRACZINSKAS
Director

Standard Operating Procedure (SOP)

for

Completing the Annual Network Review

for the

North Carolina Division of Air Quality (DAQ)

SECTION 2

Approval Sign-Off Sheet

I certify that I have read and approve of the contents of this revision of the "SOP for Preparing a QAP/SOP" with an effective date of 10/1/2017.

Joette Steger, PPB Supervisor: _____ 9/29/2017

John C. Evans, Ambient Monitoring Section Chief: _____ 9/29/17

Table of Contents

2.43 Standard Operating Procedure for Completing the Annual Network Review for the North Carolina Division of Air Quality (DAQ)

2.43.1 Introduction

This section discusses the significant changes since the previous revision and the scope, application and purpose of this standard operating procedure (SOP).

2.43.1.1 Significant Changes

2.43.1.1.1 Significant Changes between Revision 1 and 2

The SOP was revised to update links to external information, make updates required for the sulfur dioxide sites established as part of the data requirements rule and reflect the changes made in the annual network review forms. Instead of six forms for all sites, there are now seven forms tailored to specific sites:

- Ozone only sites;
- Sulfur dioxide only sites;
- Ozone and sulfur dioxide only sites;
- Particle only sites;
- Near road sites;
- NCore sites; and
- Gases and particles at sites that are not near road or NCore.

2.43.1.1.1 Significant Changes between Revision 1 and 0

The SOP was revised to reflect the changes made in the annual network review forms. Instead of one generic form for all sites, there are now six forms tailored to specific sites:

- Ozone only sites;
- Fine particle only sites;
- Ozone and sulfur dioxide only sites;
- Particle only sites;
- Near road sites; and
- All pollutants at non-near road sites.

2.43.1.2 Scope/Application/Purpose

The DAQ is required by Part 58.10 of Title 40 of the Code of Federal Regulations (CFR) to submit a network monitoring plan every year and a network monitoring assessment every 5 years. As part of preparing the network plan, the DAQ conducts an annual network review each year at the end of the ozone season. The annual network review requires a review form to be completed for each monitoring station in the network. The review form requires the person completing the form to verify the physical location of the site, the monitoring objectives and

scales of representation for each monitor at the site, the probe location for each monitor, presence of trees and other obstructions, and the locations of roads and amount of traffic on those roads. The review form also periodically requires the person completing the form to take photographs of the monitoring site. These review forms form the basis for the annual network monitoring plan and any changes made to the network. The review forms also serve to document that the site continues to meet the criteria for locating a site in 40 CFR 58 Appendix E.

2.43.2 Description of the Annual Network Review Form

This section describes the annual network review form and the purpose for each section.

2.43.2.1 Site Information Section

The top of the first page of the form (shown in Figure 1) provides information on the location of the monitoring station. The information in this section of the form is the same for all of the monitors located at the site. The information requested includes information that identifies the site (Site Name, AQS Site #) as well as information that identifies where the site is located (Region, Street Address, Urban Area, Core-based Statistical Area, Longitude, Latitude, Elevation). It also includes information about what is located near the site (roads, railroad tracks, water towers, power lines) that could potentially bias the data collected at the site.

Site Review Form Calendar Year 2017

Site Information

Region ____	**Site Name** _____		**AQS Site # 37-**_____-_____
Street Address-_____		**City** _____	
Urban Area Choose an item.		**Core-based Statistical Area** Choose an item.	
Enter Exact		**Method of Measuring**	
Longitude _____	**Latitude** _____		
In Decimal Degrees	In Decimal Degrees	Select one	**Explanation:** _____
Elevation Above/below Mean Sea Level (in meters) _____			
Name of nearest road to inlet probe _____ ADT _____ Year Choose one _____ Comments: _____ Distance of site to nearest major road (m) _____ Direction from site to nearest major road ___ Name of nearest major road _____ ADT _____ Year Choose one _____ Comments: _____			
Site located near electrical substation/high voltage power lines?			Yes ☐ No ☐
Distance of site to nearest railroad track	(m) _____	Direction to RR ___	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____	Direction ___	
Distance between site and drip line of water tower (m) _____	Direction from site to water tower _____		☐NA
Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools. _____			

Figure 1. Top Section of Page One of the Annual Network Review Form

2.43.2.2 Monitor Information Sections

There are one to four sections of the form that provide specific information on the monitor or monitors located at the site. Monitors are grouped together based on the criteria they must meet to be properly sited. All of these sections are similar in that the top part provides space to indicate which monitors are present at the site, their monitoring objectives, type, and scale of representation and the lower part provides space to report information on the location of the probe (distance from ground, supporting platform, collocated probes, trees, obstacles, roads).

2.43.2.2.1 Gaseous Pollutant Section Excluding Near Road and Trace-Level NO_y Pollutants

One section of the form (shown in Figure 2) provides space for reporting information on sulfur dioxide monitors, ozone monitors, nitrogen oxide monitors, high-sensitivity reactive oxides of nitrogen monitors, ammonia monitors, carbon monoxide monitors that are not near road, air toxics monitors, and hydrocarbon monitors. These monitors are all grouped together on the form because they must all meet the same criteria with regards to where they are sited. All of these monitoring probes must be located two to 15 meters from the ground and at least one meter from the supporting platform and other probe inlets.

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_x (NAAQS) ☐ $HSNO_y$ ☐ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ HSCO (Not Micro) ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☐ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☐ No ☐ Give actual measured height from ground (meters) _____

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☐ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) _____

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☐ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐

*Distance from probe to tree (m) _____ Direction from probe to tree ___ *Height of tree (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☐

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) _____ Direction from probe to nearest traffic lane ___

Figure 2. Gaseous Pollutant Section Excluding Near Road, Micro-scale, and NCORE NOy Pollutants

2.43.2.2.2 Trace-level Reactive Oxides of Nitrogen Monitor Section

The second section of the form for non-near-road multipollutant sites (shown in Figure 3) provides space for reporting information on trace-level reactive oxides of nitrogen monitors. These monitoring probes must be located 10 to 15 meters from the ground and at least one meter from the supporting platform and other monitoring probes.

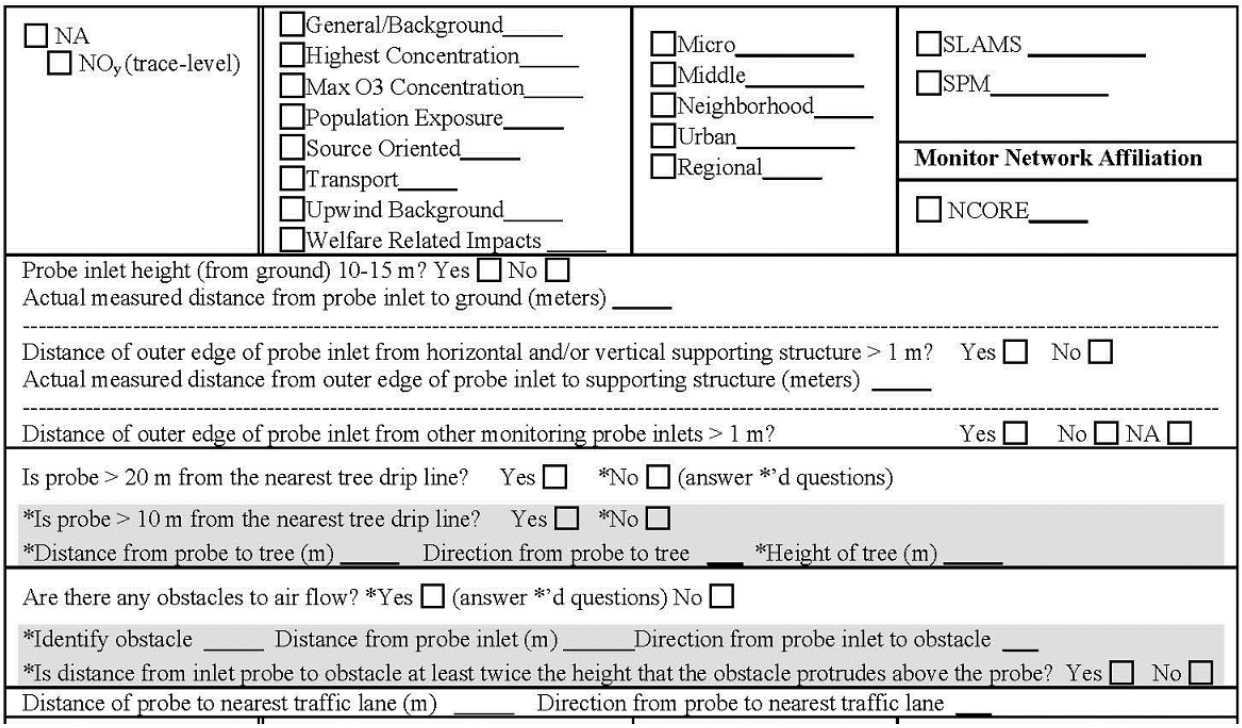


Figure 3. Trace-level NOy Monitor Section

2.43.2.2.3 Near Road Nitrogen Dioxide and Carbon Monoxide Monitor Section

The first section of the near-road form (shown in Figure 4) provides space for reporting information on near road nitrogen dioxide and carbon monoxide monitors. These monitors have similar criteria and are grouped together. These monitoring probes must be located two to seven meters from the ground and at least one meter from the supporting platform and other monitoring probes. In addition they must be within 50 meters of the outside edge of the traffic lane.

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NO_2 (Near Road only) ☐ CO (Near Road only)	☐ Highest Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Welfare Related Impacts_____	☐ Micro_____	☐ SLAMS _____ ☐ SPM_____
Probe inlet height (from ground) 2-7 m? Yes ☐ No ☐ Give actual measured height from ground (meters) _____ Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☐ No ☐ Actual measured distance from outer edge of probe inlet to supporting structure (meters) _____ Distance of outer edge of probe inlet from other monitoring probe inlets > 0.25 m? Yes ☐ No ☐ NA ☐			
Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions) *Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Distance from probe to tree (m) _____ Direction from probe to tree ___ *Height of tree (m) _____			
Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☐ *Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___ *Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐			
Distance of probe to nearest traffic lane (m) _____ Direction from probe to nearest traffic lane ___			

Figure 4. Near Road Nitrogen Dioxide and Carbon Monoxide Monitor Section

2.43.2.2.4 Low Volume Particle Monitor Section

The last section of the forms that include particle monitors (shown in Figure 5) provides space for reporting information on low volume particle monitors (i.e., $PM_{2.5}$ FRM, BAM, SASS, and URG monitors). These monitors must be sited by the same criteria so they are grouped together. These probes must be located two to 15 meters from the ground, at least two meters from the supporting platform and at least one meter from other monitoring probes. To be classified as micro-scale, the probes must be within 2 to 7 meters of the ground. Low volume particle monitors that are collocated with other low volume monitors must have their probes within four meters of each other horizontally and one meter vertically.

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM10 Lead (PB) ☐ PM2.5 Cont. (TEOM) ☐ PM2.5 Cont. (BAM) ☐ PM2.5 Spec. (SASS) ☐ PM2.5 Spec. (URG) ☐ PM2.5 Cont. Spec.	☐ General/Background ____ ☐ Highest Concentration ____ ☐ Population Exposure ____ ☐ Source Oriented ____ ☐ Transport ____ ☐ Welfare Related Impacts ____	☐ Micro ____ ☐ Middle ____ ☐ Neighborhood ____ ☐ Urban ____ ☐ Regional ____	☐ SLAMS ____ ☐ SPM____ **Monitor Network Affiliation** ☐ NCORE ____ ☐ SUPPLEMENTAL SPECIATION ____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY____

Probe inlet height (from ground) ☐ < 2 m ____ ☐ 2-7m ____ ☐ 7-15 m ____ ☐ > 15 m ____
Actual measured distance from probe inlet to ground (meters) ____
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) ____ Yes ☐ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☐
Distance (Y) between outer edge of all low volume monitor inlets and any Hi-Volume PM-10 or TSP inlet = 2 m or greater? Yes ☐ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, FRM & TEOM, BAM & TEOM) Located at Site? *Yes ☐ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) ____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) ____

Is an URG 3000 monitor collocated with a SASS monitor at the site? *Yes ☐ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated speciation samplers inlets (X) within 2 to 4 m of each other? Yes ☐ No ☐
Give actual (meters) ____
* Are collocated speciation sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) ____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) ____ Direction from probe to tree ___ *Height of tree (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☐
*Identify obstacle ____ Distance from probe inlet (m) ____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐
Distance of probe to nearest traffic lane (m) ____ Direction from probe to nearest traffic lane ___

Figure 5. Low Volume Particle Monitor Section

2.43.2.3 Recommendations Section

The bottom of the last page of the form (shown in Figure 6) provides recommendations for moving the site or changing the scale of representation or monitoring objective for one or more of the monitors at the site. It also prompts the person completing the form to check when pictures were last taken and update the pictures, if needed. Finally, this section contains a space for the person completing the form to enter his or her name and the date he or she completed the annual network review. There is also a space for a regional reviewer to acknowledge his or her review of the form and the information it contains and the date of his or her review.

RECOMMENDATIONS:

1) Maintain current site status? Yes ☐ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures _____ New Pictures Submitted? Yes ☐ No ☐

Reviewer _____ Date _____

Ambient Monitoring Coordinator _____ Date_____

Figure 6. Bottom Section of Last Page of the Annual Network Review Form

2.43.3 Annual Network Review Procedures

This section provides the procedures for updating the review form and providing the review form to the regions, completing the annual network review, reviewing the annual network review, and submitting the annual network review to the Raleigh Central Office (RCO).

2.43.3.1 Procedures for Updating the Review Form and providing it to the Regions

This subsection discusses the procedures and schedule for updating the review form and sending it to the regions.

2.43.3.1.1 Reasons for Updating the Review Form

Sometimes the United States Environmental Protection Agency (EPA) makes changes to the monitoring regulations that change the criteria for locating a site in 40 CFR 58 Appendix E, change the criteria for spacing collocated monitors in 40 CFR 58 Appendix A, or change the monitoring objectives or scales of representation for certain monitors. When the EPA makes these types of changes, the annual network review form will need to be updated to reflect the new monitoring requirements. Sometimes the EPA adds new monitoring requirements, which will also result in the need to update the form. Sometimes the annual network review form will also need to be updated based on comments received during the previous network review, because the regions or central office need additional information, or something on the review form is not correct and needs to be fixed. Sometimes the Office of Management and Budget (OMB) will change the definitions of Metropolitan and Micropolitan Statistical Areas, which will also result in a need to update the form.

2.43.3.1.2 Procedures for Updating the Review Form

Each year the person responsible for updating the review form will review the Federal Register for changes to the monitoring requirements. The latest version of the Code of Federal Regulations is also available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr58_main_02.tpl. This person will also check the OMB website (https://www.whitehouse.gov/omb) to see if any changes were made in defining Metropolitan and Micropolitan Statistical Areas in North Carolina. Then he or she will update the forms for

any changes made to the monitoring regulations by the EPA and Core-Based Statistical Areas by OMB and will send the draft forms out to the RCO (NCDENR.DENR.DAQ.Ambient-Monitoring.CO@lists.ncmail.net) and Regional Office (NCDENR.DENR.DAQ.AMBIENT-MONITORING.REGIONALOFFICES@lists.ncmail.net) ambient monitoring staff to solicit comments and recommendations for additional changes to the form. Based on feedback received, this person will make any additional modifications that are needed to finalize the forms. Once the forms are finalized, this person will post the forms in IBEAM and send an e-mail to the regions notifying them that the forms are available.

2.43.3.1.3 Schedule for Updating the Review Form and Making it Available to the Regions
Any revisions needed to the forms should be completed by the end of July so that the draft forms can be reviewed by the central and regional office ambient monitoring personnel before the forms are finalized. The final annual network review forms should be posted to the internal web site and made available for the regions to use before the end of August.

2.43.3.2 Procedures for Completing the Review Form
This subsection discusses the procedures for doing the review and filling out the review form.

2.43.3.2.1 Completing the Site Information Section
This subsection discusses the procedures for locating the site information and completing the review form.

2.43.3.2.1.1 Region
In the drop down box, select the region or local program responsible for operating the monitor.

2.43.3.2.1.2 Site Name
Enter the common name used by the operators to refer to the site.

2.43.3.2.1.3 Air Quality System (AQS) Site Number
Enter the unique site identification number assigned to the site to identify it in the Air Quality System (AQS). If you do not know what this number is, some ways to find this number are by looking in IBEAM and running the "Ambient Monitoring: Sites by Site Name, Logger Id, or Site Id" report, looking in Air Data (https://www.epa.gov/outdoor-air-quality-data), finding the site on the interactive map and clicking on the icon, looking at an AQS AMP350 (raw data) report for the site.

2.43.3.2.1.4 Address
Sometimes local addresses change. The regional reviewer will want to confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location. The street address should match the street address in the "Ambient Monitoring: Sites by Site Name, Logger Id, or Site Id" report and what is reported in AQS (accessed via Air Data (https://www.epa.gov/outdoor-air-quality-data) or an AMP report).

If the street addresses do not match, send an e-mail to DENR.DAQ.Ask_Ambient@lists.ncmail.net and ask them to correct the street address in the appropriate database (IBEAM, AQS or both).

2.43.3.2.1.5 City
Enter the name of the city where the monitor is located.

2.43.3.2.1.6 Urban Area
If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. If the urban area is missing from the list, let the person who updates the list know so the list can be corrected. Otherwise select "Not in an Urban Area".

2.43.3.2.1.7 Core-Based Statistical Area (CBSA)
If the monitor is located within a county that is part of a Metropolitan Statistical Area (MSA) or a Micropolitan Statistical Area (MiSA), then it is located within a Core-Based Statistical Area. Core-Based Statistical Areas are updated three years after the decennial census and sometimes annually between that update and the next decennial census. The most recent list of Core-Based Statistical Areas and the counties included in them can be found at https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/bulletins/2015/15-01.pdf. If the monitoring station is located in a county included in a MSA or MiSA, select the appropriate CBSA from the list. If the CBSA is missing from the list, let the person who updates the list know so the list can be corrected. Otherwise select "None".

2.43.3.2.1.8 Longitude and Latitude
The longitude and latitude should be entered in decimal degrees. To convert to decimal degrees from degrees, minutes, and seconds, use a conversion program, such as the one located at https://www.fcc.gov/media/radio/dms-decimal. The person completing the form should measure the longitude and latitude at the site using an appropriate device or determine it using an appropriate map or mapping software. He or she should enter the longitude and latitude on the form and also check to make sure the measured values match what is already in IBEAM ("Ambient Monitoring: Sites by Site Name, Logger Id, or Site Id" report) and what is reported in AQS (accessed via Air Data (https://www.epa.gov/outdoor-air-quality-data) or an AMP350 report).

External GPS for Laptop 1

Smart phone lat long app 1

If the longitude and latitude do not match, send an e-mail to DENR.DAQ.Ambient-Monitoring.PPB.CO@lists.ncmail.net and ask them to correct the latitude and longitude in the appropriate database (IBEAM, AQS or both).

2.43.3.2.1.9 Method of Measuring

Select the method of measuring the longitude and latitude from the drop down list. If the method used is not listed, select "Other" and type an explanation in the Explanation Box.

2.43.3.2.1.10 Elevation

The elevation should be entered in meters. The person completing the form should measure the elevation at the site using an appropriate device or determine it using a topographical map or mapping software. He or she should enter the elevation on the form and also check to make sure the measured value matches what is already in IBEAM ("Ambient Monitoring: Sites by Site Name, Logger Id, or Site Id" report) and what is reported in AQS (accessed via Air Data (https://www.epa.gov/outdoor-air-quality-data) or an AMP350 report). If the elevation does not match, send an e-mail to DENR.DAQ.Ask_Ambient@lists.ncmail.net and ask them to correct the elevation in the appropriate database (IBEAM, AQS or both).

Google Maps smart phone app 1

2.43.3.2.1.11 Road Information

For the nearest road to the inlet probe, list whatever roadway that carries vehicles that is closest to the probe, whether or not it is a named or public road and even if the road has very little traffic. Use the comments space if necessary to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site as well as the AADT if it is available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site as well as the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at https://connect.ncdot.gov/resources/State-Mapping/Pages/Traffic-Volume-Maps.aspx. Locate the monitoring station on the map and then report the closest measured traffic volume to the monitoring station as shown in Figure 7. For AADT values for local roadways contact the appropriate local governments.

Walkbox string measuring device 1

Rolatape surveyors wheel 1

GPS Distance enabled smart phone 1

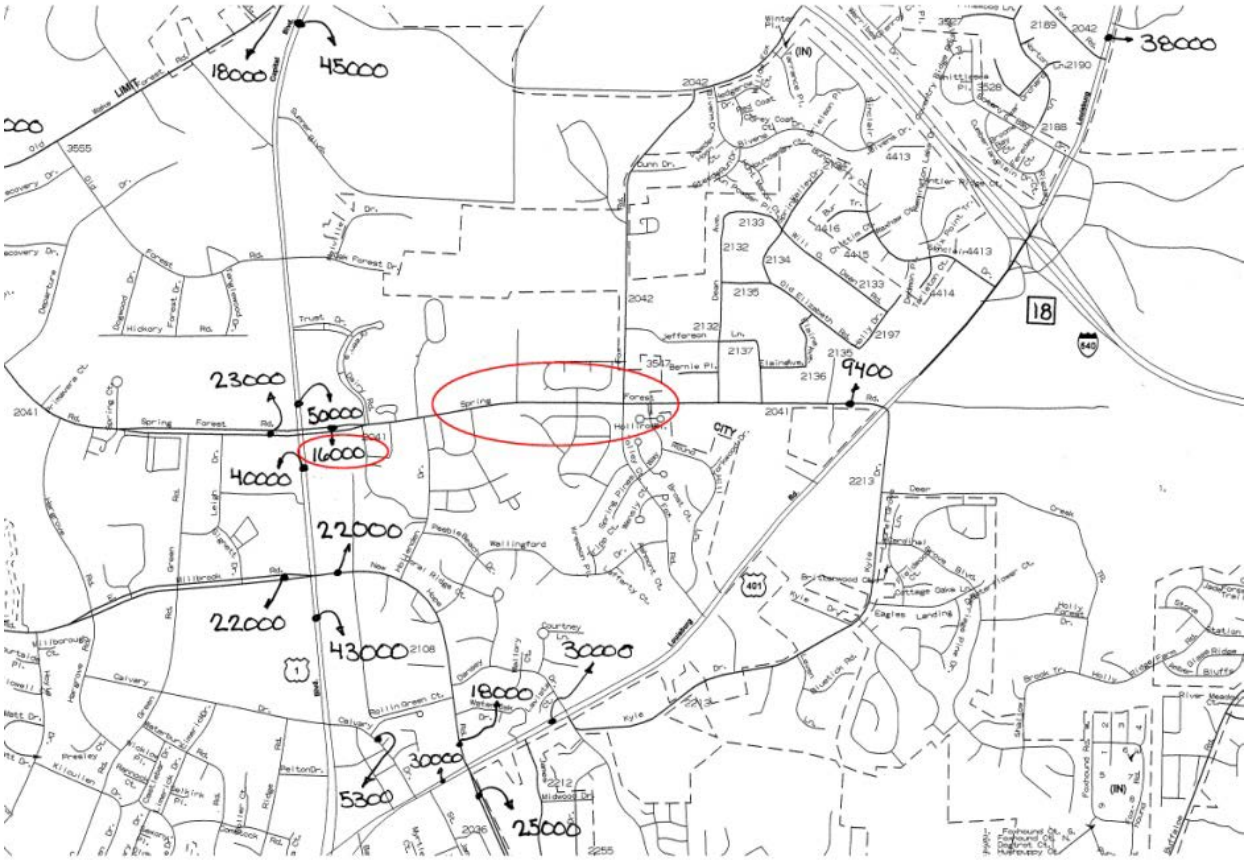


Figure 7. Example Traffic Volume Map from NC DOT

2.43.3.2.1.12 Electrical Substations and High Voltage Power Lines

If the property where the monitoring station is located is next to an electrical substation or if high voltage power lines pass through the property or next to the property where the monitoring station is located, check “Yes”. Otherwise check “No”.

Silva compass: the standard. 1

2.43.3.2.1.13 Railroad Tracks

If the monitoring station is located within 500 meters of railroad tracks record the distance to the railroad tracks and the direction from the site to the railroad tracks. If no railroad tracks are within 500 meters of the site check “NA”.

2.43.3.2.1.14 Power Poles with Transformers

Record the distance from the site to the nearest power pole with a transformer and the direction from the site to the nearest power pole with a transformer. This information may be helpful if the site should ever have to be relocated.

2.43.3.2.1.15 Water Towers

If the monitoring station is located on or adjacent to property containing a water tower, record the distance to the water tower drip line (closest edge of the water tower tank) and the direction from the site to the water tower. If there are no water towers on the property or on the adjacent property check “NA”.

2.43.3.2.1.16 Any Sources of Potential Bias

Use this space to record any information about the site that is not requested elsewhere. Especially note any changes to the site or that occurred near the site in the past year, such as road construction, building construction, new or closing businesses, changes in traffic patterns, crops or other agricultural activities.

2.43.3.2.2 Completing the Pollutant Sections of the Form

This subsection discusses the procedures for completing the pollutant sections of the form for the various monitors.

2.43.3.2.2.1 Parameters

Check the boxes for all of the monitors in the given group of monitors that are located at the site. For example, for the low volume particle monitoring group, if the site is fine particle federal reference method, FRM, only site, then check the PM2.5 FRM box and leave the rest blank. If the site has both a PM2.5 FRM and a PM2.5 beta attenuation monitor check both the PM2.5 FRM and PM2.5 Cont. (BAM) boxes and leave the rest blank. If the site does not have any monitors for the group, check the NA box, skip that section and go on to the next section.

2.43.3.2.2.2 Monitoring Objective

For each pollutant monitor at the station consider why that monitor is there and what purpose it serves. Monitoring objectives are different for different types of pollutants. There are six general types of monitoring objectives that apply to all pollutants: (a) Highest Concentration, sites located to determine the highest concentrations of that pollutant expected to occur in the area covered by the network; (b) Population Exposure, sites located to measure typical concentrations of that pollutant in areas of high population density; (c) Source Oriented, sites located to determine the impact of significant sources or source categories of that pollutant on air quality; (d) General/Background, sites located to determine general background concentration levels of that pollutant; (e) Transport, sites located to determine the extent of regional pollutant transport among populated areas and in support of secondary standards; and (f) Welfare Related Impacts, sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts. In addition, sites established with the objective of studying ozone and its precursors may have additional objectives of either being a Maximum Ozone Concentration site or an Upwind Background site. A monitor may have more than one objective, for example, it could be a highest concentration site and a population exposure site.

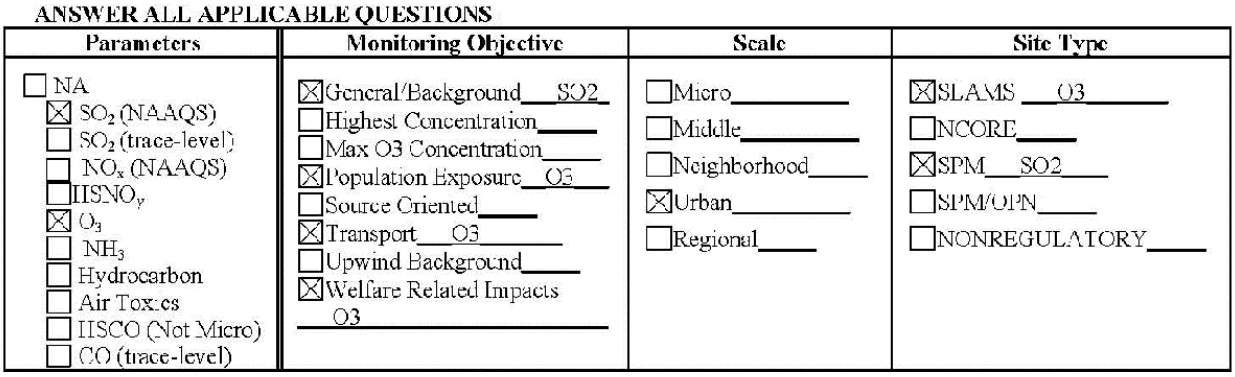
Monitoring objectives are also related to the scale of representativeness as shown in Table 1.

Table 1. Relationship between Monitoring Objectives and Scales of Representativeness

Monitoring Objective	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.

Monitoring Objective	Appropriate siting scales
4. General/background & regional transport	Urban, regional.
5. Welfare-related impacts	Urban, regional.

If a given group has more than one monitor located at the site and the monitors have different monitoring objectives, write the pollutant on the line after the checked monitoring objective as shown in Figure 8.



ANSWER ALL APPLICABLE QUESTIONS

Parameters	Monitoring Objective	Scale	Site Type
☐ NA ☒ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_x (NAAQS) ☐ NO_y ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (NOT Micro) ☐ CO (trace-level)	☒ General/Background SO2 ☐ Highest Concentration ☐ Max O3 Concentration ☒ Population Exposure O3 ☐ Source Oriented ☒ Transport O3 ☐ Upwind Background ☒ Welfare Related Impacts O3	☐ Micro ☐ Middle ☐ Neighborhood ☒ Urban ☐ Regional	☒ SLAMS O3 ☐ NCORE ☒ SPM SO2 ☐ SPM/OPN ☐ NONREGULATORY

Figure 8. Example of Different Monitoring Objectives for Two Monitors at One Site

The person completing the form should also review the monitoring objective for the monitor that is listed in AQS. This information can be obtained from Air Data (https://www.epa.gov/outdoor-air-quality-data) if the monitor has a single objective or from the AMP390 if it has multiple objectives. To obtain a copy of the AMP390, contact DENR.DAQ.Ambient-Monitoring.PPB.CO@lists.ncmail.net. If the monitoring objectives on the network review form are different from the monitoring objectives in AQS, then in the last section of the form on Page 4, check the box indicating that the monitoring objective should be changed and write the new monitoring objective on the line.

2.43.3.2.2.3 Scale

The scale of representativeness is determined by how close the monitor is located to a potential source or by the local terrain or urban development. For most monitors the scale of representativeness is determined by how close the monitor is to the roadway and how much traffic is present on the roadway. Figure 9 to Figure 11 provide the separation distances for neighborhood and urban scale oxides of nitrogen and ozone, for neighborhood scale carbon monoxide, and for micro, middle, neighborhood, and urban scale particle monitors. For sulfur dioxide the scale of representativeness is determined by how close the monitor is located to a source that emits sulfur dioxide (i.e., a coal-fired boiler or an engine powered by a sulfur containing fuel). In certain areas the terrain may reduce the scale of representativeness, for example in a mountainous area the scale of representativeness may be smaller than in an area

that is flat. Large buildings in an urban area may similarly reduce the scale of representativeness by producing barriers to the flow and circulation of air.

Minimum Separation Distance Between Roadways and Probes or Monitoring Paths for Monitoring Neighborhood_and Urban_Scale Ozone and Oxides of Nitrogen (NO, NO_2, NO_x, NO_y)

Roadway average daily traffic, vehicles per day	Minimum separation distance,[1] meters	Minimum separation distance,[1, 2] meters
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
>=110,000	250	250

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.
[2] Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Figure 9. Table E-1 from 40 CFR 58 Appendix E

Table E–2 to Appendix E of Part 58—Minimum Separation Distance Between Roadways and Probes or Monitoring Paths for Monitoring Neighborhood Scale Carbon Monoxide

Roadway average daily traffic, vehicles per day	Minimum distance[1](meters)
≤10,000	10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≥60,000	150

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

Figure 10. Distances from Roadway for Neighborhood Scale Carbon Monoxide Monitors

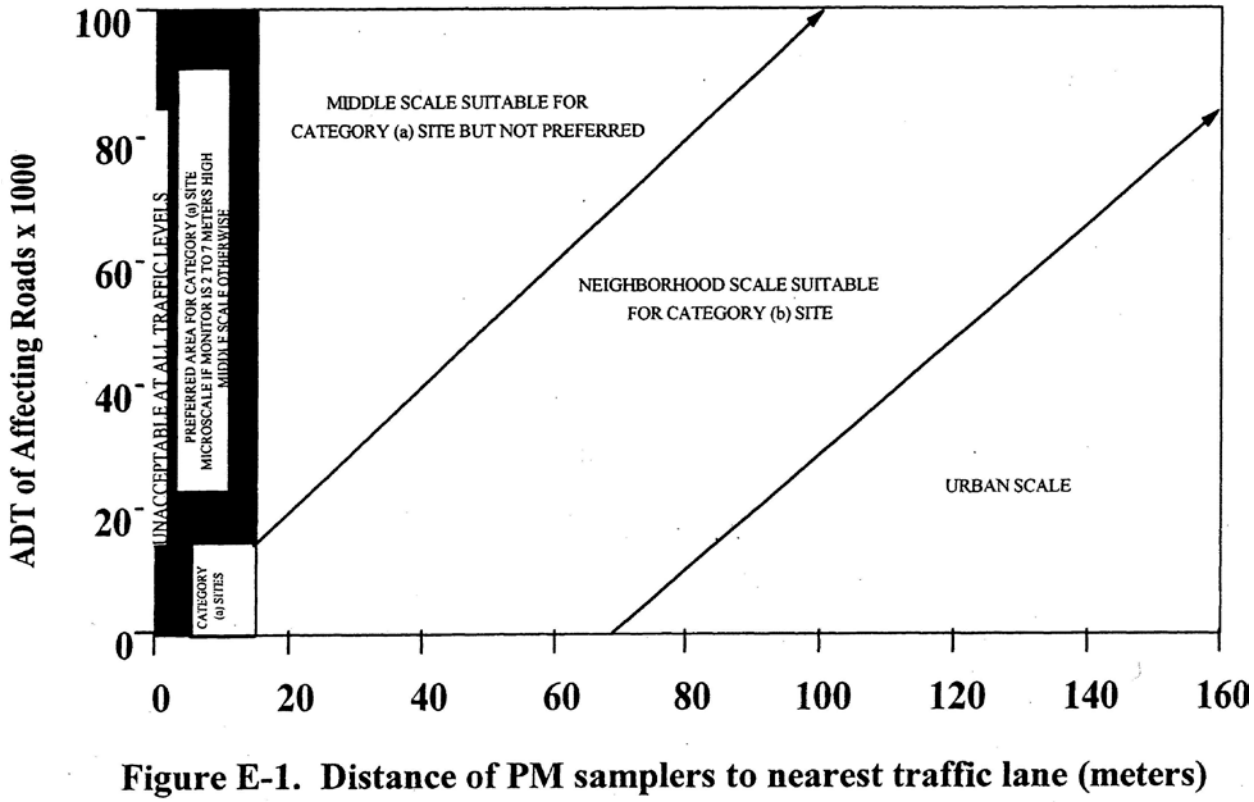


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Figure 11. Figure E-1 from 40 CFR 58 Appendix E

The person completing the form should review Table 1 to ensure that the monitoring objectives and scale of representativeness for the site are still compatible. If they are not, then the monitoring objectives may need to be changed or the site may need to be relocated.

The person completing the form should also review the scale of representativeness for the monitor that is listed in AQS. This information can be obtained from Air Data (https://www.epa.gov/outdoor-air-quality-data). If the scale of representativeness on the network review form is different from the scale of representativeness in AQS, then in the last section of the form on Page 4, check the box indicating that the scale of representativeness should be changed and write the new scale of representativeness on the line. Or if the site needs to meet a certain scale of representativeness and no longer does and needs to be relocated, check the box indicating the site should be relocated and explain why. Certain monitors are required to be a certain scale, for example, National Core (NCore) monitoring stations are required to be neighborhood scale and for comparison to the annual National Ambient Air Quality Standards (NAAQS) PM 2.5 monitoring sites are supposed to be either neighborhood (preferred) or urban scale.

2.43.3.2.2.4 Site Type

There are two basic site types. A monitor is either a state and local air monitoring station, SLAMS, or a special purpose monitor, SPM. An SPM is defined as any monitor included in an agency's monitoring network that the agency has designated as a special purpose monitor in its annual monitoring network plan and in AQS, and which the agency does not count when showing compliance with the minimum requirements of 40 CFR 58 Appendix D for the number and siting of monitors of various types. Any SPM operated by an air monitoring agency must be included in the periodic assessments and annual monitoring network plan required by 40 CFR 58.10. The plan shall include a statement of purpose for each SPM monitor and evidence that operation of each monitor meets the requirements of appendix A or an approved alternative as provided by 40 CFR 58.11(a)(2) where applicable. The monitors that were established for the purpose of meeting the sulfur dioxide data requirements rule are identified as INDUSTRIAL in AQS.

2.43.3.2.2.5 Probe Location

The probe must be located between 2 and 15 meters above ground level for all O_3 and SO_2 monitoring sites, and for neighborhood or larger spatial scale Pb, PM_{10}, $PM_{10-2.5}$, $PM_{2.5}$, NO_2, and CO sites. Middle scale $PM_{10-2.5}$ sites are required to have sampler inlets between 2 and 7 meters above ground level. Micro-scale Pb, PM_{10}, $PM_{10-2.5}$, and $PM_{2.5}$ sites are required to have sampler inlets between 2 and 7 meters above ground level. Micro-scale near-road NO_2 monitoring sites are required to have sampler inlets between 2 and 7 meters above ground level. The inlet probes for micro-scale carbon monoxide monitors that are being used to measure concentrations near roadways must be between 2 and 7 meters above ground level. Those inlet probes for micro-scale carbon monoxide monitors measuring concentrations near roadways in downtown areas or urban street canyons must be between 2.5 and 3.5 meters above ground level. The probe for gaseous pollutants must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, *etc.,* and away from dusty or dirty areas. If the probe or a significant portion of the monitoring path is located near the side of a building or wall, then it should be located on the windward side of the building relative to the prevailing wind direction during the season of highest concentration potential for the pollutant being measured. In North Carolina for ozone and fine particles, the probe should be on the southwest side of the building.

When possible, measure the distance between the inlet to the probe or monitor and the wall or roof of the building or the platform as shown in Figure 12 to Figure 14. Also measure the distance from the inlet of the probe or monitor to the ground as shown in Figure 13 and Figure 14. Check the appropriate boxes on the form and where space is available record the actual measurements. If you check “No” for any box, contact the ECB so that they can correct the problem.

Figure 12. Measuring Probe Distances

Figure 13. Measure Probe Distances

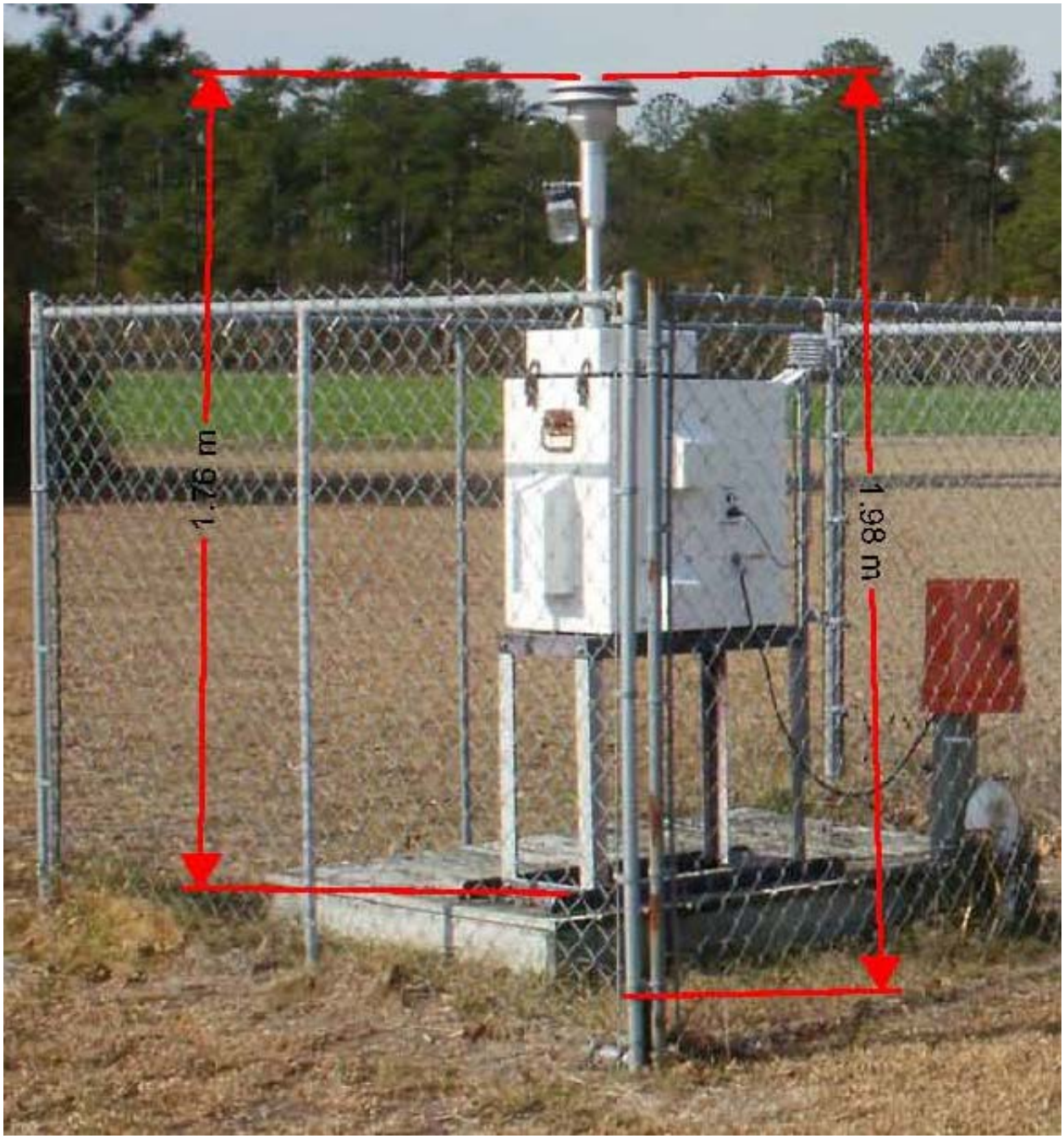


Figure 14. Measure Inlet Heights

2.43.3.2.2.6 Spacing for Collocated Particle Monitors

Sometimes two or more particle monitors are collocated at a site for various reasons. These collocated particle monitors must meet certain spacing requirements depending on the volume of air they sample and their reason for being collocated. First there is a minimum horizontal spacing required between the two inlets. To be conservative this distance should be measured so that the entire inlet opening of Monitor 1 and Monitor 2 are more than 1 meters from each other

as shown in Figure 15. For low volume samplers, such as the PM 2.5 federal reference method (FRMs), beta attenuation monitors (BAMs), SASS, and URG monitors the minimum distance between monitors must be 1 meter measured as shown in Figure 15. Measure the distance "Y" using a tape measure or other suitable device. If a space is provided for the actual distance, record the actual distance in meters on the form. Check the box indicating that the distance is greater than 1 meter for low volume monitors if that is the case.

Simple tape measure works well. 1

Telescoping poles for odd measurements. 1

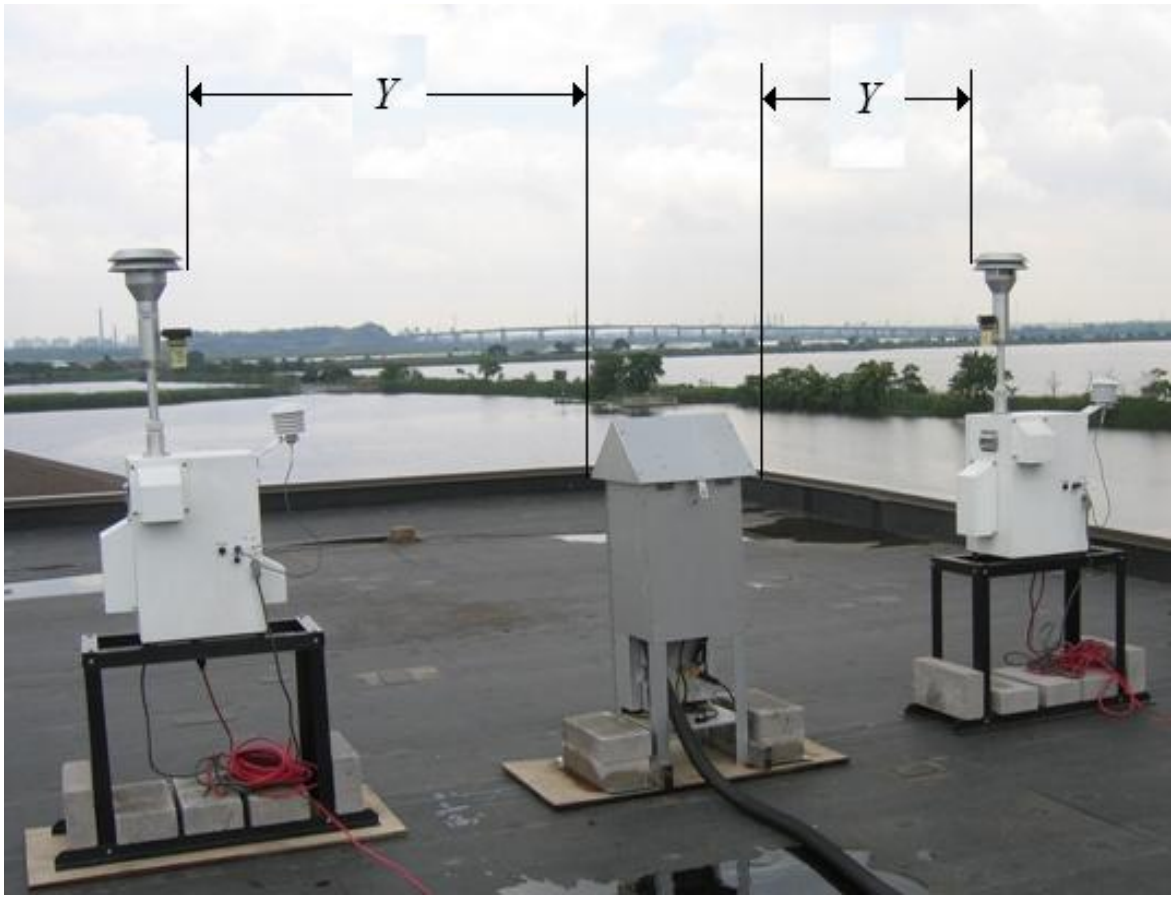


Figure 15. Measuring the Minimum Safe Spacing between Inlets

Second there is a maximum horizontal as well as vertical spacing required between both inlets. All collocated monitor inlets must be within 4 meters horizontally of one another. To be conservative this distance should be measured so that the entire inlet opening of Monitor 1 and Monitor 2 are within 4 meters of each other as shown in Figure 16. The purpose for this measurement is to ensure that the collocated monitors are measuring the same air mass. Measure the distance "X". If a space is provided for the actual distance, record the actual distance in meters on the form. Check the box indicating that the distance is less than 4 meters if that is the case. The collocated monitor inlets should also be within 1 meter of each other vertically. Measure the actual difference in height between the two monitor inlets and record the measured value in meters on the sheet. Check the box indicating that the difference in inlet heights is less than 1 meter if that is the case. When BAMs are installed in buildings instead of a shelter, this criteria will not be met and the "No" box should be checked unless the FRM is also installed on the roof.

Figure 16. Measuring the Maximum Safe Spacing between Collocated Inlets

It is critical that certain monitor pairs meet the maximum spacing requirement of less than 4 meters. These monitor pairs include the following: 1) a PM_{10} FRM and a collocated PM_{10} FRM, 2) a $PM_{2.5}$ FRM and a collocated $PM_{2.5}$ FRM, 3) a $PM_{2.5}$ BAM and a collocated $PM_{2.5}$ FRM, 4) a $PM_{2.5}$ SASS and a collocated $PM_{2.5}$ URG, and 5) a $PM_{2.5}$ FRM and a collocated PM_{10} BAM. Under ideal conditions, all of the particle monitor inlets at the site should be within 4 meters of each other, but this may not be achievable at a site with multiple particle monitors.

If the collocated particle monitors do not meet these requirements (i.e., the "No" box was checked), the reviewer should alert the appropriate people so that the deficiency at the site can be corrected (i.e., the monitors can be moved closer together or further apart or the inlets adjusted).

2.43.3.2.2.7 Location of Trees Relative to the Probe

Trees can provide surfaces for SO_2, O_3, or NO_2 adsorption or reactions, and surfaces for particle deposition. Trees can also act as obstructions in cases where they are located between the air pollutant sources or source areas and the monitoring site, and where the trees are of a sufficient height and leaf canopy density to interfere with the normal airflow around the probe or inlet. To reduce this possible interference or obstruction, the probe or inlet must be at least 10 meters or further from the drip line of trees. For the DAQ network, a distance of at least 20 meters between the probe and any tree or trees is preferred. The scavenging effect of trees is greater for O_3 than for other criteria pollutants. The reviewer must take steps to consider the impact of trees on

ozone monitoring sites and take steps to avoid this problem, such as arranging for trees to be removed or trimmed or relocating the site to a more open area. For micro-scale sites of any air pollutant, no trees or shrubs should be located between the probe and the source under investigation, such as a roadway or a stationary source.

Abney Level for tree height. 1

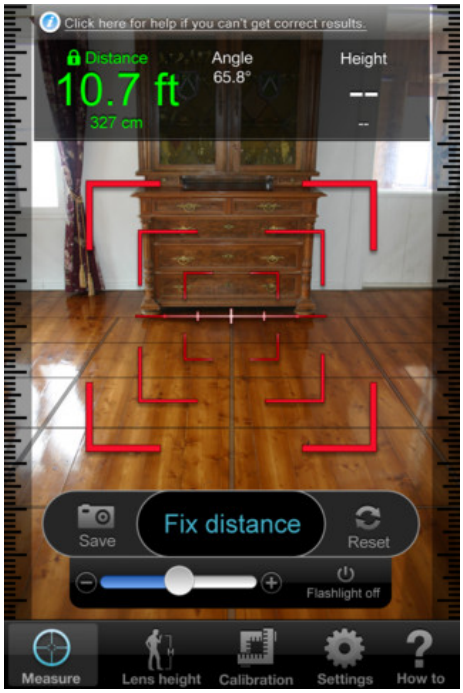
Smart phone clinometer app for trees. 1

2.43.3.2.2.8 Spacing of the Probe from Obstacles

Buildings and other obstacles may possibly scavenge SO_2, O_3, or NO_2, and can act to restrict airflow for any pollutant. An obstacle is anything that restricts air flow. A tree can be an obstacle because it has branches and leaves that restrict the flow of air but a pole is not considered to be an obstacle. To avoid interference from obstacles, the probe or inlet must have unrestricted airflow and be located away from obstacles. The distance from the obstacle to the probe or inlet must be at least twice the height that the obstacle protrudes above the probe or inlet. An exception to this requirement can be made for measurements taken in street canyons or at source-oriented sites where buildings and other structures are unavoidable.

Generally, a probe located near or along a vertical wall is undesirable because air moving along the wall may be subject to possible removal mechanisms. A probe or inlet must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. For ozone pollution, in North Carolina the season of greatest pollutant concentration potential is second quarter and the predominant wind direction during this season is southwest. For particle sampling, a minimum of 2 meters of separation from walls, parapets, and structures is required for rooftop site placement. For near-road NO_2 monitoring stations, the monitor probe shall have an unobstructed air flow, where no obstacles exist at or above the height of the monitor probe, between the monitor probe and the outside nearest edge of the traffic lanes of the target road segment.

If something (a tree, building, fence) is present at the monitoring site that can block or restrict air flow, answer "Yes" to the question "Are there any obstacles to air flow?" Identify the obstacle on the line. Measure the distance from the probe or inlet to the obstacle using an appropriate technique. Then determine the height of the obstacle. If the monitor and obstacle are on level ground, subtract the height of the probe from the height of the obstacle. Multiple this distance by two and compare the value to the distance between the monitor and the obstacle. If the distance between the obstacle and monitor is more than the result, check the "Yes" box for the question "Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe?" Otherwise check "No". Record the direction to the obstacle when standing at the probe or inlet.



Distance app for smart phone camera. 1

Lazer range finder. 1

If the obstacle and monitor are on uneven ground, measure the difference in elevation between the obstacle and the monitor as shown in Figure 17. Stand at the lower elevation and mark a spot on the obstacle or monitor at eye level. Then stand at the higher elevation and mark another spot on the obstacle or monitor at eye level. Measure the difference between the two marks. This difference will be the difference in elevation. Add or subtract this measured difference in elevation on to or from the difference in height of the monitor and obstacle. Multiple this value by two and compare the result to the distance between the monitor and the obstacle. If the distance between the obstacle and monitor is more than the result, check the "Yes" box for the question "Is distance from inlet probe to obstacle at least twice the height that the obstacle

protrudes above the probe?" Otherwise check "No". Record the direction to the obstacle when standing at the probe or inlet.

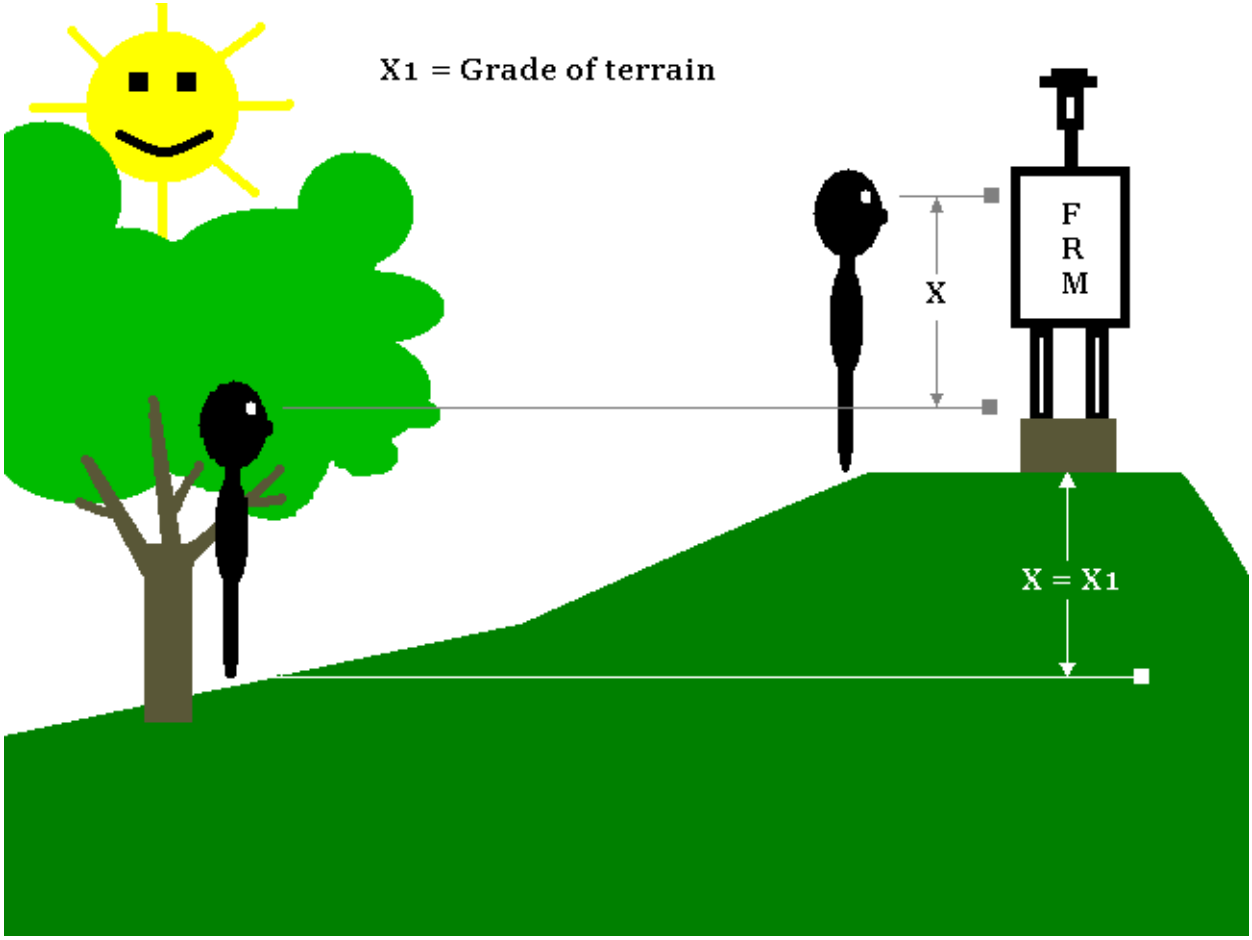


Figure 17. Measuring the difference in elevation between an obstacle and a monitor inlet or probe

2.43.3.2.2.9 Location of the Nearest Roadway Relative to the Probe

Measure the distance in meters from the probe to the nearest traffic lane and not the edge of the road (see Figure 18). Record the measured distance on the form. Stand at the monitoring probe and look in the direction of the road. Use a compass to measure the direction from the monitor to the road and select the closest direction from the dropdown list.

Figure 18. Nearest Traffic Lane versus Edge of Road

The spacing between the monitor probe and the road as well as the amount of traffic on the road often determines the scale of representativeness for a site as well as if the monitor is properly placed to achieve its monitoring objectives. Use the criteria below to evaluate ozone, carbon monoxide, particle, lead, and nitrogen dioxide and reactive oxides of nitrogen monitors to ensure that they still represent the desired scale and are achieving the desired monitoring objectives.

a. Spacing between roads and ozone monitors

In choosing a site for an O_3 analyzer, it is important to minimize destructive interferences from sources of NO, because NO readily reacts with O_3. Figure 9 provides the required minimum separation distances between a roadway and a probe for various ranges of daily roadway traffic. A sampling site having a point analyzer probe located closer to a roadway than allowed by the requirements in Figure 9 should be classified as micro-scale or middle scale, rather than neighborhood or urban scale, since the measurements from such a site would more closely represent the middle scale.

b. Spacing between roads and carbon monoxide monitors

Near-road micro-scale CO monitoring sites, including those located in downtown areas, urban street canyons, and other near-road locations such as those adjacent to roads with a high level of

traffic, are intended to provide a measurement of the influence of the immediate source on the pollution exposure on the adjacent area. Micro-scale CO monitor inlet probes in downtown areas or urban street canyon locations shall be located a minimum distance of 2 meters and a maximum distance of 10 meters from the edge of the nearest traffic lane. Micro-scale CO monitor inlet probes in downtown areas or urban street canyon locations shall be located at least 10 meters from an intersection and preferably at a midblock location. Midblock locations are preferable to intersection locations because intersections represent a much smaller portion of downtown space than do the streets between them. Pedestrian exposure is probably also greater in street canyon/corridors than at intersections. Spacing for neighborhood scale CO monitoring sites is provided in Figure 10.

c. Spacing between roads and particle and lead monitors

Because emissions associated with the operation of motor vehicles contribute to urban area particulate matter ambient levels, spacing from roadway criteria are necessary for ensuring national consistency in locating PM samplers. The intent is to locate localized hot-spot sites in areas of highest concentrations, whether it be from mobile or multiple stationary sources. If the area is primarily affected by mobile sources and the maximum concentration area(s) is judged to be a traffic corridor or street canyon location, then the monitors should be located near roadways with the highest traffic volume and at separation distances most likely to produce the highest concentrations. For the micro-scale traffic corridor site, the location must be between 5 and 15 meters from the major roadway. For the micro-scale street canyon site the location must be between 2 and 10 meters from the roadway. For the middle scale site, a range of acceptable distances from the roadway is shown in Figure 11. This figure also includes separation distances between a roadway and neighborhood or larger scale sites by default. Any inlet, 2 to 15 meters from the ground, and further back from the road than the middle scale requirements will generally be neighborhood, urban or regional scale. For example, according to Figure 11, if a PM sampler is primarily influenced by roadway emissions and that sampler is set back 10 meters from a 30,000 ADT (average daily traffic) road, the site should be classified as micro-scale, if the sampler height is between 2 and 7 meters. If the sampler height is between 7 and 15 meters, the site should be classified as middle scale. If the sample is 20 meters from the same road, it will be classified as middle scale; if 40 meters, neighborhood scale; and if 110 meters, urban scale.

d. Spacing between roads and nitrogen dioxide monitors

In evaluating locations for near-road NO_2 monitors, the monitor probe shall be as near as practicable to the outside nearest edge of the traffic lanes of the selected road segment; but shall not be located at a distance greater than 50 meters, in the horizontal, from the outside nearest edge of the traffic lanes of the selected road segment. In evaluating locations for NO_2 monitors for neighborhood and larger scale monitoring, it is important to minimize near-road influences.

Figure 9 provides the required minimum separation distances between a roadway and a probe for various ranges of daily roadway traffic. A sampling site having a point analyzer probe located closer to a roadway than allowed by the requirements in Figure 9 should be classified as micro-scale or middle scale rather than neighborhood or urban scale.

2.43.3.2.3 Procedures for Submitting Recommendations for Changes to the Site and Updating Site Pictures

This subsection discusses the procedures for submitting recommendations for changes to the site and updating site pictures.

2.43.3.2.3.1 Completing the Recommendations Section of the Form

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section. If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale or representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

2.43.3.2.3.2 Updating the Site Pictures

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a

compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc*.), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

2.43.3.2.4 Schedule for Completing the Annual Network Review Form

The regional operator completing the form should complete the site review by October 31

2.43.3.3 Procedures for Regional Review and Submittal of the Completed Forms

This subsection discusses the procedures for reviewing the completed review form and submitting the form to the Central Office.

2.43.3.3.1 Reviewing the Completed Form

This subsection discusses the procedures for the regional office review of the form. The first task of the reviewer of the completed form is to check the form to see if it is completely filled out, i.e., all of the boxes are checked and blanks filled out for site information and recommendations and that all of the monitors are listed on the form and their appropriate sections are completely filled out. If not, the reviewer should return the form to the person who completed it and ask them to obtain the missing information. The second task is to make sure that the information on the form makes sense and is understandable. If not, the reviewer should ask the person completing the form to clarify or correct the confusing information if it is incorrect. Third, the reviewer should look at the recommendation section of the form and confirm that the information in the form supports the recommendations.

2.43.3.3.2 Submitting the Completed Form to the Central Office

After the regional office review is completed, the annual network review form should be saved as a pdf file and transferred to the central office using the group drive.

2.43.3.3.3 Schedule for Reviewing and Submitting the Completed Form to the Central Office

The regional review of the completed form should occur during November and December so that the form is received in the central office by the end of the calendar year.

2.43.4 References

1. Appendix E to Part 58—Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring (available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=94da0c2b9702b057d2417c73e9483171&mc=true&node=ap40.6.58_161.e&rgn=div9)

2. Appendix A to Part 58—Quality Assurance Requirements for SLAMS, SPMs and PSD Air Monitoring (available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=94da0c2b9702b057d2417c73e9483171&mc=true&node=ap40.6.58_161.a&rgn=div9)

3. Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring (available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=94da0c2b9702b057d2417c73e9483171&mc=true&node=ap40.6.58_161.d&rgn=div9)

4. Part 58—Ambient Air Quality Surveillance (available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr58_main_02.tpl)

Site Review Form Calendar Year 2017

Site Information

Region_____	**Site Name** ____	**AQS Site # 37-**____-____
Street Address-____		**City** ____
Urban Area Choose an item.	**Core-based Statistical Area** Choose an item.	
Enter Exact		**Method of Measuring**
Longitude ____	**Latitude** ____	
In Decimal Degrees	In Decimal Degrees	___ **Explanation:** ____
Elevation Above/below Mean Sea Level (in meters)		____

Name of nearest road to inlet probe _____ ADT _____ Year latest available _____

Comments: _____

Distance of site to nearest major road (m) _____ Direction from site to nearest major road ___

Name of nearest major road _____ ADT _____ Year Comments: _____

Site located near electrical substation/high voltage power lines? Yes ☐ No ☐

Distance of site to nearest railroad track (m) _____ Direction to RR ___ ☐NA

Distance between site and drip line of water tower (m) _____ Direction from site to water tower _____ ☐**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	**Monitoring Objective**	**Scale**	**Monitor Type**
☐ NA ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ O_3 ☐ Hydrocarbon ☐ Air Toxics -VOC ☐ Air Toxics - Aldehydes ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood _____ ☐ Urban_____ ☐ Regional_____	☐ SLAMS _____ ☐ SPM _____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☐ No ☐ Give actual measured height from ground (meters) _____

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☐ No☐

Actual measured distance from outer edge of probe to supporting structure (meters) _____

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☐ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐

*Distance from probe to tree (m) _____ Direction from probe to tree ___ *Height of tree (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☐

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) _____ Direction from probe to nearest traffic lane ___

Site Review Form Calendar Year 2017

Instructions:

Address: Sometimes local addresses change. Confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location.

Urban Area: If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. Otherwise select "Not in an Urban Area".

Core-Based Statistical Area (CBSA): If the monitor is located within a county that is part of a metropolitan statistical area (MSA) or a micropolitan statistical area (MiSA), then it is located within a core-based statistical area. If the monitoring station is located in a county included in a MSA or MiSA, select the appropriate CBSA from the list. Otherwise select "None".

Longitude and Latitude: The longitude and latitude should be entered in decimal degrees. Use a conversion program, such as https://www.fcc.gov/media/radio/dms-decimal, to convert to decimal degrees.

Road Information: For the nearest road to the inlet probe, list whatever roadway that carries vehicles that is closest to the probe, whether or not it is a named or public road and even if the road has very little traffic. Use the comments space if necessary to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site as well as the AADT if it is available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site as well as the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at https://connect.ncdot.gov/resources/State-Mapping/Pages/Traffic-Volume-Maps.aspx. For AADT values for local roadways contact the appropriate local governments.

Any Sources of Potential Bias: Use this space to record any information about the site that is not requested elsewhere. Especially note any changes to the site that occurred near the site in the past year, such as road construction, building construction, new businesses, businesses closing, or changes in traffic patterns, crops or other agricultural activities.

Monitoring Objective: Why is this monitor here? What purpose does it serve? Monitoring objectives include: (a) Highest Concentration, which determine the highest concentrations of pollutant expected to occur in the area covered by the network; (b) Population Exposure, which measure typical concentrations of pollutant in areas of high population density; (c) Source Oriented, which determine the impact of significant sources or source categories of pollutant or precursors on air quality; (d) General/Background, which determine general background pollutant concentrations; (e) Transport, which determine the extent of regional pollutant transport among populated areas and in support of secondary standards; and (f) Welfare Related Impacts, which measure pollutant impacts on visibility, vegetation damage, or other welfare-based impacts. Sites established with the objective of studying ozone and its precursors may also be Maximum Ozone Concentration or Upwind Background sites. A monitor may have multiple objectives.

Scale: The scale of representativeness is determined by how close the monitor is located to a potential source or by the local terrain or urban development. For most monitors the scale of representativeness is determined by how close the monitor is to the roadway and how much traffic is present on the roadway.

Minimum Separation Distance Between Roadways and Probes or Monitoring Paths for Monitoring Neighborhood_and Urban_Scale Ozone and Oxides of Nitrogen (NO, NO_2, NO_x, NO_y)

Roadway average daily traffic, vehicles per day	Minimum separation distance,[1] meters	Minimum separation distance,[1, 2] meters
≤ 1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
>=110,000	250	250

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.
[2] Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM10 Lead (PB) ☐ PM2.5 Cont. (BAM) ☐ PM2.5 Spec. (SASS) ☐ PM2.5 Spec. (URG) ☐ PM2.5 Cont. Nitrate ☐ PM2.5 Cont. Sulfate ☐ PM2.5 Aethalometer	☐ General/Background _____ ☐ Highest Concentration _____ ☐ Population Exposure _____ ☐ Source Oriented _____ ☐ Transport _____ ☐ Welfare Related Impacts _____	☐ Micro _____ ☐ Middle _____ ☐ Neighborhood _____ ☐ Urban _____ ☐ Regional _____	☐ SLAMS _____ ☐ SPM _____ **Monitor Network Affiliation** ☐ NCORE _____ ☐ SUPPLEMENTAL SPECIATION_ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☐ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) _____

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) _____ Yes ☐ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is an URG 3000 monitor collocated with a SASS monitor at the site? *Yes ☐ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated speciation samplers inlets (X) within 1 to 4 m of each other? Yes ☐ No ☐
Give actual (meters) _____
* Are collocated speciation sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters)_____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 1 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) _____ Direction from probe to tree ___ *Height of tree (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☐
*Identify obstacle ____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No☐

Distance of probe to nearest traffic lane (m) _____ Direction from probe to nearest traffic lane ___

Site Review Form Calendar Year 2017

Instructions (continued):

Table E–2 to Appendix E of Part 58—Minimum Separation Distance Between Roadways and Probes or Monitoring Paths for Monitoring Neighborhood Scale Carbon Monoxide

Roadway average daily traffic, vehicles per day	Minimum distance[1] (meters)
≤10,000	10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≥60,000	150

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

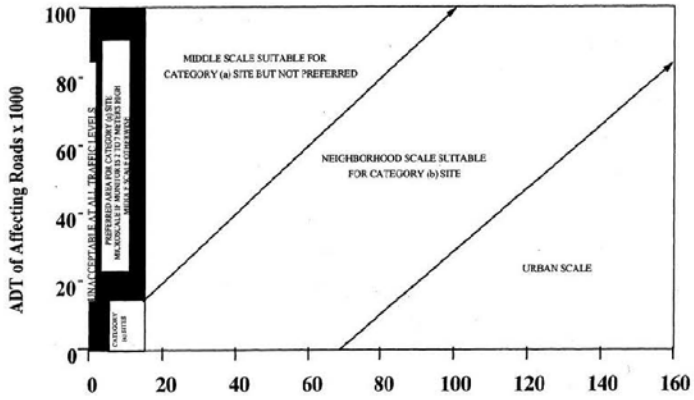


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Probe Location: The probe must be located between 2 and 15 meters above ground level for all O_3 monitoring sites. Gaseous pollutant probes must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, *etc.*, and away from dusty or dirty areas. If the probe is located near the side of a building or wall, then it should be located on the southwest side of the building.

Instructions for Measuring Distances between Inlets of Collocated Monitors

Diagram provided by Paul Chappin 8/4/2015

X is the distance allowed between collocated monitors. All collocated monitor inlets must be within 4 meters of one another. To be conservative, this distance should be measured so that the entire inlet opening of Monitor 1 and Monitor 2 are within 4 meters of each other, i.e., X = ~1.5 to 4 meters. The purpose for this measurement is to ensure that the collocated monitors are measuring the same air mass.

Y is the minimum distance between collocated monitors. The minimum distance a low volume monitor must be from another low volume monitor is 1 meter. The minimum distance any monitor must be from a high volume monitor (Wedding PM 10 or TSP) is 2 meters. To be conservative this distance should be measured so that the entire inlet opening of Monitor 1 and Monitor 2 are more than either 1 meter or 2 meters from each other, i.e., Y = 1 or 2 meters. The purpose of this measurement is to ensure that neither monitor is being impacted by the turbulence created by the adjacent monitor, i.e., that both monitors are sampling air masses that are not impacted by nearby monitors.

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ NO_y (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood _____ ☐ Urban_____ ☐ Regional_____	☐ SLAMS _____ ☐ SPM _____ **Monitor Network Affiliation** ☐ NCORE _____

Probe inlet height (from ground) 10-15 m? Yes ☐ No ☐
Actual measured distance from probe inlet to ground (meters) _____

Distance of outer edge of probe inlet from horizontal and/or vertical supporting structure > 1 m? Yes ☐ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) _____

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☐ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) _____ Direction from probe to tree ___ *Height of tree (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☐
*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) _____ Direction from probe to nearest traffic lane ___

RECOMMENDATIONS:
1) Maintain current site status? Yes ☐ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐
Comments:

Date of Last Site Pictures _____ New Pictures Submitted? Yes ☐ No ☐
Reviewer _____Date _____
Ambient Monitoring Coordinator _____Date _____

Site Review Form Calendar Year 2017

Instructions (continued):

Trees: The probe or inlet must be at least 10 meters or further from the drip line of trees. A distance of at least 20 meters between the probe and any tree or trees is preferred.

Obstacles: An obstacle is anything that restricts air flow. A tree can be an obstacle because it has branches and leaves that restrict the flow of air but a pole is not considered to be an obstacle. To avoid interference from obstacles, the probe or inlet must have unrestricted airflow and be located away from obstacles. The distance from the obstacle to the probe or inlet must be at least twice the height that the obstacle protrudes above the probe, inlet, or monitoring path.

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.