Air Quality
ENVIRONMENTAL QUALITY

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2016-2017 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Metropolitan Statistical Area

G. The Wilmington Monitoring Region

July 1, 2016

Nothing Compares℠

State of North Carolina | Department of Environmental Quality | Division of Air Quality
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G. The Wilmington Monitoring Region

The Wilmington monitoring region, shown in Figure G1, has four parts: (1) the Wilmington metropolitan statistical area, MSA (New Hanover and Pender Counties), (2) the North Carolina part of the Myrtle Beach-Conway-North Myrtle Beach MSA (Brunswick County) (3) the Jacksonville MSA (Onslow County) and (4) the non-MSA portion of this monitoring region (Carteret, Columbus and Duplin Counties).

Figure G1. The Wilmington monitoring region
The red dots show the approximate locations of the North Carolina Division of Air Quality monitoring sites in this region.

(1) The Wilmington MSA

The Wilmington MSA consists of two counties: New Hanover and Pender. The City of Wilmington is the major metropolitan area. The North Carolina Division of Air Quality, DAQ, currently operates two criteria pollutant monitoring sites and one urban air toxics monitoring site in this MSA. The criteria pollutant monitoring sites are the Castle Hayne ozone and particle and the New Hanover sulfur dioxide monitoring sites. The urban air toxics site is at the Battleship.

Figure G2. Castle Hayne ozone and particle monitoring site, 37-129-0002

At the **Castle Hayne** site, 37-129-0002, the DAQ operates an ozone monitor, a one-in-three-day fine particle monitor, a continuous fine particle monitor and a rotating PM10 monitor that operates every third year. Figure G2 shows the site. Table G1 summarizes monitoring information for the site. Figure G3 through Figure G10 provide views looking north, northeast, east, southeast, south, southwest, west and northwest. The DAQ completed one beta attenuation monitor, BAM, study in Dec. 2011. At that time, the BAM was shut down and the one-in-three-day fine particle federal reference method, FRM, monitor became a state and local air monitoring station, SLAMS. In 2012, the DAQ installed another special purpose non-regulatory BAM and began a second BAM study at the site on Oct. 23, 2012.

Table G1. Site Table for Castle Hayne

Site Name:	Castle Hayne			**AQS Site Identification Number:**	37-129-0002
Location:	6028 Holly Shelter Road, Castle Hayne, North Carolina				
MSA:	Wilmington, NC			**MSA #:**	9200
Latitude	34.364167	**Longitude**	-77.838611	**Datum:**	WGS84
Elevation	12 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry (047)	EQOA-0880-047	1-Hour	Apr. 1 to Oct. 31
PM 2.5 Local Conditions	R & P Model 2025 PM2.5 Sequential w/WINS – gravimetric analysis (118)	RFPS-0498-118	24-Hour	Every Third Day, Year Round
PM10 Total 0-10 µm STP	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	12 months, Every third year
Acceptable PM2.5 AQI & Speciation	Met One BAM w/VSCC (733)	EQPM-0308-170	1-Hour	Year Round

Date Monitor Established:	Ozone	Jan. 1, 1979
Date Monitor Established:	PM 2.5 Local Conditions (federal reference method)	July 1, 2002
Date Monitor Established	PM10 Total 0-10 µm STP	Aug. 1, 2016
Date Monitor Established:	Acceptable PM2.5 AQI & Speciation	Oct. 23, 2014

Nearest Road:	Holly Shelter Road	**Traffic Count:**	2800	**Year of Count:**	2013

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	60	North northwest	SLAMS	Real-time AQI reporting. Compliance w/NAAQS.
PM 2.5 Local Conditions, FRM	60	North northwest	SLAMS	AQI reporting. Compliance w/NAAQS.
PM10 Total 0-10 µm STP	60	North northwest	SPM	Industrial expansion monitoring for PSD modeling
Acceptable PM2.5 AQI & Speciation	60	North northwest	SLAMS	Real-time AQI reporting.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	Population exposure	Urban	Yes	None
PM 2.5 Local Conditions, FRM	Population exposure	Neighborhood	Yes	None
PM10 Total 0-10 µm STP	General/Background	Neighborhood	Yes	Starts 8/1/2016
Acceptable PM2.5 AQI & Speciation	Population exposure	Neighborhood	No	None

	Meets Part 58 Requirements:			
Parameter Name	**Appendix A**	**Appendix C**	**Appendix D**	**Appendix E**
Ozone	Yes	Yes	Yes	Yes
PM 2.5 Local Conditions, FRM	Yes	Yes	No requirements	Yes
PM10 Total 0-10 µm STP	Yes	Yes	No requirements	Yes
Acceptable PM2.5 AQI & Speciation	Yes	Yes	No requirements	Yes

Parameter Name	**Probe Height (m)**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3.8	1.0 meter	>20 meters	None
PM 2.5 Local Conditions, FRM	5.0	2.03 meters	>20 meters	None
PM10 Total 0-10 µm STP	5.0	2.03 meters	>20 meters	None
Acceptable PM2.5 AQI & Speciation	5.0	2.03 meters	>20 meters	None

Figure G3 Looking north from the Castle Hayne site

Figure G6. Looking northeast from the Castle Hayne site

Figure G4. Looking northwest from the Castle Hayne site

Figure G7. Looking east from the Castle Hayne site

Figure G5. Looking west from the Castle Hayne site

Figure G8. Looking southeast from the Castle Hayne site

Figure G9. Looking southwest from the Castle Hayne site

Figure G10. Looking south from the Castle Hayne site

Current comparisons for the BAM and FRM monitors are available from the United States Environmental Protection Agency, EPA, at http://www.epa.gov/airquality/airdata/ad_rep_frmvfem.html. On Mar. 12, 2015, the FRM was moved to the roof of the building and the BAM was installed inside the building to help stabilize temperature and relative humidity to see if the two monitors would agree better under these conditions. The data comparison for Mar. 19, 2015, through Apr. 6, 2016, is shown in Figure G11. Since the BAM was moved into the shelter, the BAM and FRM appear to be comparing better at this site. As a result of this improved agreement, the DAQ will make the BAM a SLAMS and the primary monitor at this site on July 1, 2016. On July 1, 2016, the DAQ will also make the FRM the collocated quality assurance monitor for the DAQ BAM 1020 monitoring network.

The DAQ requires PM_{10} data in the coastal area for Prevention of Significant Deterioration, PSD, modeling for industrial expansion. Because the DAQ shut down the PM_{10} monitoring site in Jacksonville on Dec. 31, 2007, the DAQ began manual one-in-six day PM_{10} monitoring at the Castle Hayne site in February 2008 to provide the necessary PM_{10} data for PSD modeling for the coastal area. However, a wildfire next to the site forced the DAQ to shut down the monitor on Mar. 31, 2008. After the wildfire was extinguished, the DAQ decided not to resume PM_{10} monitoring at Castle Hayne because of the pending construction of the Titan Cement Facility across the street from the Castle Hayne site. Modeling results indicate that Titan could contribute over 10 percent of the NAAQS to the PM_{10} concentrations measured at Castle Hayne, making Castle Hayne an unsuitable site for obtaining data to use for PSD modeling. As a result, the PM_{10} monitor was located at Kenansville in second quarter 2009. At the end of 2010, the DAQ began operating the monitor on a one-in-three-year schedule and made the site one of six rotating background PM_{10} sites for the state. The Kenansville site collected PM_{10} data from August 2013 through July 2014. In 2016 Titan announced that they would not be building a cement facility in Castle Hayne. Since the Titan facility is no longer under consideration, DAQ plans to collect PM_{10} data at Castle Hayne from August 2016 to July 2017.

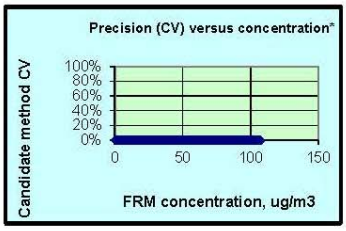
Summary - Candidate ARM Comparability

Applicant:	NC DEQ DAQ
Candidate method:	BAM 1020 with VSCC inside a building with FRM on roof - Class
Test site:	Castle Hayne, NC - (Site location 37-129-0002)

Data sets	Number
Valid data sets available:	107
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	OK
Additional data sets needed:	--

(Including 8 data sets excluded because FRM conc. < 3.)

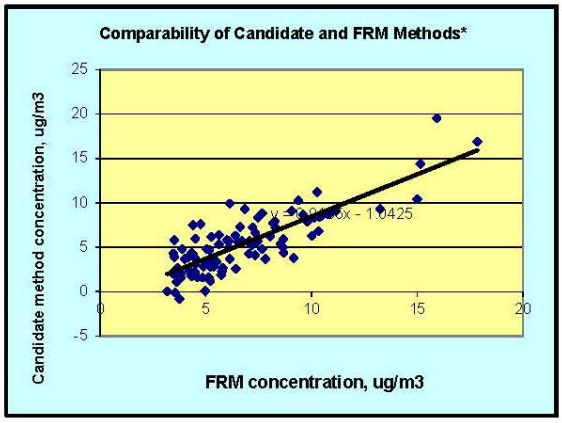
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	6.4	4.9				
Maximum:	17.8	19.5				
Minimum:	2.1	-2.2				
Candidate / FRM Ratio:		77.2%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						

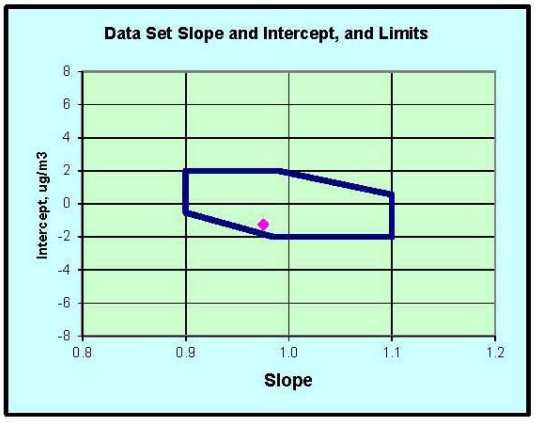


Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.975	-1.272	0.83068
Limits for Class III	Upper:	1.100	2.000	
	Lower:	0.900	-1.840	0.94521
Test Results (Pass/Fail):		PASS	PASS	FAIL

[1] Multiplicative bias [2] Additive bias

Note: Precision statistics can be calculated only for data sets containing multiple FRM or multiple candidate ARM measurements.





***If chart does not plot correctly, go to the Regression sheet and click on the ▼ in the Validity column and then on "ok." If new data are added, click "all" then "ok" to include the new data.**

Figure G11. Comparison of BAM and FRM results at Castle Hayne after moving the BAM inside the building

When the Office of Management and Budget redefined the Wilmington MSA in February 2013, the estimated population of the Wilmington MSA dropped below 350,000 and was estimated to be at 277, 969 in July 2015. Thus, only one ozone monitor is required for the MSA if the ozone design value is above 85 percent of the NAAQS. The design value for 2013-2015 for Wilmington is at 87 percent of the standard so no additional ozone monitors are needed in the MSA at this time.

At the **New Hanover** site, 37-129-0006, the NC-DAQ operates a sulfur dioxide monitor. At the beginning of 2012, the shelter was moved approximately 200 feet across the field to maintain access to the site after the host facility closed. The site is shown in Figure G12. Views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure G13 through Figure G20.

Figure G12. New Hanover sulfur dioxide monitoring site, 37-129-0006

Figure G13. Looking north from the New Hanover site

Figure G15. New Hanover site looking northeast

Figure G14. New Hanover site looking northwest

Figure G16. New Hanover site looking east

Figure G17. Looking west from the New Hanover site

Figure G19. New Hanover site looking southeast

Figure G18. New Hanover site looking southwest

Figure G20. Looking south from the New Hanover site

The New Hanover site was established in 1994 to replace the Acme-Delco site in Columbus County, which was shut down in 1995. The Acme-Delco site was located about 15 miles west of the New Hanover site. The site was moved because industrial emissions had decreased in Columbus County and the measured sulfur dioxide concentrations had dropped over the previous 10 years. During the time when both monitors operated, the New Hanover site consistently measured higher concentrations of sulfur dioxide. On Jan. 1, 2013, the New Hanover site became the required population weighted emission inventory, PWEI, site for the Wilmington MSA.

Figure G21. The Battleship urban air toxics monitoring site

At the **Battleship** site, 37-129-0010, DAQ operates a year round air toxics volatile organic compound sampler. Samples are collected in stainless steel canisters and sent to the Laboratory Analysis Branch where they are analyzed for 68 compounds using the Compendium Method for Toxic Organics 15. Figure G21 through Figure G29 show the site and views looking north, northeast, east, southeast, south, southwest, west and northwest.

Figure G22. Looking north from the Battleship site

Figure G24. Looking northeast from the Battleship site

Figure G23. Looking northwest from the Battleship site

Figure G25. Looking east from the Battleship site

Figure G26. Looking west from the Battleship site

Figure G28. Looking southeast from the Battleship site

Figure G27. Looking southwest from the Battleship site

Figure G29. Looking south from the Battleship site

In 2008, EPA expanded the **lead monitoring** network to support the lower lead NAAQS of 0.15 micrograms per cubic meter. The 2010 changes to the lead monitoring requirements focuses monitoring efforts on fence line monitoring located at facilities that emit 0.5 tons or more of lead per year and at National Core, NCore, monitoring sites. These changes to the lead monitoring network requirements did not require lead monitoring in the Wilmington MSA. The MSA has no NCore monitoring sites and no permitted facilities that emit more than 0.5 tons per year of lead.[1]

Changes to **the ozone monitoring** requirements will extend the ozone season a month, starting on Mar. 1 instead of Apr. 1 in 2017.

The Wilmington MSA is not required by the 2010 **nitrogen dioxide monitoring** rule to have nitrogen dioxide monitors. It is too small to require area-wide monitors or near roadway monitoring. This MSA will also not be required to do carbon monoxide monitoring as a result of the changes to the **carbon monoxide monitoring** requirements because the population is less than one million.

[1] Data obtained from the NC-DAQ emission inventory database.

The Wilmington MSA has not been required by the 2010 **sulfur dioxide monitoring** rule to add additional sulfur dioxide monitors. The existing sulfur dioxide monitor at the New Hanover site meets the PWEI monitoring requirements for the MSA.

(2) The Myrtle Beach-Conway-North Myrtle Beach MSA

The Myrtle Beach-Conway-North Myrtle Beach MSA consists of Brunswick County in North Carolina and Horry County in South Carolina. The principal cities are Myrtle Beach, Conway and North Myrtle Beach. The MSA has an estimated population as of July 2015 of 431,964 people, which requires it to have an ozone monitor.[2] The DAQ does not operate any monitoring sites in this MSA. As shown in Figure G30, the South Carolina Department of Health and Environmental Control, DHEC, started operating the Coastal Carolina ozone monitoring station on May 1, 2015. At this time the DAQ and DHEC have signed an official agreement regarding the monitoring responsibilities for the MSA.[3]

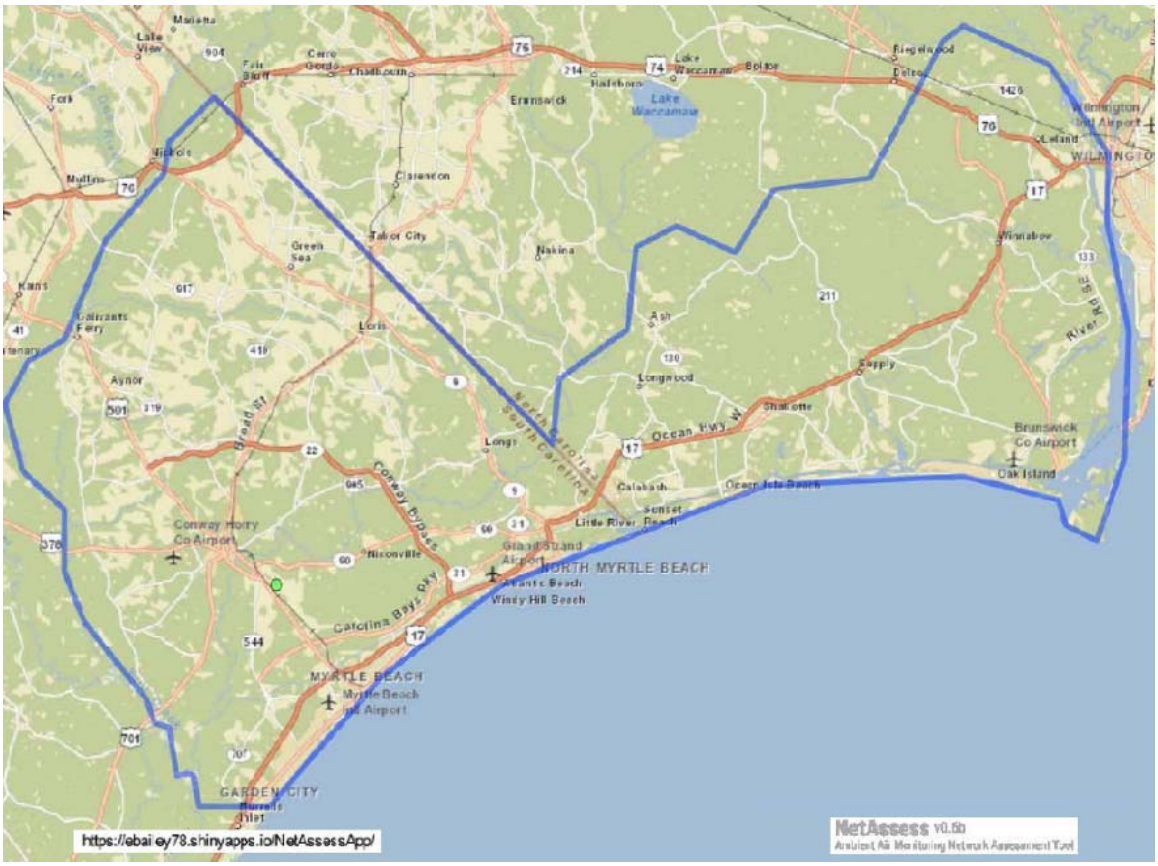


Figure G30. Monitoring sites in the Myrtle Beach-Conway-North Myrtle Beach MSA
The green dot shows the location of the Coastal Carolina ozone monitoring station.

[2] Annual Estimates of the Resident Population: Apr. 1, 2010 to July 1, 2015, U.S. Census Bureau, Population Division, Released Mar. 24, 2016, available on the world wide web at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

[3] Memorandum of Agreement (MOA) on Criteria Monitoring Between SCDHEC and NCDENR DAQ, July 1, 2015, Available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=6786.

Changes to the **lead monitoring network** requirements in 2010 did not result in additional monitoring in this MSA. Changes to the **ozone monitoring requirements** did not require additional monitoring in the Myrtle Beach-Conway-North Myrtle Beach MSA other than the ozone monitor that is already required and the extension of the ozone season by one month.

This MSA is also not required to do nitrogen dioxide monitoring by the 2010 **nitrogen dioxide monitoring** requirements. It is too small to require area-wide monitors or near roadway monitoring. The Myrtle Beach-Conway-North Myrtle Beach MSA will be required to monitor for sulfur dioxide by the 2010 **sulfur dioxide monitoring** requirements because there is a facility in Brunswick County that will choose to monitor for sulfur dioxide rather than use modeling to demonstrate attainment under the data requirements rule. More information on this facility and monitor is provided in Volume 1, Section 4. This MSA will not be required to monitor for carbon monoxide by the **changes to the carbon monoxide monitoring requirements** because the population is less than one million.

(3) The Jacksonville MSA

The Jacksonville MSA consists of Onslow County. The principal city is Jacksonville. The DAQ does not operate any monitoring stations in the Jacksonville MSA. The Jacksonville particle-monitoring site was shut down on Dec. 31, 2007, because the measured concentrations were less than 80 percent of the NAAQS.

Changes to the **lead monitoring network** requirements in 2010 did not result in adding lead monitors to the MSA. Jacksonville does not have an NCore monitoring site. It had a permitted facility that emitted 0.5 tons or more per year of lead in 2009. However, lead emissions at Camp Lejeune in 2010 were below the 0.5-ton threshold. The EPA concurred that actual emissions were less than 0.5 tons and did not require monitoring at the facility fence line. The lead emissions in 2014 are still below 0.5 tons.[4]

Changes to the **ozone monitoring requirements** did not result in additional monitoring in the Jacksonville MSA. Its population is above the threshold for requiring population exposure monitoring in urban areas but monitoring is not required because it does not have an ozone design value. Currently, the NC-DAQ does not monitor for ozone in Jacksonville because the ozone levels measured by the Castle Hayne monitor in New Hanover County indicate that the ozone concentrations on the coast are at 87 percent of the 2015 standard of 70 parts per billion. As shown in Figure G31, models consistently show low ozone levels in the Jacksonville MSA and lower probabilities of exceeding the standard in Jacksonville than at Castle Hayne.

[4] 2014 Toxic Release Inventory, released March 2016, available on the worldwide web at https://iaspub.epa.gov/triexplorer/tri_release.chemical.

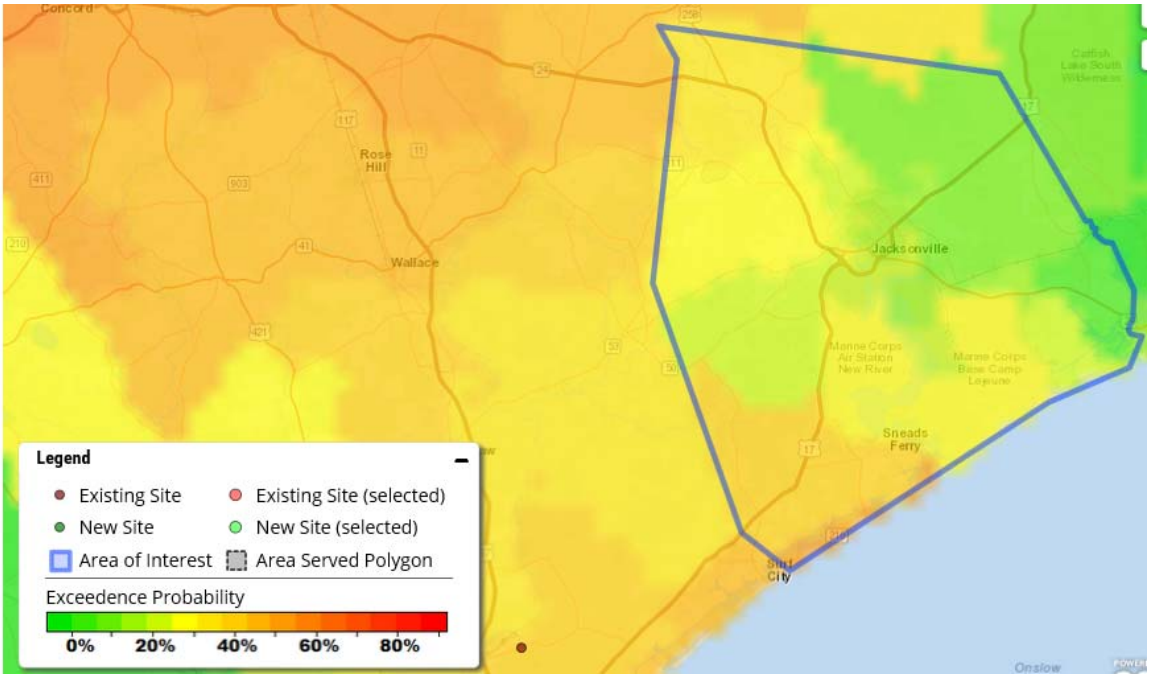


Figure G31. Probability of ozone exceeding the 2015 standard at least once in the Jacksonville MSA

The Jacksonville MSA did not add nitrogen dioxide monitors as a result of the 2010 **nitrogen dioxide monitoring** requirements. It is too small to require area-wide monitors or near roadway monitoring. The Jacksonville MSA will also not need to add monitors to comply with the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide in the MSA and the population is not large enough to require a PWEI monitor. This MSA is also not required to do carbon monoxide monitoring by the changes to the **carbon monoxide monitoring** requirements because the population is less than one million people.

(4) The Non-MSA Portion of the Wilmington Monitoring Region

The non-MSA portion of the Wilmington monitoring region consists of three counties (Carteret, Columbus and Duplin). This area has no MSAs. The NC-DAQ currently operates one monitoring site here and the EPA operates a Clean Air Status and Trends Network, CASTNET, site in Beaufort (Carteret County). The CASTNET sites are discussed in the CASTNET network plan available at https://www.epa.gov/sites/production/files/2016-05/documents/castnet_plan_2016_draft.pdf. The one DAQ site is discussed further here. The NC-DAQ site is a Mercury Deposition Network (MDN) site at Waccamaw State Park. The Kenansville particle monitoring station was shut down Dec. 31, 2015.

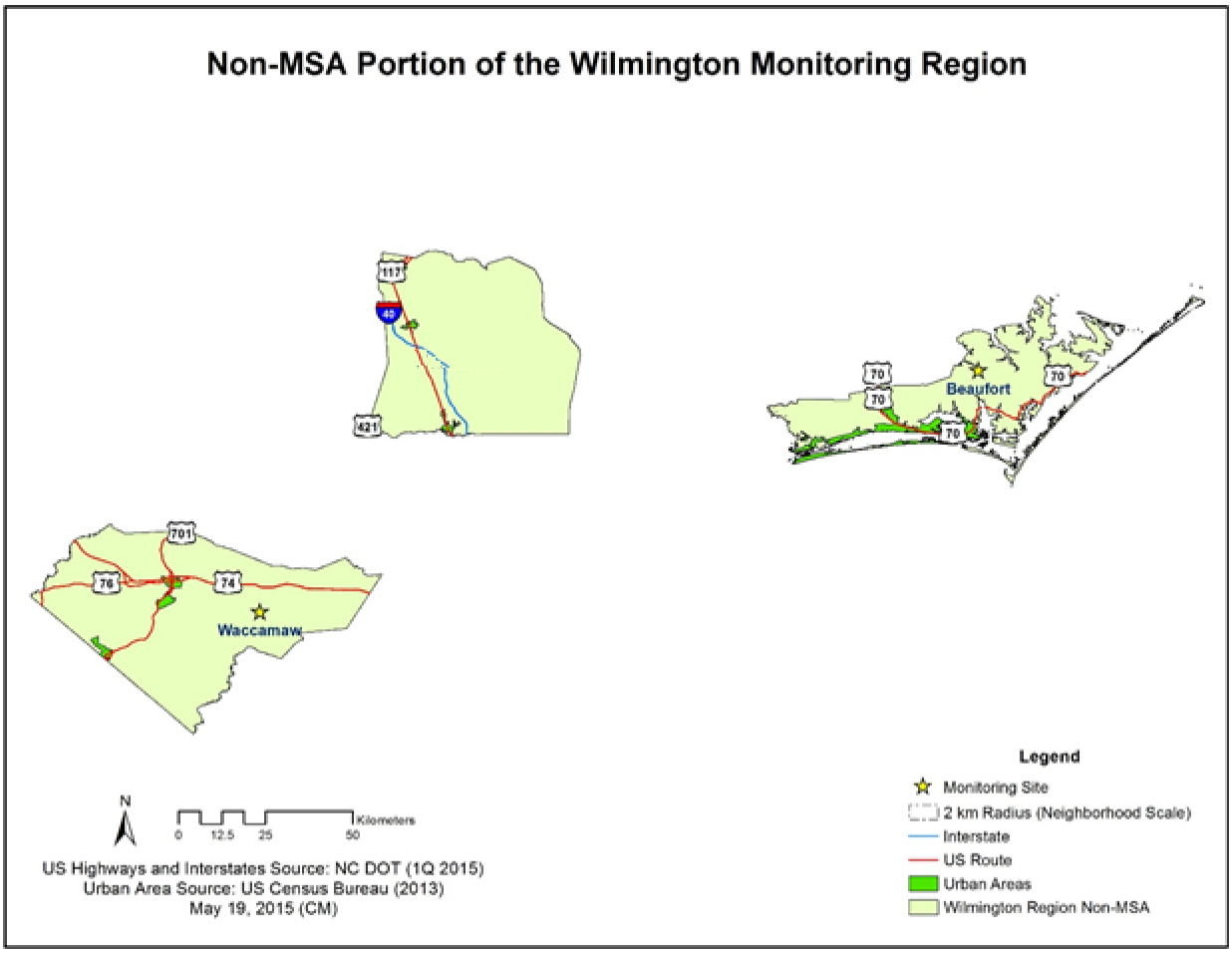


Figure G32. Monitoring site locations

At the **Waccamaw** MDN site in Columbus County, the DAQ operates a weekly mercury deposition monitor to measure total mercury, Hg, concentration and deposition in precipitation. The DAQ upgraded the site to more modern equipment in 2014. A picture of the site as well as views looking north, northeast, east, southeast, south, west and northwest are provided in Figure G33 through Figure G41.

Figure G33. The Waccamaw (NC08) MDN site

Figure G34. Looking north from the Waccamaw MDN site

Figure G35. Looking northeast from the Waccamaw MDN site

Figure G36. Looking northwest from the Waccamaw MDN site

Figure G39. Looking east from the Waccamaw MDN site

Figure G37. Looking west from the Waccamaw MDN site

Figure G40. Looking southeast from the Waccamaw MDN site

Figure G38. Looking southwest from the Waccamaw MDN site

Figure G41. Looking south from the Waccamaw MDN site

The 2010 **lead monitoring** requirements did not result in lead monitoring in this area because there are no NCore monitoring stations or permitted facilities that emit 0.5 tons or more of lead per year.[5] The new **ozone monitoring** requirements did not require additional monitoring in this area. There is no MSA here so population exposure monitoring requirements for urban areas do not apply. The 2010 **nitrogen dioxide** monitoring requirements also did not add monitors to this area. It is too small to require area-wide monitors or near road monitoring. This area will also not need to add monitors to meet the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide in this area and the population is too small to require a PWEI monitor. The changes to the **carbon monoxide monitoring** requirements will not require monitoring in this area because the population is under one million.

[5] *ibid*.

Appendix G.1 Annual Network Site Review Forms for 2015

Castle Hayne

New Hanover in Wilmington

Battleship in Wilmington

Kenansville (shut down 12/31/2015)

Site Review Form Calendar Year 2015

Site Information

Region WIRO	**Site Name** Castle Hayne	**AQS Site # 37-129-0002**
Street Address 6028 HOLLY SHELTER RD		**City** Castle Hayne
Urban Area Not in an Urban Area	**Core-based Statistical Area** Wilmington, NC	

Enter Exact		
Longitude -77.838611	**Latitude** 34.364167	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	**Other (explain)** **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		12

Name of nearest road to inlet probe HOLLY SHELTER RD ADT 16000 Year latest available 2013

Comments: _____

Distance of site to nearest major road (m) 4500.00 Direction from site to nearest major road W

Name of nearest major road Interstate 40 ADT 27000 Year 2013

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 of site to nearest power pole w/transformer (m) ____ Direction N

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.

Cultivated fields

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) 4.47

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) 2.00

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) 60 Direction from probe to nearest traffic lane NNW

Site Review Form Calendar Year 2015

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 ___

Parameters	Monitoring Objective	Scale	Monitor Type
☒ NA Air flow > 200 L/min ☐ PM10 ☐ TSP ☐ TSP Pb	☐ Highest Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Background_____ ☐ Transport_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☐ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____

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 probe to supporting structure (meters) _____ Yes ☐ No ☐

Entire inlet opening of collocated PM-10, TSP or TSP Pb Samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ NA ☐

Actual measured distance (X) including entire inlet openings of both (all) collocated probe inlets (meters) _____

Distance (Y) between outer edge of any high volume inlet and any other high or low volume inlet ≥ 2 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 2015

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_FRM **Monitor Network Affiliation** ☐ NCORE _____ ☐ SUPPLEMENTAL SPECIATION _____ **Monitor NAAQS Exclusion** ☒ NONREGULATORY_BAM

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 5.0

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) 2.03 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) 1.4
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) .10

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) 60 Direction from probe to nearest traffic lane NNW

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 December 9, 2015 New Pictures Submitted? Yes ☒ No ☐

Reviewer Tony Sabetti Date December 28, 2015

Ambient Monitoring Coordinator Tony Sabetti DateDecember 28, 2015

Site Review Form Calendar Year 2015

Site Information

Region WIRO	**Site Name** New Hanover	**AQS Site # 37-129-0006**	
Street Address-2400 Hwy 421 North		**City Wilmington**	
Urban Area Not in an Urban Area		**Core-based Statistical Area** Wilmington, NC	
Enter Exact		**Method of Measuring**	
Longitude -77.95663	**Latitude** 34.26955		
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**6**	

Name of nearest road to inlet probe US Hwy 421 ADT 22000 Year latest available2013

Comments: _____

Distance of site to nearest major road (m) 51.00 Direction from site to nearest major road W

Name of nearest major road US Hwy 421 ADT 22000 Year latest available2013

Comments: _____

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 185 Direction to RR E ☐NA
Distance of site to nearest power pole w/transformer	(m) 41 Direction W
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.

None

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ Ozone (O_3)	☐General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☐Regional	☐SLAMS ☐SPM

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 gas 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 ___

Site Review Form Calendar Year 2015

OZONE MONITOR RECOMMENDATIONS:

1) Maintain current monitor 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 monitor? Yes ☐ No ☐

Comments: _____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☒ SO_2 (NAAQS) ☐ SO_2 (trace-level)	☐ General/Background ☒ Highest Concentration ☐ Population Exposure ☐ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☒ Urban ☐ Regional	☒ SLAMS ☐ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4

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) 1.5

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) 51 Direction from probe to nearest traffic lane W

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor 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 monitor? Yes ☐ No ☐

Comments: _____

Date of Last Site Pictures December 30, 2015 New Pictures Submitted? Yes ☒ No ☐

Reviewer Tony Sabetti Date December 30, 2015

Ambient Monitoring Coordinator Tony Sabetti Date December 30, 2015

Revised 2015-12-31

Site Review Form Calendar Year 2015

Site Information

Region WIRO	**Site Name** Battleship	**AQS Site # 37-129-0010**
Street Address 1 Battleship Road		**City** Castle Hayne
Urban Area WILMINGTON	**Core-based Statistical Area** Wilmington, NC	

Enter Exact		**Method of Measuring**	
Longitude -77.95585	**Latitude** 34.23551		
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**12**	

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

Comments: N/A

Distance of site to nearest major road (m) 255 Direction from site to nearest major road W

Name of nearest major road Hwy 421 ADT 34000 Year 2013

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 of site to nearest power pole w/transformer	(m) 85 Direction S

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.

None

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) 4.00

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) 1.2

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) 75 Direction from probe to nearest traffic lane S

Site Review Form Calendar Year 2015

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 ___

Parameters	Monitoring Objective	Scale	Monitor Type
☒ NA Air flow > 200 L/min ☐ PM10 ☐ TSP ☐ TSP Pb	☐ Highest Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Background_____ ☐ Transport_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☐ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____

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 probe to supporting structure (meters) _____ Yes ☐ No ☐

Entire inlet opening of collocated PM-10, TSP or TSP Pb Samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ NA ☐
Actual measured distance (X) including entire inlet openings of both (all) collocated probe inlets (meters) _____
Distance (Y) between outer edge of any high volume inlet and any other high or low volume inlet ≥ 2 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 2015

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 ___

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 December 30, 2015 New Pictures Submitted? Yes ☒ No ☐

Reviewer Tony Sabetti Date December 30, 2015

Ambient Monitoring Coordinator Tony Sabetti Date December 30, 2015

Site Review Form Calendar Year 2015

Site Information

Region WIRO	**Site Name** Kenansville	**AQS Site # 37-061-0002**
Street Address 328 Limestone Road		**City** Kenansville
Urban Area Not in an Urban Area	**Core-based Statistical Area** None	
Enter Exact		
Longitude -77.9607	**Latitude** 34.954823	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	**Other (explain)** / **Explanation:** Google Earth
Elevation Above/below Mean Sea Level (in meters)		34

Name of nearest road to inlet probe Limestone Road ADT Latest available 3100 Year 2014

Distance of ozone probe to nearest traffic lane (m) 375 Direction from inlet to nearest traffic lane NE

Comments: _____

Name of nearest major road Hwy 24/903 ADT 8800 Year latest available 2014

Distance of site to nearest major road (m) 760.00 Direction from site to nearest major road SE

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 of site to nearest power pole w/transformer	(m) 190 Direction NE	

Distance between site and drip line of water tower (m) 600 Direction from site to water tower E ☐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.

Cultivated fields

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 http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html, 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 http://www.ncdot.gov/travel/statemapping/trafficvolumemaps/default.html. 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.

Site Review Form Calendar Year 2015

Parameters	Monitoring Objective	Scale	Monitor Type
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_____ ☒ NeighborhoodBAM ☐ Urban_____ ☒ RegionalFRM	☒ SLAMS FRM ☐ SPM_____ ☒ Nonregulatory BAM ☐ Supplemental Speciation _____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) 2.5
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.1

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): 2.4
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other?	Yes ☒ No ☐ Give actual (meters): .13

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 ☐

Site Review Form Calendar Year 2015

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: December 15, 2015 New Pictures Submitted? Yes ☒ No ☐

Reviewer Tony Sabetti Date: December 28, 2015

Ambient Monitoring Coordinator Tony Sabetti Date: December 28, 2015

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.

Appendix G-2. 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) Micro-scale - 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.
f) Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts and in support of secondary standards.

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:

Table G2. 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