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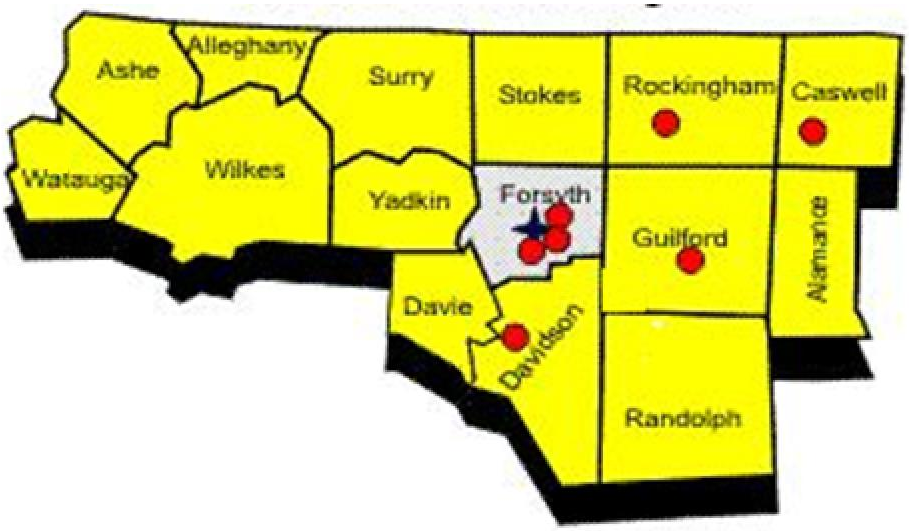
2017-2018 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area

B. The Winston-Salem Monitoring Region



June 30, 2017

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The Winston-Salem Monitoring Region

The Winston-Salem monitoring region of North Carolina, shown in Figure B1, consists of five sections: (1) the eastern mountains - Alleghany, Ashe, Surry, Watauga and Wilkes counties, (2) the Winston-Salem metropolitan statistical area, MSA - Davidson, Davie, Forsyth, Stokes and Yadkin counties, (3) the Greensboro MSA - Guilford, Randolph and Rockingham counties, (4) the Burlington MSA - Alamance County and (5) Caswell County.

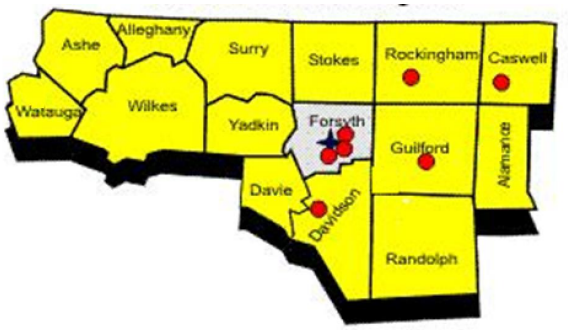

Figure B1. The Winston-Salem monitoring region
The red dots show the approximate locations of most of the monitoring sites in this region.

(1) The Eastern Mountains

The eastern mountains consist of five counties: Alleghany, Ashe, Surry, Watauga and Wilkes. There are no major metropolitan areas in this section of the North Carolina Mountains. The Boone micropolitan statistical area, MiSA, is in Watauga County, the Mount Airy MiSA is located in Surry County and the North Wilkesboro MiSA is located in Wilkes County. The North Carolina Division of Air Quality, DAQ, does not operate any monitoring sites in the eastern mountains. The Boone fine particle monitoring site located at Boone in Watauga County was shut down on Dec. 31, 2015.

In 2010 the United States Environmental Protection Agency, EPA, finalized changes to the expanded **lead monitoring** network established in 2008 to support the lower lead national ambient air quality standard, NAAQS, of 0.15 micrograms per cubic meter.[1] In 2010, the EPA focused monitoring efforts on fence line monitoring located at facilities that emit 0.5 ton or more of lead per year, at urban national core, NCore, monitoring sites and at selected airports.[2] In 2016 the requirement for monitoring at NCore sites was removed.[3] The eastern mountains do not have any permitted facilities emitting 0.5 ton or more per year of lead,[4] or any of the selected airports. Thus, the changes to the lead monitoring network requirements did not result in any lead monitoring in the eastern mountains.

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[1] National Ambient Air Quality Standards for Lead, Federal Register, Vol. 73, No. 219, \ Wednesday, Nov. 12, 2008, p. 66964, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2008-11-12/pdf/E8-25654.pdf.

[2] Revisions to Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, p. 81126, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.

[3] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[4] North Carolina Point Source Emission Report, available from the world wide web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2015&physical=byCounty&overridetype=All&toxics=153&sortorder=3&viewreport=View+Report. Accessed May 6, 2017.

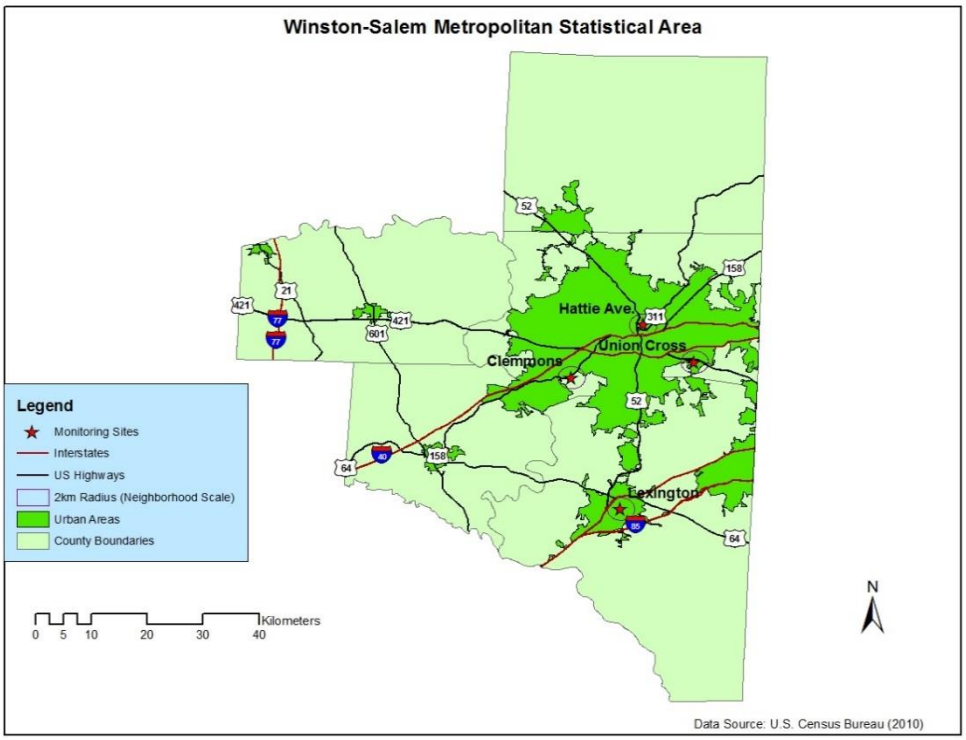
The 2015 **ozone monitoring** requirements did not result in additional ozone monitoring in the eastern mountains.[5] This area does not have any MSAs requiring a minimum number of monitors by 40 Code of Federal Regulations, CFR, 58 Appendix D for population exposure monitoring in urban areas.

The eastern mountains did not need to add monitors to comply with the 2010 **nitrogen dioxide monitoring** requirements.[6] The area is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The eastern mountain area also does not need additional monitors to meet the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide emissions located within the area.[7] This area will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million.[8]

(2) The Winston-Salem MSA

The Winston-Salem MSA consists of five counties: Davidson, Davie, Forsyth, Stokes and Yadkin. The major metropolitan area is Winston-Salem. The DAQ currently operates one monitoring site in the Winston-Salem MSA and the Forsyth County Office of Environmental Assistance and Protection, Forsyth County, operates three. These sites are located at Lexington in Davidson County and Clemmons, Union Cross and Hattie Avenue in Winston-Salem in Forsyth County. The locations of these monitors are shown in Figure B2. The Forsyth County sites and monitors are discussed in Volume 1, Appendix C. Only the DAQ site is further discussed in this subsection.

[5] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.
[6] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.
[7] North Carolina Point Source Emission Report, available from the world wide web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2015&physical=byCounty&overridetype=All&toxics=264&sortorder=3. Access May 6, 2017.
[8] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.



Hattie Avenue is a multi-pollutant site; Union Cross is an ozone site; Clemmons School is an ozone and fine particle site and Lexington is a fine particle site. The circles represent the scale (4 Km).

Figure B2. Location of monitoring sites in the Winston-Salem MSA

Figure B3. Lexington water tower fine particle monitoring site, 37-057-0002

At the **Lexington** site**,** 37-057-0002, the DAQ operates one-in-three-day and one-in-six-day fine particle FRM monitors and a continuous fine particle monitor. The MetOne Super SASS and URG monitors were shut down in January 2015. The site is pictured in Figure B3. Views looking north, northeast, east, south, southwest and west are provided in Figure B4 through Figure B9. Table B1 summarizes monitoring information for the site.

Figure B4. Looking north from Lexington site

Figure B5. Looking northeast from Lexington site

Figure B6. Looking west from Lexington site

Figure B8. Looking east from Lexington site

Figure B7. Looking southwest from Lexington site

Figure B9. Looking south from Lexington site

Table B1. Site Table for Lexington

Site Name:	Lexington			**AQS Site Identification Number**	37-057-0002
Location:	938 South Salisbury Street, Lexington, North Carolina				
CBSA:	Winston-Salem, NC			**CBSA #:**	49180
Latitude	35.814444	**Longitude**	-80.262500	**Datum:**	WGS84
Elevation	241 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
PM 2.5 local conditions, primary	R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC – Gravimetric Analysis	RFPS-1006-145	24-Hour	Every third day, year-round
				Every sixth day, year-round
PM 2.5 local conditions, secondary	Met One BAM-1020 Mass Monitor w/VSCC, 170	EQPM-0308-170	1-Hour	Hourly, year-round

Date Monitor Established:	PM 2.5 local conditions, primary monitor	Jan. 1, 1999
	PM 2.5 local conditions, collocated monitor	Jan. 1, 2017
	PM 2.5 local conditions, secondary continuous monitor	July 22, 2014

Nearest Road:	South Salisbury Street	**Traffic Count:**	1000	**Year of Count:**	2015 Estimate

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
PM 2.5 local conditions, primary	30 meters	East	SLAMS	Required for demonstration of maintenance. Compliance w/NAAQS
PM 2.5 local conditions,	30 meters	East	SLAMS	Collocated monitor to meet 40 CFR 58

Table B1. Site Table for Lexington

collocated				Appendix A requirements
PM 2.5 local conditions, secondary	30 meters	East	SLAMS	Real-time AQI reporting & forecasting.

Parameter Name	Monitoring Objective	Scale	Suitable for Comparison to NAAQS	Proposal to Move or Change
PM 2.5 local conditions, primary	Population exposure	Neighborhood	Yes	None
PM 2.5 local conditions, collocated	Population exposure	Neighborhood	Yes	Will end
PM 2.5 local conditions, secondary	Population exposure	Neighborhood	Yes	None

	Meets Part 58 Requirements for:			
Parameter Name	**Appendix A**	**Appendix C**	**Appendix D**	**Appendix E**
PM 2.5 local conditions, primary	Yes	Yes	Not required	Yes
PM 2.5 local conditions, collocated	Yes	Yes	Not required	Yes
PM 2.5 local conditions, secondary	Yes	Yes	Not required	Yes

Parameter Name	Probe Height in meters	Distance to Support	Distance to Trees	Obstacles
PM 2.5 local conditions, primary	2.4	2.1 meters	>20 meters	None
PM 2.5 local conditions, collocated	2.4	2.1 meters	>20 meters	None
PM 2.5 local conditions, secondary	2.4	2.1 meters	>20 meters	None

On Jan. 1, 2016, the DAQ made the continuous fine particle monitor at the site, the primary monitor to provide a collocated beta attenuation monitor, BAM 1020, and federal reference method, FRM, monitor site. A collocated BAM 1020 – FRM site was necessary to meet 40 CFR 58 Appendix A requirements. On Jan. 1, 2017, the DAQ added a second FRM to the site to provide a second FRM-FRM collocated site, if needed to meet Appendix A requirements; however, currently, the primary quality assurance organization is not operating enough primary FRMs to make a second FRM-FRM site necessary. Thus, the DAQ will continue to operate the BAM 1020 monitor as the primary monitor at the site and move the collocated FRM to another site to eventually replace the collocated FRM-FRM site at the Board of Education in Asheville.

In 2014 the DAQ shut down the seasonal ozone monitor at **Mocksville,** 37-059-0003, because it was not required by 40 CFR 58 Appendix D. In 2015 the FCOEAP shut down the Peters Creek carbon monoxide monitor and the Shiloh Church ozone monitor. The carbon monoxide monitor was no longer required by the state implementation plan to demonstrate compliance with the carbon monoxide standard and the ozone monitor was not required by Appendix D.

The 2010 changes to the **lead monitoring** requirements did not require lead monitoring in the Winston-Salem MSA.[9] The Winston-Salem MSA does not have any permitted facilities emitting more than 0.5 ton per year of lead.[10]

[9] Revisions to Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, p. 81126, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.

[10] United States Environmental Protection Agency. (2017). *TRI Explorer* (2015 Dataset (released March 2017)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (May 04, 2017).

The 2015 changes to the **ozone monitoring** requirements lengthened the monitoring season so that it begins on March 1 instead of April 1 starting in 2017.[11] The ozone monitoring changes did not result in additional monitors in the Winston-Salem MSA. This MSA already exceeds the minimum number of monitors required by 40 CFR 58 Appendix D for population exposure monitoring in urban areas.

To comply with the 2010 **nitrogen dioxide monitoring** requirements,[12] based on the monitoring rules finalized on March 7, 2013, the Winston-Salem MSA was required to add a monitor by Jan. 1, 2017, because the MSA population exceeded the 500,000-threshold. However, on Dec. 30, 2016, the requirement was removed to establish near-road NO_2 monitoring stations in Core Based Statistical Areas, CBSAs, having populations between 500,000 and 1,000,000 persons.[13] Currently, the MSA is too small to require area-wide monitors. The existing nitrogen dioxide monitor at Hattie Avenue was designated as one of the monitors required by the administrator to represent vulnerable populations.

The Winston-Salem MSA will not need to add sulfur dioxide monitors to comply with the 2010 **sulfur dioxide monitoring** requirements. In August 2012, the Office of Air Quality Planning and Standards, OAQPS, calculated, based on a revised 2008 emission inventory, that population weighted emission index, PWEI, monitoring was not required in the MSA. Source oriented monitoring will also not be required at the Belews Creek Steam Station in Stokes County because the facility showed by modeling that the ambient air near the facility meets the current standard. This area will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million.[14]

(3) The Greensboro-High Point MSA

The Greensboro-High Point MSA consists of three counties: Guilford, Randolph and Rockingham. The major metropolitan areas are the cities of Greensboro and High Point. The DAQ currently operates two monitoring sites in the Greensboro-High Point MSA. These sites are located at Mendenhall in Guilford County and Bethany in Rockingham County. The locations of these monitors are shown in Figure B10. The DAQ shut down the **Colfax,** 37-081-0014, one-in-three-day fine particle monitoring site at the end of 2014 because it was no longer required by Appendix D.

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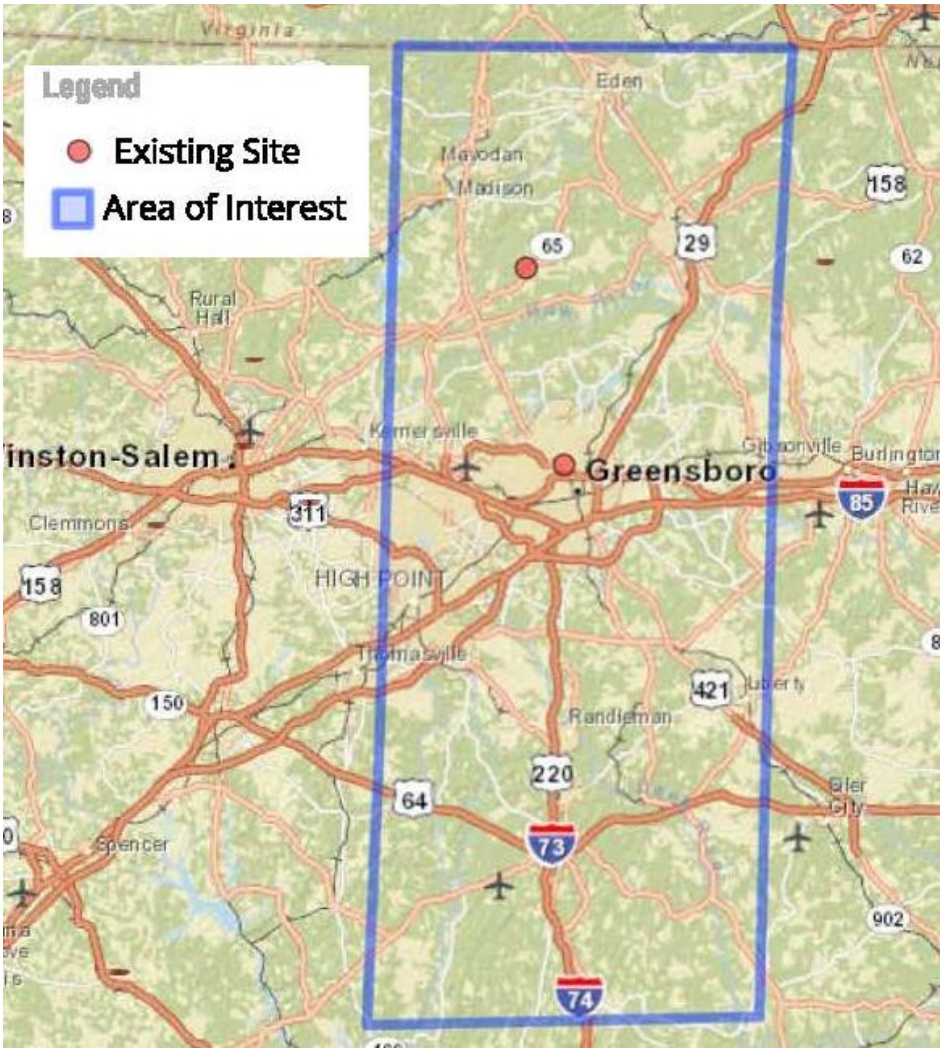
[11] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.

[12] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.

[13] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register**,** Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.

[14] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.



The Mendenhall ozone and particle monitoring site is in the center; the Bethany ozone monitoring site is to the north.

Figure B10. Location of monitors in the Greensboro-High Point MSA

At the **Mendenhall** site**,** 37-081-0013, the DAQ operates a seasonal ozone monitor, a one-in-six-day fine particle monitor, a continuous fine particle monitor and a continuous PM_{10} monitor. Figure B11 through Figure B19 show the site and views looking north, northeast, east, southeast, south, southwest, west and northwest. The Mendenhall site is the design value ozone monitoring site for the MSA. In 2011, the DAQ reduced the monitoring schedule for the fine particle monitor to one-in-six day. Site information is in Table B2.

Figure B11. Mendenhall ozone and particle monitoring site, 37-081-0013

Figure B12. Looking north from the Mendenhall site

Figure B13. Looking northwest from the Mendenhall site

Figure B16. Looking west from the Mendenhall site

Figure B17. Looking southwest from the Mendenhall site

Figure B14. Looking northeast from the Mendenhall site

Figure B15. Looking east from the Mendenhall site

Figure B18. Looking southeast from the Mendenhall site

Figure B19. Looking south from the Mendenhall site

Table B2. Site Table for Mendenhall

Site Name:	Mendenhall School	**AQS Site Identification Number**					37-081-0013
Location:	205 Willoughby Blvd, Greensboro, North Carolina						
CBSA:	Greensboro-High Point, NC			**CBSA #:**	24660		
Latitude	36.109167	**Longitude**	-79.801111	**Datum:**	NAD83	**Elevation**	247 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM 2.5 local conditions, FRM	R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC – Gravimetric Analysis	RFPS-0498-118	24-Hour	Every Sixth day, year-round
PM 2.5 local conditions, BAM	Met One BAM-1022 Mass Monitor w/ VSCC	EQPM-1013-209	1-Hour	Year-round
PM10 Total 0-10 µm STP	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	Year-round

Date Monitor Established:	Ozone	April 15, 2005
Date Monitor Established:	PM 2.5 local conditions, FRM	Dec. 14, 2001
Date Monitor Established:	PM 2.5 local conditions, continuous	Dec. 14, 2001
Date Monitor Established:	PM10 Total 0-10 µm STP	Dec. 14, 2001

Nearest Road:	Saint Regis Road	**Traffic Count:**	<1,000	**Year of Count:**	2015 Estimate

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	130 meters	North northwest	SLAMS	Compliance w/ NAAQS; real-time reporting; air quality forecasting.
PM 2.5 local conditions, FRM	130 meters	North northwest	SLAMS	Compliance w/NAAQS.
PM 2.5 local conditions, BAM	130 meters	North northwest	SPM; non-regulatory	Real-time reporting; air quality forecasting.
PM10 Total 0-10 µm STP	130 meters	North northwest	SLAMS	Compliance w/NAAQS

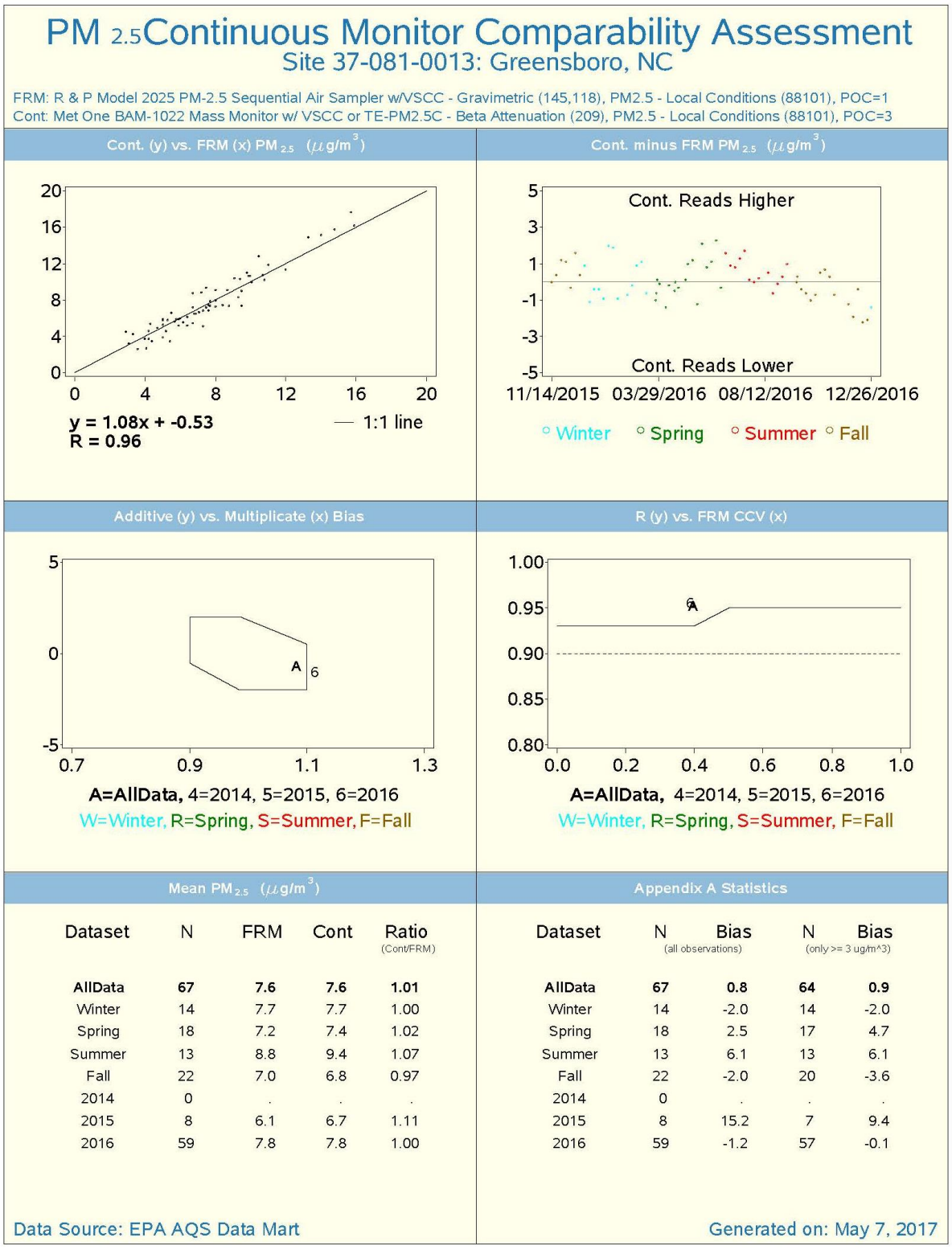
Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	General background Population exposure	Urban	Yes	None
PM 2.5 local conditions, FRM	Population exposure General background	Neighborhood	Yes	May shut down on Dec. 31, 2017
PM 2.5 local conditions, BAM	Population exposure General background	Neighborhood	No	Will become primary monitor on Jan. 1, 2018
PM10 Total 0-10 µm STP	Population exposure General background	Urban	Yes	None

Parameter Name	**Meets Part 58 Appendix A Requirements**	**Meets Part 58 Appendix C Requirements**	**Meets Part 58 Appendix D Requirements**	**Meets Part 58 Appendix E Requirements**
Ozone	Yes	Yes	Yes	Yes
PM 2.5 local conditions, FRM	Yes	Yes	Yes	Yes
PM 2.5 local conditions, BAM	Yes	No	Yes	Yes
PM10 Total 0-10 µm STP	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3.0	1.1 meters	>20 meters	None
PM 2.5 local conditions, FRM	2.5	2.2 meters	>20 meters	None
PM 2.5 local conditions, BAM	> 3.4	~2.2 meters	>20 meters	None
PM10 Total 0-10 µm STP	2.5	2.2 meters	>20 meters	None

The DAQ has been operating a BAM 1022 monitor at the site since November 2015 to evaluate how well the BAM and the FRM compare at this location. A comparison of the two monitors is shown in Figure

20. Based on the results through the end of 2016, the two monitors appear to be compare well. Thus, the DAQ will make the BAM the primary monitor at the site on Jan. 1, 2018 and either shut down the FRM at the end of 2017 or make it a collocated monitor.



Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**67**	**7.6**	**7.6**	**1.01**
Winter	14	7.7	7.7	1.00
Spring	18	7.2	7.4	1.02
Summer	13	8.8	9.4	1.07
Fall	22	7.0	6.8	0.97
2014	0	.	.	.
2015	8	6.1	6.7	1.11
2016	59	7.8	7.8	1.00

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**67**	**0.8**	**64**	**0.9**
Winter	14	-2.0	14	-2.0
Spring	18	2.5	17	4.7
Summer	13	6.1	13	6.1
Fall	22	-2.0	20	-3.6
2014	0	.	.	.
2015	8	15.2	7	9.4
2016	59	-1.2	57	-0.1

Figure 20. Comparison of the beta attenuation monitor with the federal reference monitor at Mendenhall

At the **Bethany** site**,** 37-157-0099, the DAQ operates a seasonal ozone monitor, the second required ozone monitoring site for the MSA. The DAQ added a background sulfur dioxide monitor for background PSD modeling to this site Jan. 1, 2011. The monitor operates for 12 months every three years. It will operate from April 2017 until March 2018. A picture of the site as well as views looking north, east, south and west are provided in Figure B21 through Figure B25. Site information is in Table B3

Figure B21. Bethany ozone and sulfur dioxide monitoring site, 37-157-0099

Figure B22. Looking north from the Bethany site

Figure B24. Looking east from the Bethany site

Figure B23. Looking west from the Bethany site

Figure B25. Looking south from the Bethany site

Table B3. Site Table for Bethany School

Site Name:	Bethany School	**AQS Site Identification Number**					37-157-0099
Location:	6371 NC 65 @ Bethany School, Reidsville, NC 27320						
CBSA:	Greensboro-High Point, NC			**CBSA #:**	24660		
Latitude	36.308889	**Longitude**	-79.859167	**Datum:**	WGS84	**Elevation**	277 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
Sulfur dioxide	Instrumental with pulsed fluorescence, 060	EQSA-0486-060	1-Hour	12 months Every third year

Date Monitor Established:	Ozone	July 7, 1993
Date Monitor Established:	Sulfur dioxide	Jan. 1, 2011

Nearest Road:	SR2316	**Traffic Count:**	700	**Year of Count:**	2013

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	10 meters	West	SLAMS	Compliance w/ NAAQS; real-time reporting; air quality forecasting.
Sulfur dioxide	10 meters	West	Special purpose	PSD modeling.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	Population exposure, transport, welfare related impacts	Urban	Yes	None
Sulfur dioxide	General background	Urban	Yes	None

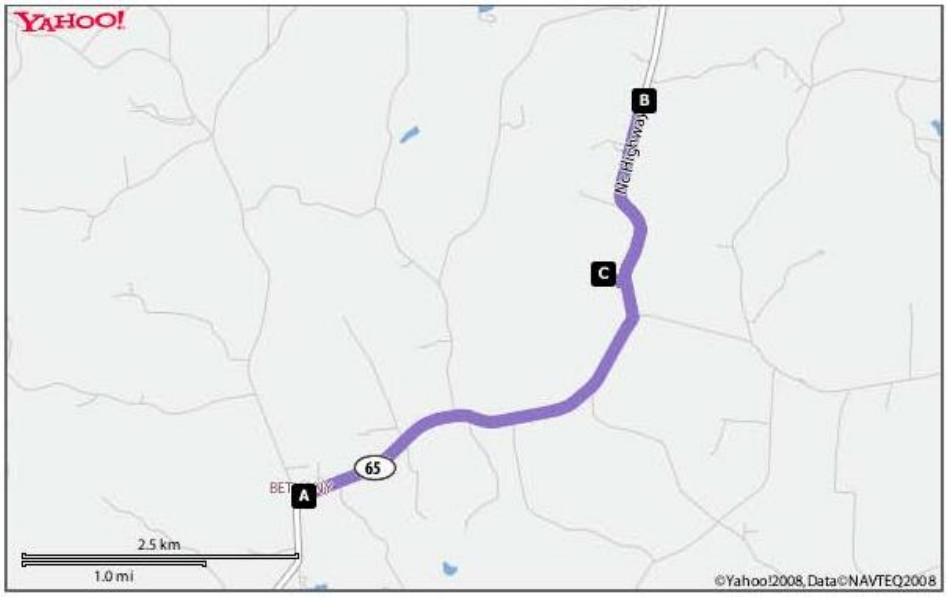
Parameter Name	**Meets Part 58 Appendix A Requirements**	**Meets Part 58 Appendix C Requirements**	**Meets Part 58 Appendix D Requirements**	**Meets Part 58 Appendix E Requirements**
Ozone	Yes	Yes	Yes	Yes
Sulfur dioxide	Yes	Yes	No requirement	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3	1.0 meter	>20 meters	None
Sulfur dioxide	3	1 meter	>20 meters	None

As shown in Figure B26 the site is located near two emission sources: Duke Energy Carolinas, LLC - Rockingham County Combustion Turbine is located about 3 kilometers to the northeast and Transcontinental Gas Pipeline Corporation - Compressor Station 160 is located about 5 kilometers to the north northeast. In 2015 the Duke Energy Carolinas facility emitted 203.7 tons of nitrogen oxides, 8.8 tons of volatile organic compounds, VOC, and 4.3 tons of sulfur dioxide.[15] Transcontinental Gas Pipeline emitted 510.6 tons of nitrogen oxides, 53.5 tons of VOC and 0.1 tons of sulfur dioxide.[16]

[15] **North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report.** Available from the World Wide Web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&location_name=&county=byCounty&year=2015&findfacility=4734&location_name=&county=byCounty&year=2014&loc_city_name=Reidsville. Accessed May 7, 2017.

[16] **North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report.** Available from the World Wide Web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&location_name=&county=byCounty&year=2015&findfacility=4445&location_name=null&county=null&year=2012&loc_city_name=Reidsville. Accessed May 7, 2017.



A is the Bethany ozone monitoring Site; B is Transcontinental Gas Pipeline Corp. - Compressor Station 160; C is Duke Energy Carolinas, LLC - Rockingham Co. Comb. Turbine

Figure B26. Location of the Bethany ozone site in relation to nearby emission sources

The DAQ received a new PSD application, 7900182.16A, for a power greenfield plant, which is currently being processed.[17] The latitude and longitude coordinates for the facility, NTE Carolinas, are shown in relation to the location of the Bethany monitoring site in Figure B27. The Bethany monitoring site is approximately 3.2 Km southwest from where the new plant will be constructed.

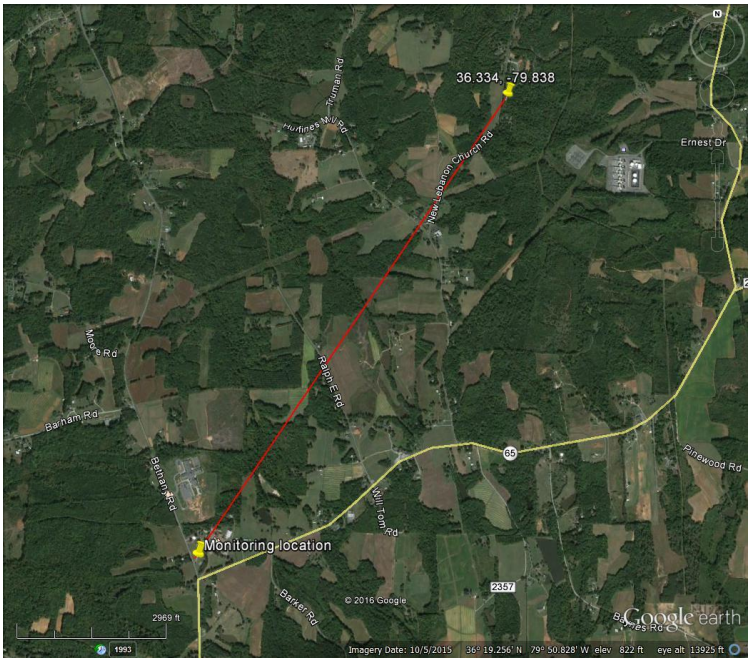


Figure B27. Location of new facility relative to the existing Bethany ozone and sulfur dioxide monitoring station

[17] Active Air Permit Applications Quick Look Status Report. Available on the worldwide web at http://www2.ncair.org/permits/aapa_reports/aapa.pdf. Accessed May 7, 2017.

In 2008 the EPA expanded the **lead monitoring** network to support the lower lead NAAQS of 0.15 micrograms per cubic meter. [18] In 2010, the EPA focused monitoring efforts on fence line monitoring located at facilities that emit 0.5 or more tons of lead per year and at NCore monitoring sites in urban areas. [19] In 2016 the requirement for monitoring at NCore sites was removed.[20] The Greensboro-High Point MSA was not required by the revised lead monitoring requirements to do lead monitoring because it does not have any permitted facilities emitting 0.5 or more tons per year of lead.[21]

The 2015 **ozone monitoring** requirements did not result in additional monitors in the Greensboro-High Point MSA.[22] This MSA meets the minimum monitoring requirements in 40 CFR 58 Appendix D for population exposure monitoring in urban areas. However, the monitoring season will begin one month earlier on March 1 instead of April 1 starting in 2017.

To comply with the 2010 **nitrogen dioxide monitoring** requirements,[23] the monitoring rules finalized on March 7, 2013, required the Greensboro-High Point MSA to add a monitor by Jan. 1, 2017, because the MSA population exceeds the 500,000-threshold. However, on Dec. 30, 2016, the requirement was removed to establish near-road NO_2 monitoring stations in Core Based Statistical Areas, CBSAs, having populations between 500,000 and 1,000,000 persons.[24]

The 2010 **sulfur dioxide monitoring** requirements ended up not requiring additional monitoring in this area because the OAQPS released revised PWEI calculations in August 2012. The August 2012 calculations resulted in a PWEI monitor not being needed in the Greensboro MSA.

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[18] National Ambient Air Quality Standards for Lead, Federal Register, Vol. 73, No. 219, \ Wednesday, Nov. 12, 2008, p. 66964, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2008-11-12/pdf/E8-25654.pdf.

[19] Revisions to Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, p. 81126, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.

[20] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[21] **North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report.** Available from the World Wide Web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2015&physical=byCounty&overridetype=All&toxics=153&sortorder=3. Accessed May 7, 2017.

[22] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.

[23] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.

[24] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register**,** Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.

This MSA will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is less than one million.[25]

(4) The Burlington MSA

The Burlington MSA consists of the county of Alamance. The major metropolitan area is the city of Burlington. The DAQ currently does not operate any monitoring sites in the Burlington MSA. The Hopedale fine particle monitoring site was shut down in 2015. This fine particle monitoring site was not required by 40 CFR 58 Appendix D.

The changes made to the **lead monitoring** requirements in December 2010 did not require additional monitoring in the Burlington MSA because the MSA does not have any permitted facilities emitting 0.5 tons or more of lead per year.[26] The 2010 **nitrogen dioxide monitoring** requirements will not require the Burlington MSA to monitor for nitrogen dioxide.[27] The MSA is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The 2010 **sulfur dioxide monitoring** requirements will also not result in additional monitoring in the MSA because there are no large sources emitting sulfur dioxide within its bounds. This area will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million.[28]

The DAQ does not plan to make any changes to the Burlington MSA ozone monitoring network. Currently, the DAQ does not monitor for ozone in Burlington because there are ozone monitors in the neighboring counties of Caswell, Guilford and Rockingham. Figure B28 shows the locations of these monitors in relation to the Burlington MSA. The monitor at Bushy Fork in Person County, also shown in Figure B28, was established as a downwind monitor for the Burlington MSA.

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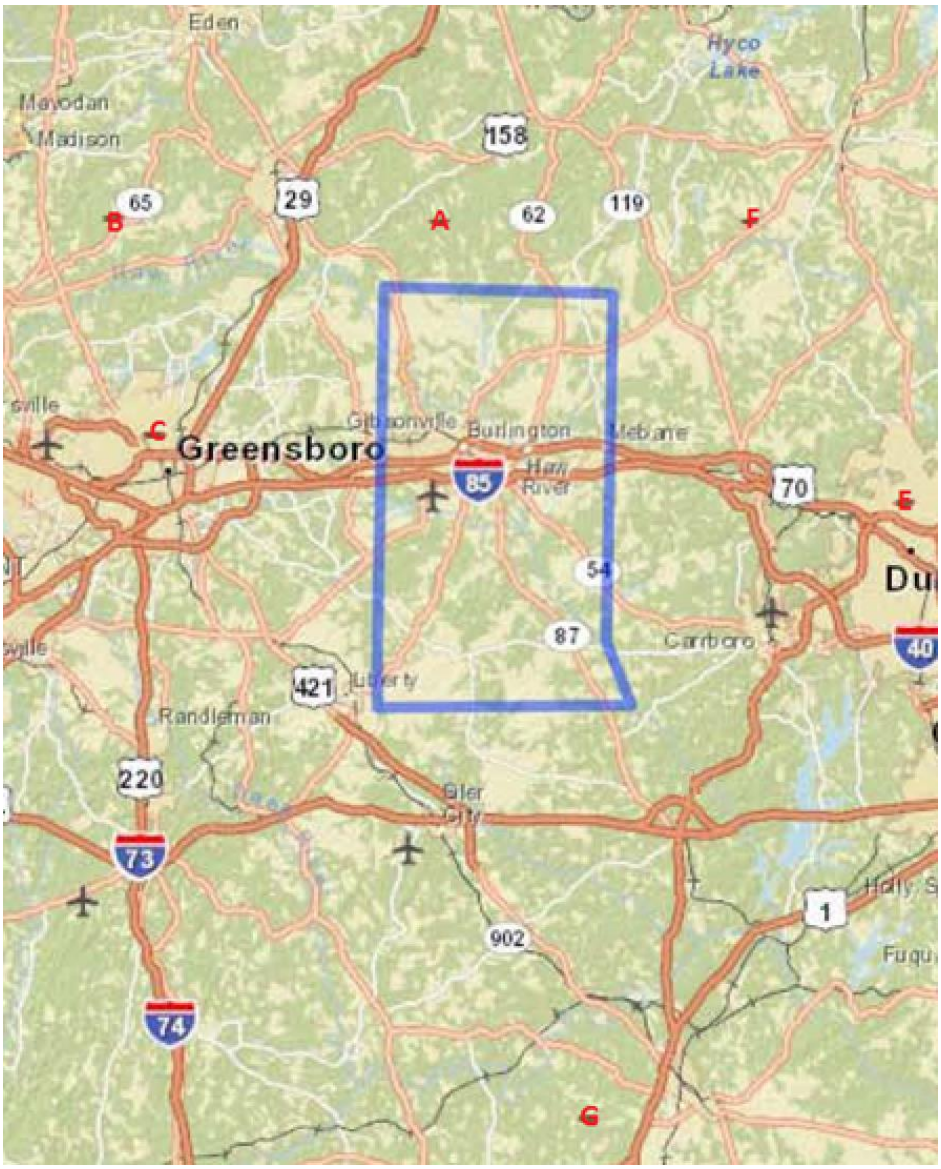
[25] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.
[26] Data obtained from the DAQ emission inventory database available from the worldwide web at http://ncair.org/.
[27] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.
[28] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.



The Burlington MSA is outlined in heavy blue line. A, to the north, is the Cherry Grove monitor; B to the northwest, is the Bethany monitor; C, to the west, is the Mendenhall monitor; E, to the east, is the Durham monitor; F, to the northeast, is the Bushy Fork monitor; G, to the south, is the Blackstone monitor. The scale of representation for these monitors is urban, 4 to 50 Km, for all but the Durham monitor, which is neighborhood scale– 0.5 to 4 Km.

Figure B28. Locations of ozone monitors near the Burlington MSA.

(5) Caswell County

There are no metropolitan or micropolitan statistical areas in Caswell County. The DAQ currently operates one monitoring site in this county, located in Cherry Grove. Figure B29 shows the location of this ozone and rotating particle monitoring site. At the **Cherry Grove** site**,** 37-033-0001, the DAQ operates a seasonal ozone monitor and a continuous every third year PM10 monitor. Fine particle monitoring at the site ended on Jan. 5, 2016.

Figure B29. Location of the Cherry Grove monitoring site

A is the Cherry Grove ozone and fine particle site. The circle approximates the urban scale of representation, 4 to 50 Km, for ozone and particles.

Figure B30 shows the site. Table B4 summarizes information for the site. Views looking north, northeast, east, south, southwest and west are shown in Figure B31 through Figure B36. The DAQ operates a background PM10 monitor at this site. The monitor operates on a one-in-three-year schedule to provide data for prevention of significant deterioration modeling for industrial expansion. The PM10 monitor operated from Feb. 4, 2016, until March 3, 2017. It will operate again in 2019.

Figure B30. Cherry Grove ozone and particle monitoring Site, 37-033-0001

Table B4. Site Table for Cherry Grove

Site Name:	Cherry Grove	**AQS Site Identification Number**					37-033-0001
Location:	7074 Cherry Grove Road, Reidsville, North Carolina						
MSA:	Not in an MSA			**MSA #:**	00000		
Latitude	36.307033	**Longitude**	-79.467417	**Datum:**	WGS84	**Elevation**	241 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM10 Total 0-10 µm STP	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	For 12 months, Every third year
Date Monitor Established:	Ozone			April 1, 1993
Date Monitor Established:	PM10 Total 0-10 µm STP			Jan. 1, 2013

Nearest Road:	Cherry Grove Road	**Traffic Count:**	1,300	**Year of Count:**	2013

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	100 meters	South	SLAMS	Compliance w/ NAAQS. Air quality forecasting.
PM10 Total 0-10 µm STP	100 meters	South	Special purpose	Industrial expansion monitoring

Table B4. Site Table for Cherry Grove

Parameter Name	Monitoring Objective	Scale	Suitable to Compare to NAAQS	Proposal to Move or Change
Ozone	Transport, welfare related impacts	Urban	Yes	None
PM10 Total 0-10 µm STP	Population exposure, general background, transport	Urban	Yes	Will operate May 1, 2019 to April 30, 2020

Parameter Name	Meets Part 58 Appendix A Requirements	Meets Part 58 Appendix C Requirements	Meets Part 58 Appendix D Requirements	Meets Part 58 Appendix E Requirements
Ozone	Yes	Yes	No requirements	Yes
PM10 Total 0-10 µm STP	Yes	Yes	No requirements	Yes

Parameter Name	Probe Height in meters	Distance to Support	Distance to Trees	Obstacles
Ozone	3	1.1 meters	>20 meters	None
PM10 Total 0-10 µm STP	2.4	2.2 meters	>20 meters	None

Figure B31. Looking north from Cherry Grove site

Figure B33. Looking west from Cherry Grove site

Figure B32. Looking northeast from Cherry Grove site

Figure B34. Looking southwest from Cherry Grove site

Figure B35. Looking east from Cherry Grove site

Figure B36. Looking south from Cherry Grove site

The **lead monitoring requirements** did not add any lead monitoring in Caswell County because the county does not have any permitted facilities located within its bounds that emit 0.5 tons or more of lead per year.[29] Caswell County also will not need additional ozone monitors to comply with the 2015 **ozone monitoring requirements**.[30] This county does not have an MSA that must meet the minimum monitoring requirements in 40 CFR 58 Appendix D for population exposure monitoring in urban areas. Ozone monitoring will be required to start on March 1 in 2017.

The 2010 **nitrogen dioxide monitoring requirements** did not result in additional monitoring in Caswell County.[31] The county is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. This area will not need additional sulfur dioxide monitors to comply with the 2010 **sulfur dioxide monitoring** requirements because it does not have any large sulfur dioxide sources within its bounds. This area also will not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million.[32]

[29] Data obtained from the DAQ emission inventory database available from the worldwide web at http://ncair.org/.
[30] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.
[31] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.
[32] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.

Appendix B.1 Annual Network Site Review Forms for 2016

Lexington

Mendenhall in Greensboro

Bethany

Cherry Grove

Site Review Form Calendar Year 2016

Site Information

Region WSRO	**Site Name** Lexington	**AQS Site # 37-057-0002**
Street Address- 938 S. Salisbury St.		**City Lexington, NC 27292**
Urban Area LEXINGTON	**Core-based Statistical Area** Winston-Salem, NC	
Enter Exact		
Longitude -80.262789	**Latitude** 35.814508	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	**Other (explain)** **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		241.00

Name of nearest road to inlet probe S. Salisbury Street ADT estimated 1000 Year estimated 2015

Distance of monitor inlet to nearest traffic lane (m) 30 Direction from inlet to nearest traffic lane E

Comments: An estimated ADT number from 2015

Name of nearest major road South Main St. ADT 14000 Year latest available 2015

Distance of site to nearest major road (m) 120.00 Direction from site to nearest major road NNW

Comments: "Traffic Volume (AADT) Maps 2015 - Davidson County"

Site located near electrical substation/high voltage power lines?		Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 120 Direction to RR ESE	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____	Direction ___
Distance between site and drip line of water tower (m) **3** Direction from site to water tower **SSW**		☐**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.

No

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 2016

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. (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 ☒ 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) 2.4
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): _____
*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 ☐

Site Review Form Calendar Year 2016

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: July 1, 2014 New Pictures Submitted? Yes ☐ No ☒

Reviewer Kimberly Hornberger Date: December 15, 2016

Ambient Monitoring Coordinator Chengqing Xiao Date: January 31, 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.

Site Review Form Calendar Year 2016

Site Information

Region WSRO	**Site Name** Mendenhall	**AQS Site # 37-081-0013**
Street Address 205 Willoughby Street		**City** Greensboro
Urban Area GREENSBORO	**Core-based Statistical Area**	Greensboro-High Point, NC
Enter Exact		
Longitude -79.802314	**Latitude** 36.109006	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	**Other (explain)** **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		247

Name of nearest road to inlet probe St. Regis St ADT <1000 Year estimated 2015

Comments: An estimated ADT number from prevous year

Distance of site to nearest major road (m) 800.00 Direction from site to nearest major road S

Name of nearest major road W Cone Blvd ADT 21000 Year latest available 2015

Comments: "Traffic Volume (AADT) Maps Urban -- Greensboro 2015"

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.

No

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ 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) 3.0

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) 1.1

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) 130 Direction from probe to nearest traffic lane NNW

Site Review Form Calendar Year 2016

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. 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) 2.5

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) 2.2 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) 2.2

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

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) 130 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 1/14/16 New Pictures Submitted? Yes ☐ No ☒

Reviewer Chris Bryant/Chengqing Xiao Date February 03, 2017

Ambient Monitoring Coordinator Chengqing Xiao DateFebruary 3, 2017

Site Review Form Calendar Year 2016

Site Information

Region WSRO	**Site Name** Bethany	**AQS Site # 37-157-0009**
Street Address-6371 NC Hwy 65		**City Reidsville, NC 27320**
Urban Area Not in an Urban Area	**Core-based Statistical Area** Greensboro-High Point, NC	
Enter Exact		
Longitude -79.8593	**Latitude** 36.3086	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	**Other (explain)** **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		274.00

Name of nearest road to inlet probe Bethany Road ADT 700 Year estimated 2013

Distance of ozone probe to nearest traffic lane (m) 10 Direction from ozone probe to nearest traffic lane W

Comments: An Estimated ADT number from "Trafiic Volume (AADT) Maps 2013-Rockingham County"

Name of nearest major road NC Hwy 65 ADT 1800 Year 2014

Distance of site to nearest major road (m) 121.00 Direction from site to nearest major road SSE

Comments: ADT number from "Trafiic Volume (AADT) Maps 2014-Rockingham County"

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.

No

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ 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) 3.00

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) 1.00

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 2016

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: August 1, 2011 New Pictures Submitted? Yes ☐ No ☒

Reviewer Blair Palmer Date: December 29, 2016

Ambient Monitoring Coordinator Chengqing Xiao Date: January 30, 2017

Instructions:

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.

Site Review Form Calendar Year 2016

Site Information

Region WSRO	**Site Name** Cherry Grove	**AQS Site # 37-033-0001**
Street Address 7074 Cherry Grove Road		**City** Reidsville, NC 27320
Urban Area Not in an Urban Area	**Core-based Statistical Area** None	
Enter Exact		
Longitude -79.467394	**Latitude** 36.307047	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	**Other (explain)** **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**241.00**

Name of nearest road to inlet probe Friendly Road ADT _____ Year Choose an item _____

Comments: Friendly Road is the closest road to site (~45 m) but it has no ADT and it is traveled infrequent

Distance of site to nearest major road (m) 123.00 Direction from site to nearest major road S

Name of nearest major road Cherry Grove ADT 1200 Year 2015

Comments: Traffic Volume (AADT) Maps 2015- Caswell County

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.

No

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ 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) 3.0

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) 1.1

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) 123 Direction from probe to nearest traffic lane S

Site Review Form Calendar Year 2016

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. 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) 2.4

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) 2.2 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) 123 Direction from probe to nearest traffic lane S

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 February 15, 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer Blair Palmer, Chengqing Xiao Date January 30, 2017

Ambient Monitoring Coordinator Chengqing Xiao Date January 30, 2017

Appendix B-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 station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

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

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
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 B5. 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