

TN Ambient Air Monitoring Plan

Tennessee Dept. of Environment and Conservation
Air Pollution Control Division



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Annual Air Monitoring Network Plan Acronym Glossary

ANMP.....	Annual Network Monitoring Plan
AQS.....	Air Quality Subsystem
BAM.....	Beta Attenuation Monitor
CASTNET.....	Clean Air Status and Trends Network
CBSA.....	Core-Based Statistical Area
CFR.....	Code of Federal Regulations
CO.....	Carbon Monoxide
DAPC.....	Division of Air Pollution Control
DV.....	Design Value
EFO.....	Environmental Field Office
EPA.....	Environmental Protection Agency
FEM.....	Federal Equivalent Method
FRM.....	Federal Reference Method
µg/m ³	Micro Grams per Cubic Meters
NAAQS.....	National Ambient Air Quality Standards
NCO.....	Nashville Central Office
NCORE.....	National Core Monitoring Station
NEI.....	National Emissions Inventory
NFO.....	Nashville Field Office
NPS.....	National Park Service
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
NO _y	Reactive Oxides of Nitrogen
O ₃	Ozone
PAMS.....	Photochemical Assessment Monitoring Station
Pb.....	Lead
PM _{2.5}	Particles with an average aerodynamic diameter of 2.5 microns or less
PM ₁₀	Particles with an average aerodynamic diameter of 10 microns or less
PWEI.....	Population Weighted Emission Index
POC.....	Parameter Occurrence Code
ppb.....	Parts Per Billion
ppm.....	Parts Per Million
PQAO.....	Primary Quality Assurance Organization
PSD.....	Prevention of Significant Deterioration
QAPP.....	Quality Assurance Project Plan
SLAMS.....	State and Local Air Monitoring Stations
SO ₂	Sulfur Dioxide
SOP.....	Standard Operating Procedure
SPM.....	Special Purpose Monitor
TEOM.....	Tapered Element Oscillating Microbalance
TDEC.....	Tennessee Department of Environment and Conservation
VSCC.....	Very sharp cut cyclone
WINS.....	Well-type Impactor Ninety-six

Introduction to the 2017/18 Ambient Air Monitoring Plan for Tennessee

The draft plan that is presented in the following pages will address each of the requirements specified in the Code of Federal Regulations (CFR). An overview of the geography, general climate, wind patterns and population trends are included to provide background information that will assist the reader in understanding the current air monitoring network and reasons for placement of the existing monitoring sites. The actual regulatory requirements that specify the number and placement of air monitoring sites are found in 40 CFR 58. The sections that provide this guidance are also included in the report as a reference to help better understand the actual monitoring needs in a given area.

In many instances, the “areas” for which monitoring is required are based on population criteria in which population must be considered to allow for monitoring in the areas where populations may be affected or exposed to the various criteria pollutants of concern. Additional monitoring sites are needed to address areas where source related emission density might be elevated and impact communities in the same area. Other considerations must also be addressed when selecting and operating air monitoring sites. The local influences of some types of sources (roadway dust or emissions) may be factors that require monitoring sites to be spaced certain distances from those sources or in the case of near-road or roadway monitoring activities, the monitors must be located very close to the potential sources of mobile emissions.

The principal areas in Tennessee with air monitoring sites are depicted with a graphic showing the locations for each of the monitoring sites. The sites are further identified with a site number, an Air Quality Site Identification (AQSID) and the types of pollutants being monitored for at each location. Tables containing the relevant information for each site are also included. The tables are provided in two sections following the location graphic and have been condensed and combined from the previous year’s format so that all relevant information can be found within each area’s section of the report and relieves the reader from searching tables at the end of the report for information about a given site.

Each of the four local programs operating an air monitoring network in Tennessee provided a separate annual review. The local program’s air monitoring network plan will be submitted at the same time as the state of Tennessee’s annual ambient air monitoring plan. Where revisions were noted in the local networks, those revisions were added to the state’s overall plan see Table 2: Metropolitan Monitoring Configuration for 2017.

The recent changes in the National Ambient Air Quality Standards (NAAQS) have resulted in a need to evaluate additional air monitoring in order to comply with the new standards. In some cases (PM, O₃, SO₂ and NO₂), the revisions to the standard were augmented with revisions to the monitoring requirements. Some of the necessary changes to the monitoring networks have been completed while others are being planned for implementation. These changes appear in the QA Handbook Volume II January, 2017.

The state of Tennessee is required to evaluate the ambient air monitoring network each year in accordance with requirements specified in 40 CFR Subpart B 58.10 and 40 CFR 58 Appendix D. All ambient air monitoring sites are meeting these regulatory requirements. Air monitoring evaluations are shown in Appendix I: Annual Site Evaluations. The Jackson and Lawrence air monitors have approved EPA waivers shown in Appendix F: EPA Approval and Special Request Letters.

Proposed Revisions to Tennessee's Ambient Air Monitoring Network

PM_{2.5} Monitoring:

The state of Tennessee does not propose to shut down any of the PM_{2.5} monitoring sites currently in operation but will propose adding to the sites an FEM continuous monitor so that eventually all but one of the PM_{2.5} sites are equipped with an FEM continuous monitor. The following table details the proposed modifications to this network, once the FEM monitors are installed, a period of correlation testing will be performed with the FRM and FEM samplers, both operating at the same time. After suitable amounts of data are generated, the FRM samplers meeting the correlation testing will be evaluated for shutdown. Using EPA's monitoring siting criteria; colocation for the new FEM samplers will be implemented. The need for meeting colocation requirements for the remaining filter based FRM's will be addressed based on the minimum requirements for colocation. Tennessee is proposing to move the Clarksville PM_{2.5} monitoring site due to safety concerns of the elevated platforms that are a part of the sampling network. Jackson and Lawrence monitoring sites have received a siting waiver and will be moved as soon as suitable locations are identified. EPA has no Source Oriented PM_{2.5} network monitoring requirements. The state of Tennessee will complete the establishment of the FEM monitoring network for PM_{2.5} during July 2017 through the end of December 2017.

Table 1: PM 2.5 Change Out Schedule

County	PM _{2.5} FRM Site ID	Street Address	Replace TEOM with a BAM 1022	Proposed BAM 1022 FEM	Existing BAM 1022 FEM	PM _{2.5} FRM Filter Based Sampler to Remain	Change out Schedule
Blount	470090011	2007 Sequoyah Ave, Maryville TN 37803	Yes	Yes	No	No	7/1/2017 to 12/31/2017
Dyer	470450004	175-B Greenwood St, Dyersburg TN 38024	Yes	Yes	Yes	No	7/1/2017 to 12/31/2017
Lawrence	470990002	355 Busby Rd, Loretto, TN 38469	Yes	Yes	No	No	7/1/2017 to 12/31/2017
Loudon	471050108	1703 Roberts Rd, Loudon, TN	N/A	Yes	Yes	No	7/1/2017 to 12/31/2017
McMinn	470071002	707 N Jackson St, Athens, TN 37303	Yes	Yes	Yes	No	7/1/2017 to 12/31/2017
Madison	471130006	1371-A North Pky, Jackson, TN 38301	Yes	Yes	No	No	7/1/2017 to 12/31/2017
Maury	471192007	1600 Nashville Hwy, Columbia, TN	N/A	Yes	Yes	No	7/1/2017 to 12/31/2017
Montgomery	471251009	1514-C Golf Club Ln, Clarksville, TN 37040	Yes	Yes	Yes	No	Operating
Putnam	471410005	630 East 20th St, Cookeville, TN 38501	N/A	Yes	Yes	No	7/1/2017 to 12/31/2017
Roane	471450004	1002 N. Roan St, Harriman, TN 37748	Yes	Yes	Yes	No	7/1/2017 to 12/31/2017
Sullivan	471631007	1649 D St, Kingsport TN 37664	Yes	Yes	Yes	No	7/1/2017 to 12/31/2017
Sumner	471650007	Rockland Recreation Area Old Hickory Dam Army Corp of Engineer Property	Yes	Yes	Yes	Yes	7/1/2017 to 12/31/2017

PM₁₀ Monitoring:

The state of Tennessee does not operate any PM₁₀ monitors as a part of the state network. The last PM₁₀ site, Luttrell, was shut down on December 31, 2015. Additional information on the monitoring requirements can be found in Appendix E: Monitoring Network Requirements.

Ozone Monitoring:

The Blountville and Fairview ozone sites have been relocated to comply with federal siting criteria. The Blountville site was moved 100 feet from its 2016 location and is considered a site reconfiguration. The EPA approval letter is attached. The Fairview site was relocated on the same property to meet the 40 CFR 58 siting criteria. The Fairview

site was relocated March 20, 2017 and began collecting data on March 29, 2017. Additional information can be found in Appendix F: EPA Approval and Special Request Letters and Appendix H: Fairview (471870106) Relocation Request.

Carbon Monoxide Monitoring:

The state of Tennessee does not operate any CO monitors as a part of the state network. Additional information on the monitoring requirements can be found in Appendix E: CO Monitoring Network Requirements.

Nitrogen Dioxide Monitoring:

The state of Tennessee does not operate any NO₂ monitors as a part of the state network. Additional information on the monitoring requirements can be found in Appendix E: NO₂ Monitoring Network Requirements.

Community Wide Monitors

An NO₂ monitoring site that meets the community wide monitoring requirement is already in operation in the Nashville CBSA. The NO₂ monitor AQS ID 47-037-0011, located on Trinity Lane in Nashville, Tennessee is identified in AQS as a SLAMS monitor. In the Memphis CBSA the state of Arkansas currently operates an NO₂ monitor at its Marion site, (AQS 05-035-0005).

National Core Monitoring Station

In October 2006, the United States Environmental Protection Agency (EPA) established the National Core (NCore) multi-pollutant monitoring network in its final amendments to the ambient air monitoring regulations for criteria pollutants (codified in 40 CFR parts 53 and 58). It is the expectation that each state will have at least one NCore site. Nationwide, approximately 50 sites will be located in urban locations and 20 sites in rural areas. The multi-pollutant monitoring approach at NCore sites will benefit health assessments, emissions strategy development, and future monitoring efforts. By providing data users, such as researchers and policy makers, with a robust suite of collocated pollutant and meteorological data, NCore sites will better characterize the numerous chemical and physical interactions between pollutants than what is traditionally available at compliance oriented monitoring sites. Shelby County operates the only required NCORE site in Tennessee. This site detailed in the Shelby's county ANMP plan. The Look Rock rural NCORE site is an optional site operated by NPS. Further details can be found in Appendix E: NCore Look Rock Monitoring Site.

Near-Road Monitors:

There are currently two Near Road sites in Tennessee, both operated in local program counties (Davidson and Shelby). The near-road monitoring network was initiated as part of the 2010 NO₂ NAAQS review and has become a multi-pollutant (CO, NO₂, NO, NO_x, PM_{2.5}) monitoring network. The EPA, in cooperation with state, local, and tribal air agencies has tracked the installation of near-road NO₂ monitoring stations across the country. As part of this effort, the Agency has created a list of sites and captured critical meta-data about the sites, their target roads and general operations. Additional information on near-road monitoring network can be found at <https://www3.epa.gov/ttnamti1/nearroad.html> and in Appendix E: Monitoring Network Requirements.

Lead Monitoring:

The state operates a single lead monitoring site in Sullivan County, Tennessee in the vicinity of the currently shutdown Exide facility. This site is located within the boundary of the current Bristol lead maintenance area. The site will be requested to be shutdown based on the closure of the sole lead source, now reclassified to attainment/maintenance and the surrender of air permits by the source.

Prevention of Significant Deterioration (PSD) monitoring:

The Prevention of Significant Deterioration (PSD) permitting program is a Clean Air Act preconstruction review program for new and modified major sources of air pollution (e.g., power plants, manufacturing facilities) where the area the source is located is classified as either in attainment or unclassifiable with the National Ambient Air Quality Standards (NAAQS). The NAAQS establishes maximum pollution concentration levels to protect public health and welfare from harmful levels of nitrogen oxides, ozone, sulfur dioxide, particulates, carbon monoxide,

and lead. A PSD increment is the maximum allowable increase in concentration towards the NAAQS from the baseline concentration for a pollutant. The baseline concentration is set for each existing pollutant at the time that the first complete PSD permit application affecting the area is submitted. PSD increments prevent the air quality in clean areas from completely consuming remaining air quality to the level set by the NAAQS. This monitoring requirement is triggered when there is insufficient ambient air quality data necessary to determine compliance with the NAAQS. Under these criteria, either pre or post construction monitoring may be required to be conducted in the area near the facility being constructed.

Currently, TDEC DAPC does not have any PSD monitors are operating in Tennessee.

Sulfur Dioxide Monitoring:

The state of Tennessee operates two SO₂ monitoring sites in the Kingsport, TN area named as nonattainment by EPA in Sullivan County, Tennessee. One is located on Skyland Drive (AQS 47-163-6002; Skyland) and the other on Wilburn Drive (AQS 47-163-6001; Ross N Robinson). These sites satisfy the PWEI (Pollution Weighted Emissions Index) requirements for the Kingsport CBSA. The state of Tennessee is investigating additional locations in the nonattainment area for SO₂ monitoring.

The state of Tennessee also operates an SO₂ monitoring site at Freels Bend (AQS 47-001-0101; Freels Bend), in Anderson County, Tennessee. This site was established to assess emission impacts from a nearby TVA fossil plant. The Knoxville CBSA is required to operate one SO₂ monitor based on the previous PWEI, however based upon the new 2014 NEI and 2016 CBSA population estimate; this may no longer be a requirement. TDEC DAPC will look into this further and determine the necessity when the final 2014 NEI is released.

The Purpose of Tennessee's Ambient Air Monitoring Network

There are several criteria used to determine the need for ambient air quality monitoring. Some of the criteria are as follows:

- EPA National Ambient Air Quality Standards (NAAQS) Criteria pollutant monitoring network requirements for the NCore (National Core), formally NAMS (National Air Monitoring Site); SLAMS (State and Local Air Monitoring Site); and SPM (Special Purpose Monitoring) monitoring networks
- The Code of Federal Regulations (CFR) sets forth as regulations the requirements for air quality monitoring to be implemented by the states and EPA. These requirements are primarily organized around population and emission density in a given area with the number of required monitors and the distribution of the monitors within the networks specified by these regulations. Additionally 40CFR, Part 58, Appendix D specifies criteria that must be followed in designing the NCore and SLAMS networks. The EPA must approve design and/or modifications to these networks.
- Additional federal regulations also specify requirements for Prevention of Significant Deterioration (PSD) monitoring networks. This monitoring requirement is triggered as part of a PSD permit application review where there is no representative contemporaneous ambient air quality data for the area near the proposed PSD source site. Under these criteria, either pre or post construction monitoring may be required to be conducted in the area near the facility likely to be impacted (as determined by modeling) by emissions.
- Air quality monitoring is required to be conducted to alert citizens in given areas to elevated levels of air pollutants in cities or communities of designated population levels that are required to provide Air Quality Index (AQI) reports to the general public.
- Air quality monitoring is conducted to address the need for background air quality data.
- Special air quality monitoring studies are conducted based on identified needs for monitoring data in a given area.
- Citizen complaints and enforcement investigations related to air quality are other reasons for air quality monitoring usually in or around a specific area related to the complaint or investigation.
- Where warranted, requests from citizens for special air monitoring studies are also a reason for air monitoring activities.
- The federal regulations also specify the frequency, method, location requirements, equipment, quality assurance procedures and reporting of data collected from the ambient air monitoring networks.

Table 2: Metropolitan Monitoring Configuration for 2017

Census Area Identification and Population			Monitoring Program	Lead		CO		SO ₂		NO ₂		Ozone			PM ₁₀		PM _{2.5}				PM _{2.5} Speciation		PM _{2.5} Cont.		
CBSA Code	Census 2010 / 2016	CBSA Title (MS Areas)	State / PQAQ	Operating	Required	Operating	Required	Operating	Required	Operating	Required	Operating	2014 2016 8 Hr DV (ppm)	Required	Operating	Required	Operating	2014 2016 Annual DV µg/m ³	2014 2016 24 Hr DV µg/m ³	Required	Operating	Required	Operating	Required	
16860	528,143 551,632	Chattanooga, TN-GA	GA 0437	0	0	0	0	0	0	0	1(b)	0	0.068	2	0	1(d)	1	8.7(c)	18(c)	2	0	1(a)	0	1	
			TN 0170	0		0		0		0		0			0(d)		3				0				
			TN 1025	0		0		0		0		0			0		0								
17300	260,625 282,349	Clarksville, TN-KY	KY 0584	0	0	0	0	0	0	0	0	1	0.062	1	0	0	0	8.5	18	1	0	0	0	1	
			TN 1025	0		0		0		0		0			0		1				0				
17420	115,788 121,262	Cleveland, TN		0	0	0	0	0	0	0	0	0		0	0	0	0			0	0	0	0	0	
27180	130,011 129,527	Jackson, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	2	7.7	16	0	0	0	2	1	
27740	198,716 201,667	Johnson City, TN		0	0	0	0	0	0	0	0	0		0	0	0	0			0	0	0	0	0	
28700	309,544 306,334	Kingsport-Bristol-Bristol, TN-VA	TN 1025	3	1	0	0	2	1	0	0	2	0.066	1	0	0	1	8.1(c)	16(c)	0	0	0	1	0	
			VA 1127	0		0		0		0		0			0		0								
28940	837,571 868,546	Knoxville, TN	TN 0581	3	1	0	0	0	1	0	1(b)	2	0.069	2	3	1	4	10.4(c)	33(c)	2	1	0	1	1	
			NPS 0745	0		1		0		0		0			0		0				0		0		0
			TN 1025	0		0		1		0		0			0		3				0		0		3
32820	1,324,829 1,342,842	Memphis, TN-MS-AR	AR 0055	0	1	0	1	0	1	1	2	1	0.067	2	0	2	0	8.6	18	2	0	1	0	1	
			MS 073	0		0		0		0		0			0		0				0		0		
			TN 0673	1		3		1		1		3			2		2				1		1		1
			TN 1025	0		0		0		0		0			0		0				0		0		0
34100	113,951 117,320	Morristown, TN	TN 1025	0	0	0	0	0	0	0	0	1	0.068	1	0	0	0			0	0	0	0	0	
34980	1,670,890 1,865,298	Nashville-Davidson—Murfreesboro	TN 0682	0	0	1	1	1	1	2	2	2	0.067	2	1(d)	2(d)	2	9.6	20	2	0	1(a)	1	1	
			TN 1025	0		0		0		2		3			0		2				0		2		0

(a) EPA has defunded the required speciation sampling in these areas. The CFR requirement has not been revised.

(b) This monitor is the near road site that may not be funded. The CFR requirement has not been revised.

(c) This data is subject to change upon EPA's concurrence of exceptional event requests.

(d) Monitoring agency receives a waiver from EPA Region 4.

Table 3: Micropolitan Monitoring Configuration for 2017

Census Area Identification and Population			Monitoring Program	Lead		CO		SO ₂		NO ₂		Ozone			PM ₁₀		PM _{2.5}				PM _{2.5} Speciation		PM _{2.5} Cont.	
CBSA Code	Census 2010 / 2016	CBSA Title (Micro Areas)		State / PQAQ	Operating	Required	Operating	Required	Operating	Required	Operating	Required	Operating	2014 2016 8 Hr DV (ppm)	Required	Operating	Required	Operating	2014 2016 Annual DV ug/m3	2014 2016 24 Hr DV ug/m3	Required	Operating	Required	Operating
11940	52,266 52,850	Athens, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	1	8.7(a)	21(a)	0	0	0	1	0
18260	106,042 109,548	Cookeville, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	1	7.8	18	0	0	0	1	0
29980	41,869 43,081	Lawrenceburg, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	1	7.2	15	0	0	0	1	0

(a) This data is subject to change upon EPA's concurrence of exceptional event requests.

Clean Air Status and Trends Network (CASTNET)

The Clean Air Status and Trends Network (CASTNET) monitoring network is designed to measure air quality in rural areas year-round. CASTNET sites in Tennessee and the state's MSAs are managed by the EPA's Clean Air Markets Division and operated by an EPA contractor. The three CASTNET sites in rural areas of Tennessee and Kentucky are as follows:

Table 4: CASTNET Sites in Tennessee

Site	AQSID	County	Location	2014 2016 DV (ppm)
Cadiz (CDZ171)	21-221-9991	Trigg	5720 Old Dover Rd, Cadiz, KY 42211	0.063
Edgar Evins (ESP127)	47-041-9991	DeKalb	Edgar Evins State Park, Smithville, TN 37166	0.062
Speedwell (SPD111)	47-025-9991	Claiborne	718 Russell Hill Rd, Speedwell, TN 37870	0.063

Monitoring Sites and Discussion

All TDEC DAPC operated sites meets the siting criteria as found in appendix E to 40 CFR Part 58 for probe and monitoring path for PM_{2.5}, O₃, Pb, and SO₂. These sites will be reevaluated annually for compliance with this criterion. These sites are part of the state of Tennessee ambient air monitoring criteria pollutant monitoring network and operated to ensure continued compliance with appendix D to 40 CFR Part 58 network design requirements. These sites are summarized in Table 2: Metropolitan Monitoring Configuration for 2017 and Table 3: Micropolitan Monitoring Configuration for 2017 on pages 11 and 12 of this plan. Current site evaluations with photographs, distance measurements and confirmation of meeting the siting criteria requirements are provided in Appendix I: Annual Site Evaluations to this plan.

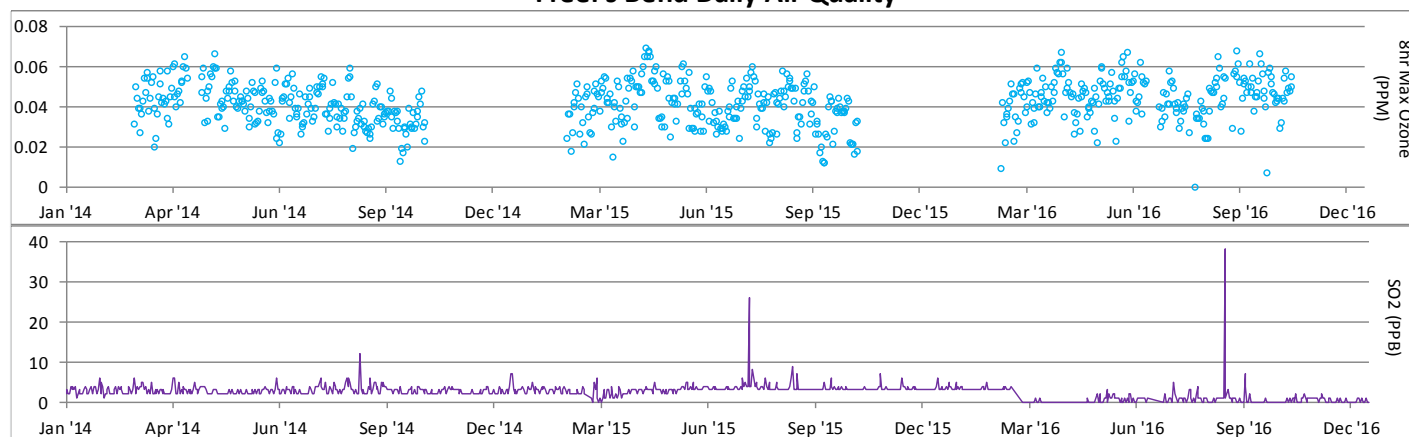
The Jackson and Lawrence sites are currently operating under an EPA approved siting criteria waiver pursuant to appendix E to 40 CFR Part 58 for probe and monitoring path for PM_{2.5}. New sites are being evaluated during CY 2017 that will meet all of the siting criteria. Copies of the approval letters are found in Appendix F: EPA Approval and Special Request Letters. These sites are part of the state's PM_{2.5} criteria pollutant monitoring network and operated to ensure continued compliance with appendix D to 40 CFR Part 58 network design requirements. A summary appears in Table 2: Metropolitan Monitoring Configuration for 2017 and Table 3: Micropolitan Monitoring Configuration for 2017 on pages 11 and 12 of this plan.

Freels Bend – Anderson County

Address	Freels Bend Study Area Melton Lake Oak Ridge	
AQSID	470010101	
CBSA	28940	
Lat, Lon	35.96522, -84.223159	
Parameter Code	42401	44201
Parameter Name	SO ₂	O ₃
Monitor Type	SLAMS	SLAMS
POC	1	1
Int	1	W
Collection Frequency	Hourly	Hourly
Method	100	87
FRM/FEM Instrument	Api Model 100 A SO2 Analyzer	Model 400 Ozone Analyzer
Analysis	Ultraviolet Fluorescence	Ultra Violet Absorption
Ref Mtd ID	EQSA-0495-100	EQOA-0992-087
Monitor Objective	Population Exposure	Population Exposure
Dominant Source	Area	Area
Measurement Scale	Urban Scale	Urban Scale
Land Use Type	Forest	Forest
Location Setting	Rural	Rural

The Freels Bend site is located in Anderson County, Tennessee and currently supports monitoring for ozone and sulfur dioxide. The site was initially established in 1992 and is expected to operate during CY's 2017 and 2018. This site is located west of Knoxville and southeast of Oak Ridge, Tennessee. This site is an upwind site from the core Knoxville MSA area. Sulfur dioxide monitoring began 03/01/2013 to assess emission impacts from the Bull Run FP. Because of the importance this site serves in assessing both the upwind ozone levels entering the Knoxville area and the ongoing need to continue to collect SO₂ data to assess area impacts near the TVA facility, this site was determined to remain in operation over 5 years (2015 through 2020). The Knoxville MSA has six operating ozone sites and is required to have only two. This site also meets the MSA's requirement of having one SO₂ site. This site is also employed in the AQI forecasting program and currently is attaining the standards for both ozone and SO₂. See Appendix I: Annual Site Evaluations for further details.

Freel's Bend Daily Air Quality

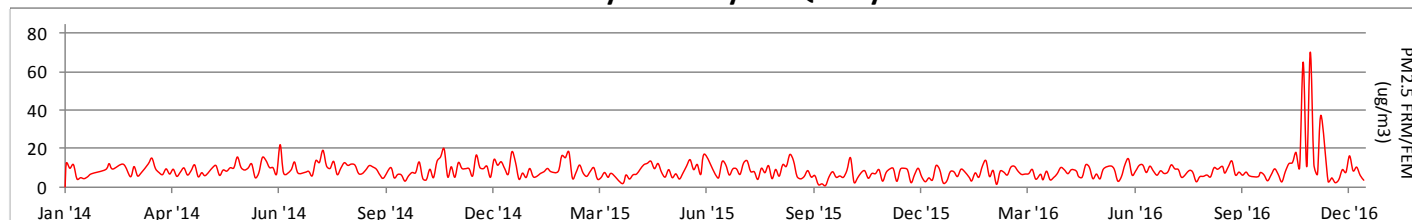


Maryville – Blount County

Address	2007 Sequoyah Avenue Maryville TN 37803	
AQSID	470090011	
CBSA	28940	
Lat, Lon	35.768847, -83.942152	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SPM	SPM
POC	1	3
Int	7	1
Collection Frequency	1 in 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022 FEM
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	Rfps-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure	
Dominant Source	Area	
Measurement Scale	Neighborhood	
Land Use Type	Residential	
Location Setting	Suburban	

The Maryville site is located in Blount County, Tennessee and currently supports monitoring for fine particulate matter. The site was initially established in 2000 and is expected to operate during CY's 2017 and 2018. This site is located south of Knoxville and northwest of the GSMNP, Tennessee. This site is an upwind site from the core Knoxville MSA area. PM_{2.5} monitoring began 05/01/2000 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM or a BAM 1022 FEM method was added later to assist with the PM Fine AQI forecasting program. Because of the importance this site serves in assessing the upwind PM_{2.5} levels entering the Knoxville area, this site was determined to remain in operation over 5 years (2015 through 2020). The Knoxville MSA has 6 PM_{2.5} FRM sites and is only required to have 2 to meet the minimum requirements. This site is a candidate site to receive an FEM continuous PM_{2.5} sampler (2017) and at such time the FRM sampler will be retired upon completion of routine correlation testing. This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from Georgia and North Carolina. See Appendix I: Annual Site Evaluations for further details.

Maryville Daily Air Quality

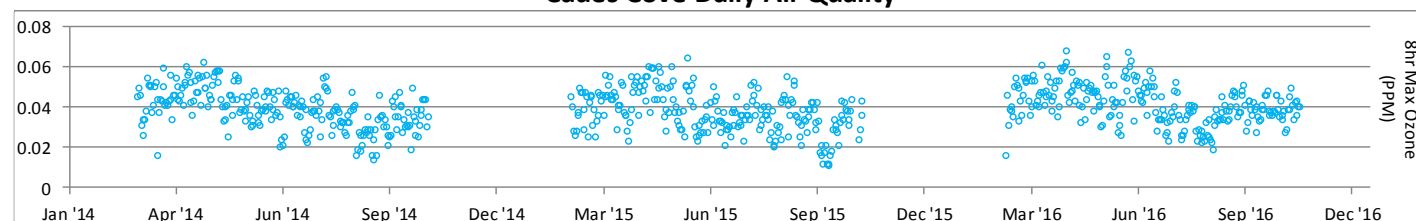


Cades Cove – Blount County (GSM NP)

Address	Great Smoky Mountains NP - Cades Cove
AQSID	470090102
CBSA	28940
Lat, Lon	35.603056, - 83.78361099999999
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	Non-EPA Federal
POC	1
Int	W
Collection Frequency	Hourly
Method	53
FRM/FEM Instrument	Monitor Labs 8810
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0881-053
Monitor Objective	Highest Concentration
Dominant Source	0
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Cades Cove site is located in Blount County, Tennessee and currently supports monitoring for ozone and meteorological parameters. The site was initially established in 05/01/1994 and is expected to operate during CY's 2017 and 2018. This site is located within the Tennessee portion of the Great Smoky Mtns. National Park. This site is within and southeast of the Knoxville MSA area. Ozone monitoring began 05/01/1994 and this site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area and TDEC DAPC reports the ozone data for this site to AQS. It is the responsibility of the NPS to operate, maintain, and conduct all QA/QC activities at this site in accordance with 40 CFR Part 58. The Cades Cove ozone site was determined to remain in operation over 5 years (2015 through 2020), subject to funding support from the Natural Parks Services (NPS). The NPS is responsible for verifying, validating and certifying the ozone data collected by this site.

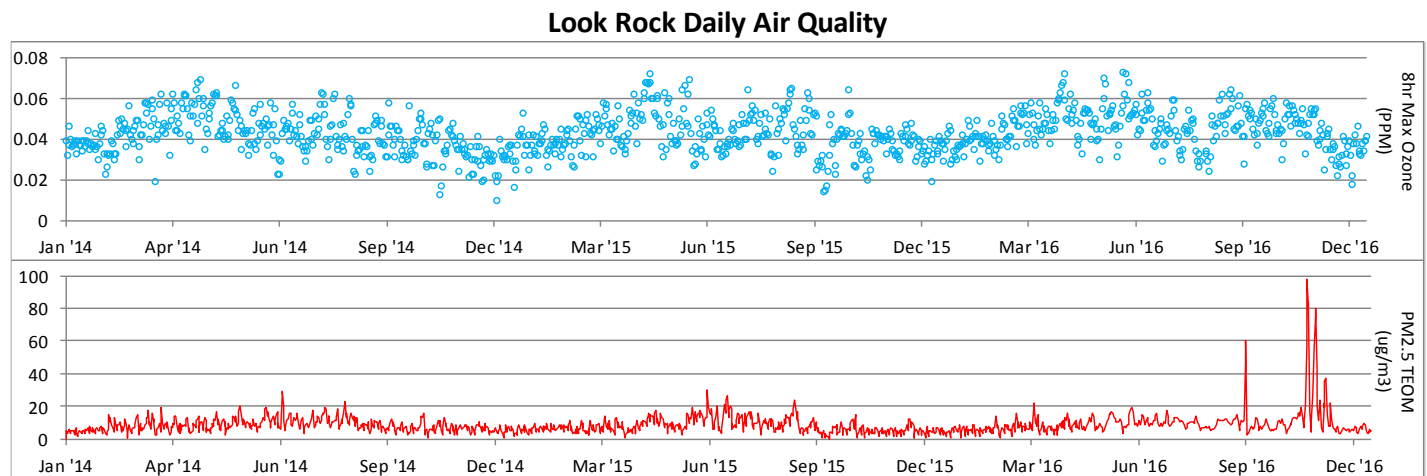
Cades Cove Daily Air Quality



Look Rock – Blount County (GSM NP)

Address	Great Smoky Mountains NP Look Rock	
AQSID	470090101	
CBSA	28940	
Lat, Lon	35.6334799, -83.941605999999993	
Parameter Code	44201	88501
Parameter Name	O ₃	PM _{2.5} Cont
Monitor Type	SLAMS	SPM
POC	1	3
Int	W	1
Collection Frequency	Hourly	Hourly
Method	053	716
FRM/FEM Instrument	Monitor Labs 8810	None
Analysis	Ultra Violet	TEOM Gravimetric 50 deg C
Ref Mtd ID	EQOA-0881-053	None
Monitor Objective	General Background	
Dominant Source	0	
Measurement Scale	0	
Land Use Type	Forest	
Location Setting	Rural	

The Look Rock site is located in Blount County, Tennessee and currently supports monitoring for ozone and other pollutants. The site was initially established in 1980 and is expected to operate during CY's 2017 and 2018. This site is located within the Tennessee portion of the Great Smoky Mtns. National Park. This site is within and southeast of the Knoxville MSA area. Ozone monitoring began 07/23/1998 and this site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. PM_{2.5} monitoring began 05/01/2002 and this site is used with the PM Fine AQI forecasting program for verification and to help address fine particulate levels found in the GSMNP area. TDEC DAPC reports the TEOM PM2.5 data for this site to AQS. This site is operated and maintained by the NPS and was determined to remain in operation over 5 years (2015 through 2020), subject to funding support from the NPS. See Appendix I: Annual Site Evaluations for further details. The NPS is responsible for verifying, validating and certifying the ozone data collected by this site.

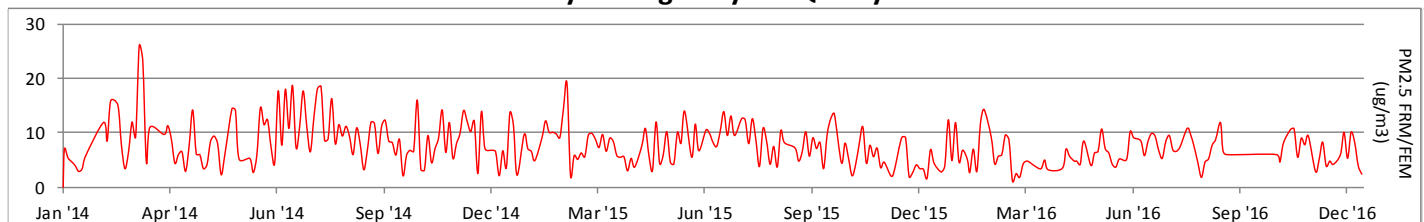


Dyersburg – Dyer County

Address	175-B Greenwood Street, Dyersburg TN 38024	
AQSID	470450004	
CBSA	20540	
Lat, Lon	36.038924, -89.382126	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SLAMS	SLAMS
POC	1	3
Int	7	1
Collection Frequency	1 In 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure	
Dominant Source	Area	
Measurement Scale	Neighborhood	
Land Use Type	Residential	
Location Setting	Suburban	

The Dyersburg site is located in Dyer County, Tennessee and currently supports monitoring for fine particulate matter. The site was initially established in 1999 and is expected to operate during CY's 2017 and 2018. This site is located northwest of Jackson and north-northeast of Memphis, Tennessee. This site is downwind from the core Memphis MSA area. PM_{2.5} monitoring began 08/22/1998 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a Met One BAM 1022 FEM method was added later to assist with the PM Fine AQI forecasting program. Because of the importance this site serves in assessing the area PM_{2.5} levels outside of the Memphis area, this site was determined to remain in operation over 5 years (2015 through 2020). This site also received an FEM continuous PM_{2.5} sampler on Jan 10, 2017 and the FRM sampler will be retired upon completion of routing correlation testing. This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from adjacent states. See Appendix I: Annual Site Evaluations for further details.

Dyersburg Daily Air Quality

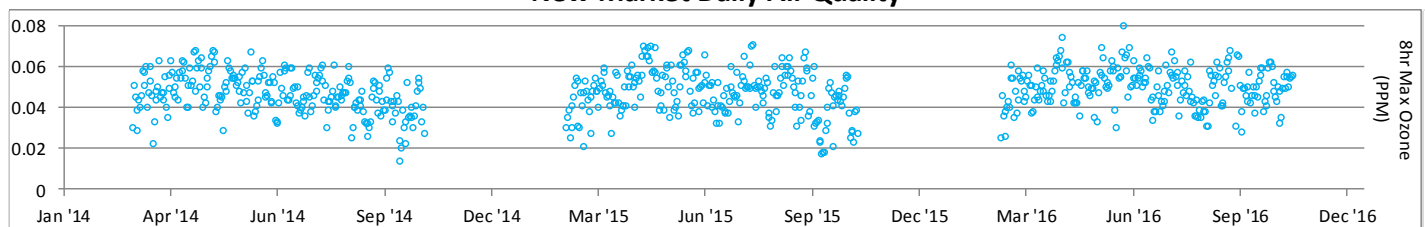


New Market – Jefferson County

Address	2393 Forrester Rd, New Market, TN 37820
AQSID	470890002
CBSA	34100
Lat, Lon	36.105629, -83.6020769999999
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	87
FRM/FEM Instrument	Model 400 Ozone Analyzer
Analysis	Ultra Violet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Max Ozone Concentration
Dominant Source	0
Measurement Scale	0
Land Use Type	Agricultural
Location Setting	Rural

The New Market site is located in Jefferson County, Tennessee and currently supports monitoring for ozone. The site was initially established in 1999 and is expected to operate during CY's 2017 and 2018. This site is located east northeast of Knoxville and west northwest of Morristown, Tennessee. This site is downwind from the core Knoxville MSA area. Ozone monitoring began 03/01/1999 and this site is used with the ozone AQI forecasting program for verification and to help address transport wind patterns opposite of the predominate area directions. This MSA is required to have 1 ozone site and this site meets that requirement. Because of the importance, this site serves in assessing the area ozone levels outside and downwind of the Knoxville area, this site was determined to remain in operation over 5 years (2015 through 2020). See Appendix I: Annual Site Evaluations for further details.

New Market Daily Air Quality

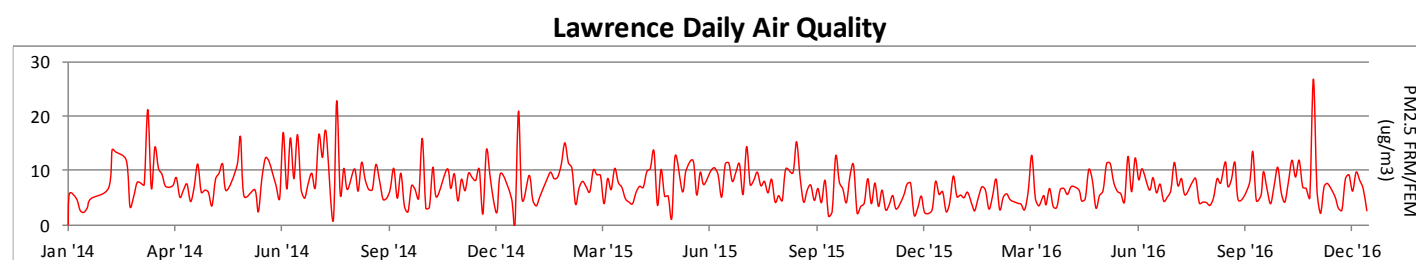


Lawrence – Lawrence County

Address	355 Busby Rd, Loretto, TN 38469	
AQSID	470990002	
CBSA	29980	
Lat, Lon	35.115968, -87.469954	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SLAMS	SLAMS
POC	1	3
Int	7	1
Collection Frequency	1 In 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Upwind background, population exposure	
Dominant Source	0	
Measurement Scale	Regional Scale	
Land Use Type	Agricultural	
Location Setting	Rural	

The Lawrence Co. site is located in Lawrence County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located on the southern border of Tennessee north of Alabama. The site is south west of Nashville and south east of Jackson, Tennessee. This site is not located near any MSA area in Tennessee. PM_{2.5} monitoring began 12/24/1998 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM method was added 01/01/2003 to assist with the PM_{2.5} AQI forecasting program. This site also supported a PM_{2.5} Speciation and URG sampler from 12/03/2001 to 09/26/2014. This site is schedule to receive an FEM continuous PM_{2.5} sampler this year and at such time the FRM sampler will be retired upon completion of routine correlation testing. Because this site serves as a background PM_{2.5} site it was determined to remain in operation over 5 years (2015 through 2020). See Appendix I: Annual Site Evaluations for further details.

This site will continue to operate under an EPA site waiver until a new location can be found. See Appendix F: EPA Approval and Special Request Letters for the siting waiver from the EPA.



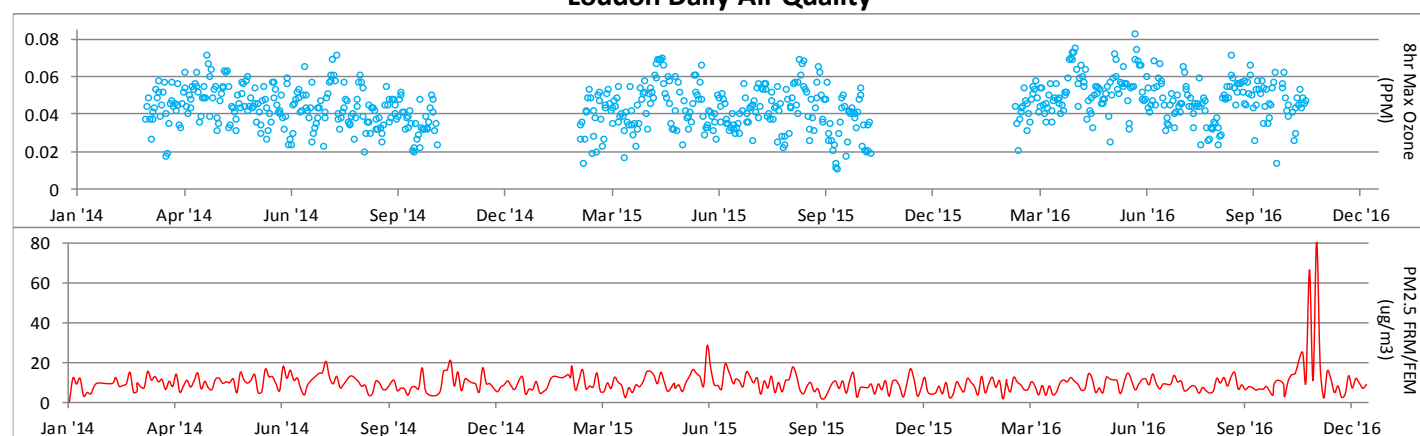
Loudon – Loudon County

Address	2175 Robert Road, Loudon, TN 37774		
AQSID	471050108		
CBSA	28940		
Lat, Lon	35.744539, -84.317057		
Parameter Code	44201	88101	88101
Parameter Name	O ₃	PM _{2.5} Cont	PM _{2.5} Cont
Monitor Type	SLAMS	SPM	SPM
POC	1	3	4
Int	W	1	1
Year	2014	2017	2017 - planned
Collection Frequency	Hourly	Hourly	Hourly
Method	87	209	209
FRM/FEM Instrument	Model 400 Ozone Analyzer	Met One BAM 1022	Met One BAM 1022
Analysis	Ultra Violet Absorption	Real Time Beta Attenuation Mass Monitor	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0992-087	EQPM-1013-209	EQPM-1013-209
Monitor Objective	Max Ozone Concentration	Population Exposure	Population Exposure
Dominant Source	Area		
Measurement Scale	Neighborhood		
Land Use Type	Residential		
Location Setting	Suburban		

The Loudon Pope site has been relocated from 130 Webb Drive, Loudon, TN 37774 to 2175 Roberts Road, in Loudon County, TN 37774. The relocation approval letter can be found in Appendix F: EPA Approval and Special Request Letters. The Loudon site supports monitoring for PM_{2.5} and O₃. This site is located southwest of Knoxville and northeast of Chattanooga, Tennessee. This site is upwind of the Knoxville Core MSA area and downwind from the Chattanooga MSA area. The ozone monitor was relocated to the Loudon Elementary School site March 3, 2017. The Knoxville MSA has 6 operating ozone sites and is only required to have 2.

PM_{2.5} monitoring is scheduled to begin on June 1, 2017 as a part of the Loudon air quality study and complaint investigation. This site received an FEM continuous PM_{2.5} sampler on May 8, 2017. The FRM sampler located at the on 130 Webb Drive, Loudon, TN 37774 will be retired upon completion of routine correlation testing. The Knoxville MSA has 6 operating PM_{2.5} FRM sites and is required to have only 2. See Appendix I: Annual Site Evaluations for further details. The Loudon site will serve as the new PM_{2.5} collocated site due to a higher 3-year design value than the current Jackson collocated site. Loudon has a 3-year design (2014-2016) value of 9.5µg/m³ and Jackson has a 3-year design value of 7.7µg/m³. The changeover to the collocation is projected to take place by December 31, 2017. Monitoring at this site is used by the AQI forecasting program for verification for the Knoxville MSA area. This site serves in assessing the air quality levels upwind of the Knoxville area.

Loudon Daily Air Quality

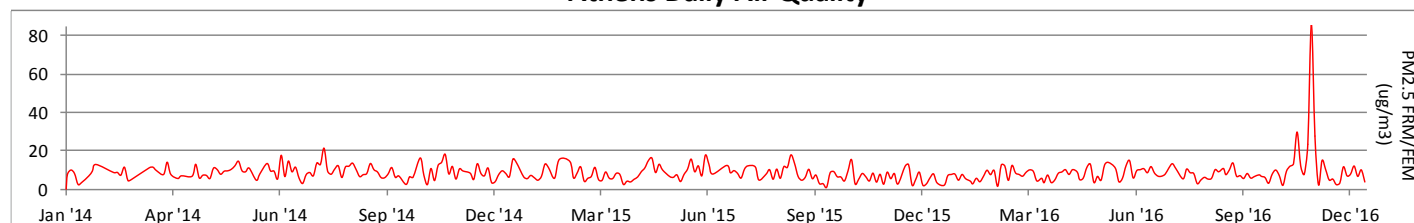


Athens – McMinn County

Address	Saint Mark Ame Zion Church: 707 North Jackson St, Athens, TN 37303	
AQSID	471071002	
CBSA	11940	
Lat, Lon	35.45011499, -84.59619499999999	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SPM	SPM
POC	1	3
Int	7	1
Collection Frequency	1 In 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure	
Dominant Source	Area	
Measurement Scale	Neighborhood	
Land Use Type	Commercial	
Location Setting	Urban And Center City	

The Athens site is located in McMinn County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located northeast of Chattanooga and southwest of Knoxville, Tennessee. This site is downwind from the Chattanooga MSA area and located in the Athens, Micropolitan area. PM_{2.5} monitoring began 02/03/2000 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM method was added 01/01/2005 to assist with the PM Fine AQI forecasting program. This site also received an FEM continuous PM_{2.5} sampler on July 18, 2016 and the FRM sampler will be retired upon completion of routing correlation testing. This site was determined to remain in operation over 5 years (2015 through 2020). This site serves to help quantify air quality in this developing area of the state. See Appendix I: Annual Site Evaluations for further details.

Athens Daily Air Quality



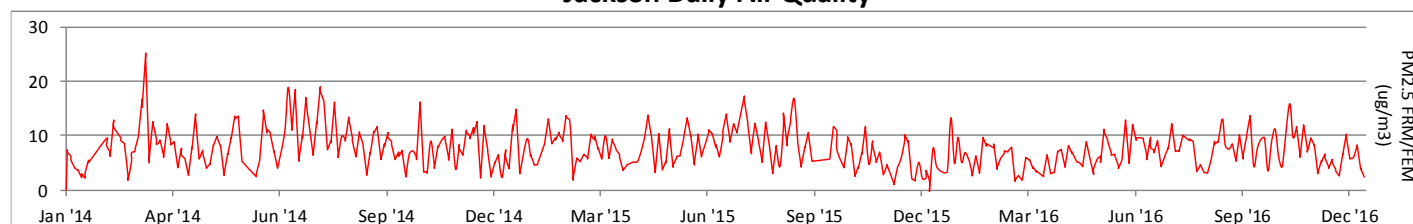
Jackson – Madison County

Address	1371-A North Parkway, Jackson, TN 38301		
AQSID	471130006		
CBSA	27180		
Lat, Lon	35.6513489999999, -88.809578		
Parameter Code	88101	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SLAMS	SLAMS	SLAMS
POC	1	2	3
Int	7	7	1
Collection Frequency	1 In 3	1 In 3	Hourly
Method	118	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025		Met One BAM 1022
Analysis	Gravimetric		Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118		EQPM-1013-209
Monitor Objective	Population Exposure		
Dominant Source	Area		
Measurement Scale	Neighborhood		
Land Use Type	Residential		
Location Setting	Suburban		

The Jackson site is located in Madison County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located northeast of Memphis, Tennessee and southeast of Dyersburg, Tennessee. This site is located in the Jackson, TN MSA area. PM_{2.5} monitoring began 11/17/2004 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM method was added 01/01/2005 to assist with the PM Fine AQI forecasting program. This site is a candidate to receive an FEM continuous PM_{2.5} sampler (2017) and the FRM sampler will be retired upon completion of routine correlation testing. The Jackson MSA area has a single FRM PM_{2.5} sampler and is not required to operate any PM_{2.5} sites. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only PM_{2.5} monitoring site in this region. See Appendix I: Annual Site Evaluations for further details. This site will continue to operate under an EPA site waiver until a new location can be found. Also see Appendix F: EPA Approval and Special Request Letters for the siting waiver from the EPA.

The Jackson PM_{2.5} site will no longer be collocated by December 31, 2017. It will only contain a single FEM PM_{2.5} monitor. The Loudon site will serve as the new collocated PM_{2.5} site because it has higher 3 year (2014-2016) design value than the Jackson monitor. Loudon has a 3-year design value of 9.5µg/m³ and Jackson has a 3-year design value of 7.7µg/m³.

Jackson Daily Air Quality

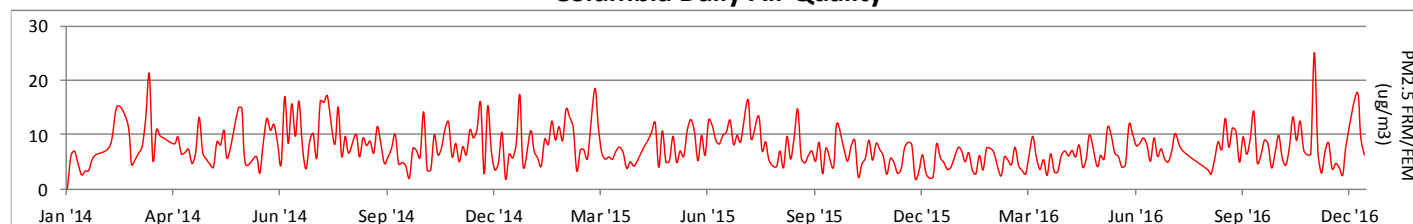


Columbia – Maury County

Address	1600 Nashville Hwy, Columbia, TN	
AQSID	471192007	
CBSA	17940	
Lat, Lon	35.65187999, -87.0096	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SPM	SPM
POC	1	3
Int	7	1
Collection Frequency	1 In 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure	
Dominant Source	Area	
Measurement Scale	Middle Scale	
Land Use Type	Commercial	
Location Setting	Urban And Center City	

The Columbia site is located in Maury County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located south-southwest of Nashville and northwest of Lewisburg, Tennessee. This site is up wind from the Nashville MSA area. PM_{2.5} monitoring began 12/25/1998 as a part of the original PM_{2.5} state network. This site also received an FEM continuous PM_{2.5} sampler on April 13, 2016 and the FRM sampler will be retired upon completion of routing correlation testing. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only PM_{2.5} site in this region. See Appendix I: Annual Site Evaluations for further details.

Columbia Daily Air Quality

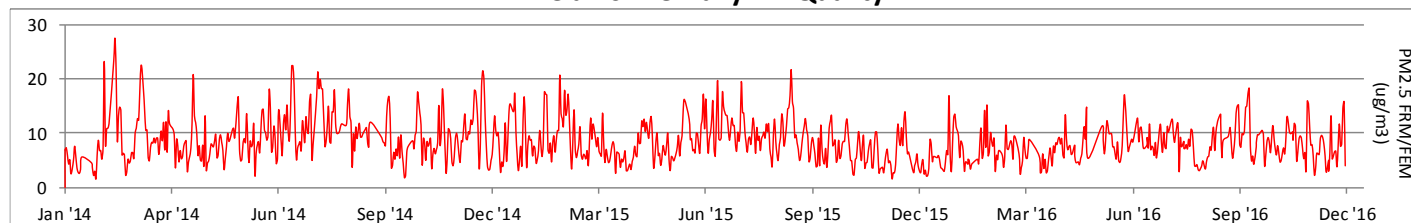


Clarksville – Montgomery County

Address	1514-C Golf Club Ln, Clarksville, TN	
AQSID	471251009	
CBSA	11940	
Lat, Lon	36.514712, -87.32804699999999	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SLAMS	SLAMS
POC	1	3
Int	7	1
Collection Frequency	Daily	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure	
Dominant Source	0	
Measurement Scale	Neighborhood	
Land Use Type	Residential	
Location Setting	Suburban	

The Clarksville site is located in Montgomery County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located northwest of Nashville, Tennessee and is located near the Tennessee/Kentucky border. This site is upwind from the Clarksville, TN-KY MSA area. This site is suitable for use in meeting the MSA monitoring requirement for PM_{2.5} for both Tennessee and Kentucky. PM_{2.5} monitoring began 01/01/1998 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM method was added 03/10/2008 to assist with the PM fine AQI forecasting program. The Clarksville MSA area has a single FRM PM_{2.5} sampler and is not required to operate a PM_{2.5} site for the MSA. This site also received an FEM continuous PM_{2.5} sampler on Jan 7, 2017 and the FRM sampler will be retired upon completion of routing correlation testing. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only PM_{2.5} site in this region. Tennessee is considering removal of the elevated platforms that are a part of the sampling network for safety related concerns and is proposing to place the Clarksville PM_{2.5} monitoring site on the ground near the existing location the elevated platform now occupies. If a suitable location is not available in the immediate area, Tennessee proposes to relocate the site as close as possible to the previous location. This proposed change is anticipated over the next calendar year and will be preceded by a formal written request to EPA with the relocation details. See Appendix I: Annual Site Evaluations for further details.

Clarksville Daily Air Quality

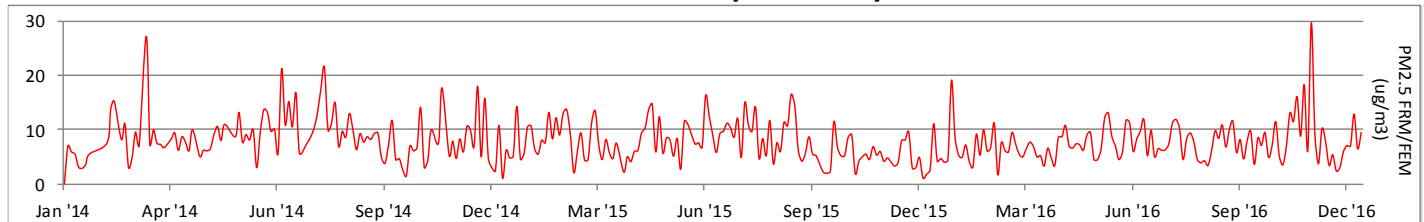


Cookeville – Putnam County

Address	630 East 20Th Street, Cookeville TN	
AQSID	471410005	
CBSA	18260	
Lat, Lon	36.1857019999999, -85.492107	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SPM	SPM
POC	1	3
Int	7	1
Collection Frequency	1 In 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure	
Dominant Source	Area	
Measurement Scale	Neighborhood	
Land Use Type	Residential	
Location Setting	Suburban	

The Cookeville site is located in Putnam County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located east of Nashville and northeast of Chattanooga, Tennessee. This site is not located in or near an MSA area. PM_{2.5} monitoring began 08/15/2006 after the site was relocated. This site also received an FEM continuous PM2.5 sampler on February 9, 2017 and the FRM sampler will be retired upon completion of routing correlation testing. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only PM_{2.5} site in this region. See Appendix I: Annual Site Evaluations for further details.

Cookeville Daily Air Quality

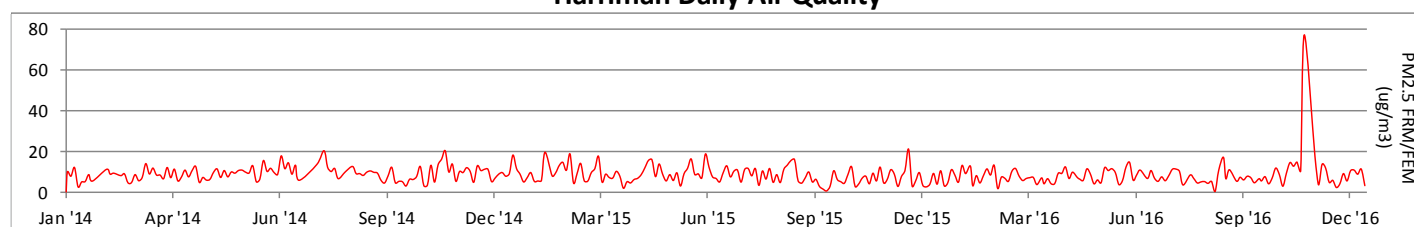


Harriman – Roane County

Address	Harriman High: 1002 N. Roan St Harriman, TN	
AQSID	471450004	
CBSA	11940	
Lat, Lon	35.939078, -84.54280199999999	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SPM	SPM
POC	1	3
Int	7	1
Collection Frequency	1 In 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure	
Dominant Source	Area	
Measurement Scale	0	
Land Use Type	Industrial	
Location Setting	Suburban	

The Harriman site is located in Roane County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located west of Knoxville and west-southwest of Oak Ridge, Tennessee. This site is upwind from the Knoxville MSA area. PM_{2.5} monitoring began 01/01/1998 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM method was added 01/01/2005 to assist with the PM fine AQI forecasting program. This site also received an FEM continuous PM_{2.5} sampler on Jan 23, 2017 and the FRM sampler will be retired upon completion of routing correlation testing. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is in a county containing a partial PM_{2.5} nonattainment area. The Knoxville MSA has six operating PM_{2.5} FRM sites and is required to have only two. See Appendix I: Annual Site Evaluations for further details.

Harriman Daily Air Quality

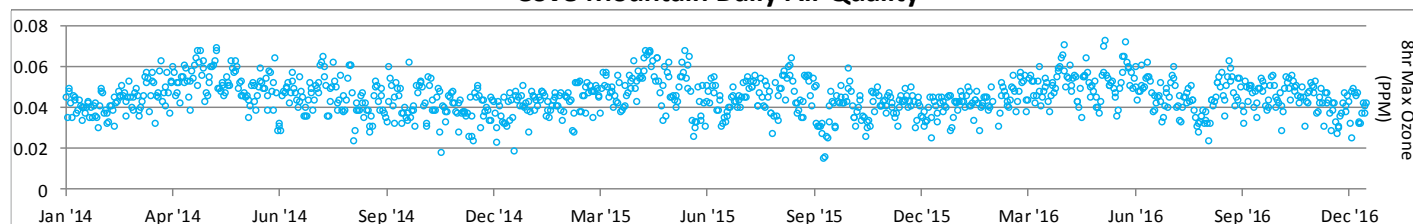


Cove Mountain – Sevier Country (GSM NP)

Address	Great Smoky Mountain NP- Cove Mountain
AQSID	471550101
CBSA	42940
Lat, Lon	35.6966669999999, -83.609722
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	General/Background
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Forest
Location Setting	Rural

The Cove Mt. site is located in Sevier County, Tennessee and currently supports monitoring for ozone and meteorological parameters. This site is located within the Tennessee portion of the Great Smoky Mtns. National Park. This site is outside and southeast of the Knoxville MSA area. Ozone monitoring began 07/01/1988 and this site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. This site is operated and maintained by the NPS and was determined to remain in operation over 5 years (2015 through 2020), subject to funding support from the NPS.

Cove Mountain Daily Air Quality

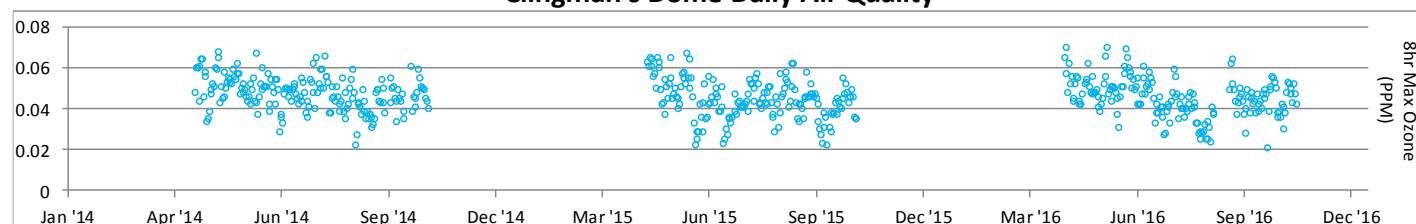


Clingman's Dome – Sevier County (GSM NP)

Address	Great Smoky Mountain Np Clingman's Dome
AQSID	471550102
CBSA	42940
Lat, Lon	35.562778, -83.4981
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Year	2014
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-47
Monitor Objective	Highest Concentration
Dominant Source	Area
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Clingman's Dome site is located in Sevier County, Tennessee and currently supports monitoring for ozone and meteorological parameters. This site is located within the Tennessee portion of the Great Smoky Mtns. National Park. This site is outside and southeast of the Knoxville MSA area. Ozone monitoring began 04/01/1993 and this site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. This site is operated and maintained by the NPS and was determined to remain in operation over 5 years (2015 through 2020), subject to funding support from the NPS. The location for the site is the highest point inside of Tennessee and the site is actually located on the border of Tennessee and North Carolina. The elevation of the site poses challenges in maintenance and access as the site is often impacted in the late fall and throughout the winter and spring by excessive snow fall and icing events that prevent access to the site. The ozone data collected at this site is truncated due to the site access issues in March and April and in some years in October due to early snowfall events.

Clingman's Dome Daily Air Quality

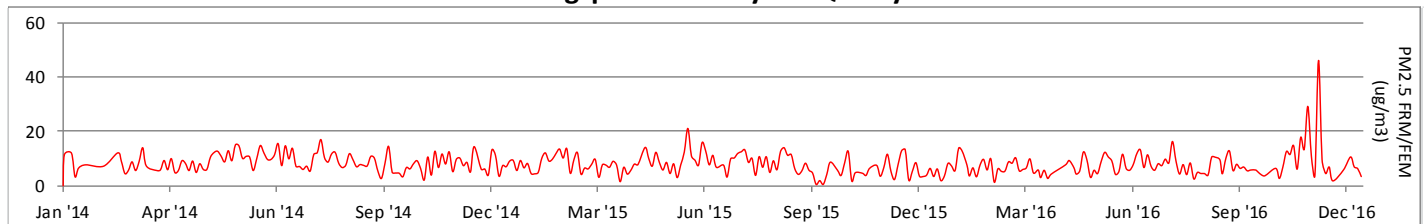


Kingsport (PM_{2.5}) – Sullivan County

Address	1649 D Street Kingsport TN 37664	
AQSID	471631007	
CBSA	11940	
Lat, Lon	36.5387619999999, -82.5215649999999	
Parameter Code	88101	88101
Parameter Name	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SLAMS	SPM
POC	1	3
Int	7	1
Collection Frequency	1 In 3	Hourly
Method	118	209
FRM/FEM Instrument	R & P Co Plus Model 2025	Met One BAM 1022
Analysis	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Population Exposure Upwind Background	Population Exposure
Dominant Source	Area	
Measurement Scale	Urban Scale	
Land Use Type	Residential	
Location Setting	Suburban	

The Kingsport site is located in Sullivan County, Tennessee and currently supports monitoring for PM_{2.5}. This site is located in the far northeast corner of the state and is south of the state of Virginia on the Tennessee Virginia line. This site is upwind of Gate City, VA and downwind from the Johnson City MSA area. Kingsport is also a part of the Kingsport Bristol MSA. PM_{2.5} monitoring began 10/01/1998 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM method was added 01/01/2005 to assist with the PM Fine AQI forecasting program. The Kingsport MSA area has a single FRM PM_{2.5} sampler and is not required to operate a PM_{2.5} site for the MSA. This site also received an FEM continuous PM_{2.5} sampler on March 13, 2017 and the FRM sampler will be retired upon completion of routing correlation testing. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only PM_{2.5} site in this region. See Appendix I: Annual Site Evaluations for further details.

Kingsport PM Daily Air Quality

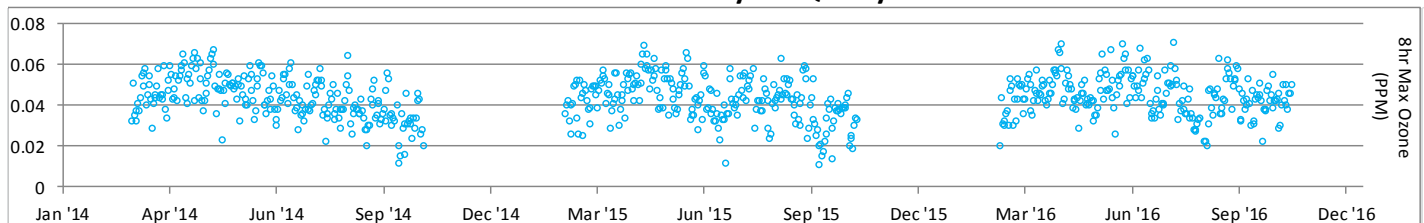


Blountville – Sullivan County

Address	Indian Springs School Shawnee Ave Blountville, TN
AQSID	471632002
CBSA	28700
Lat, Lon	36.5414389999999, -82.424824
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	87
FRM/FEM Instrument	Model 400 Ozone Analyzer
Analysis	Ultra Violet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Rural

The Blountville site is located in Sullivan County, Tennessee and currently supports monitoring for ozone. This site is located east of Kingsport and near the Virginia state line. This site is downwind from the Johnson City MSA area. Ozone monitoring began 01/01/1980 and this site is used with the ozone AQI forecasting program for verification and to help address the ozone impacts in the Kingsport - Bristol and Johnson City MSA area. The Kingsport MSA has 2 ozone sites operating and is required to have only 1 ozone site. TDEC will propose the shut this site down in the next year. There is another ozone monitoring site in Sullivan County that will remain operational. See Appendix I: Annual Site Evaluations for further details. This site was reconfigured in March 2017 due to failing the siting criteria requirements stated in 40 CFR 58 Appendix D. The reconfiguration letter was approved on please refer to Appendix F: EPA Approval and Special Request Letters.

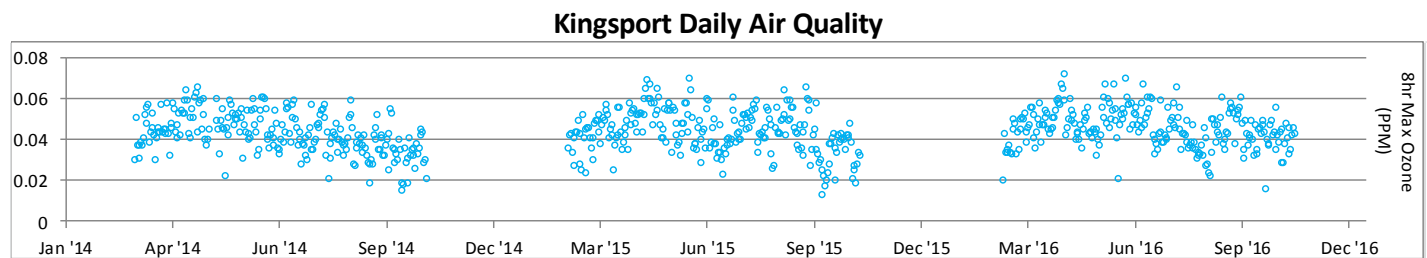
Blountville Daily Air Quality



Kingsport O₃ – Sullivan County

Address	3301 Bloomingdale Rd. Kingsport TN 3762
AQSID	471632003
County Name	Sullivan
CBSA	28700
Lat, Lon	36.58211, -82.485742
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	87
FRM/FEM Instrument	Model 400 Ozone Analyzer
Analysis	Ultra Violet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	0
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Kingsport site is located in Sullivan County, Tennessee and currently supports monitoring for ozone. This site is located in the far northeast corner of the state and is south of the state of Virginia on the Tennessee Virginia line. This site is upwind of Gate City, VA and downwind from the Johnson City MSA area. Kingsport is also a part of the Kingsport Bristol MSA Ozone monitoring began 04/01/1995 and this site is used with the ozone AQI forecasting program for verification and to help address the Kingsport-Bristol-MSA area. The Kingsport MSA has two ozone sites operating and is required to have only one ozone site. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is located in the Kingsport area. See Appendix I: Annual Site Evaluations for further details.

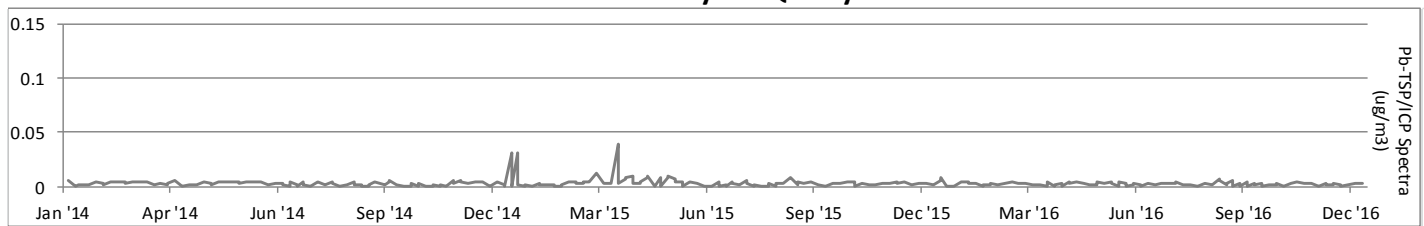


Exide – Sullivan County

Address	364 Exide Drive, Bristol TN 37620	
AQSID	471633004	
County Name	Sullivan	
CBSA	11940	
Lat, Lon	36.524433, -82.27261	
Parameter Code	14129	14129
Parameter Name	Pb	Pb
Monitor Type	SLAMS	SLAMS
POC	1	2
Int	7	7
Collection Frequency	1 In 6	1 In 6
Method	192	192
FRM/FEM Instrument	Pb-TSP/ICP Spectra (ICP-MS)	Pb-TSP/ICP Spectra (ICP-MS)
Analysis	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract With Hot Nitric Acid	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract With Hot Nitric Acid
Ref Mtd ID	EQL-0710-192	EQL-0710-192
Monitor Objective	Source Oriented	
Dominant Source	Point	
Measurement Scale	Urban Scale	
Land Use Type	Industrial	
Location Setting	Urban And Center City	

The Exide site is located in Sullivan County, Tennessee and currently supports monitoring for lead. This site is located east of Kingsport and northeast of Blountville on the Tennessee Virginia state lines. This site is downwind from Johnson City and Blountville and is located in the Kingsport Bristol MSA area. Lead monitoring began 01/01/2010 and this site is used to verify lead NAAQS compliance at a now shutdown lead battery plant. This area is now classified as an attainment area for lead. The former lead source has surrendered its air permits and shut down. TDEC APC is preparing to request that the monitoring site be permanently shut down reflecting the reality that the only industrial lead source is no longer operating. See Appendix I: Annual Site Evaluations for further details.

Exide Daily Air Quality

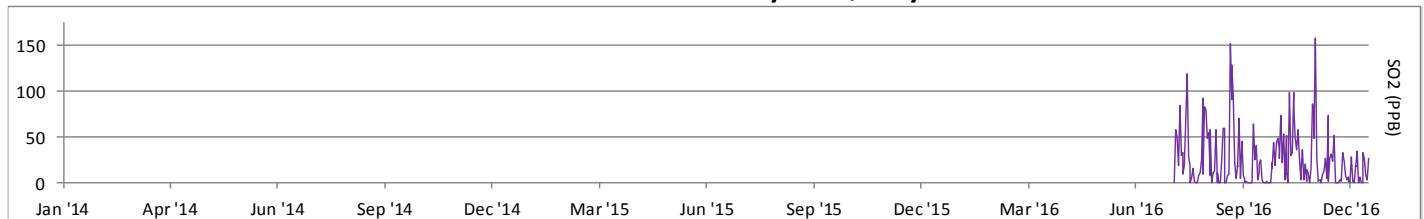


Ross N Robinson – Sullivan County

Address	Wilburn Drive
AQSID	471636001
County Name	Sullivan
CBSA	28700
Lat, Lon	36.5326160009, -82.516306
Parameter Code	42401
Parameter Name	SO ₂
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Ross N Robinson site is located in Sullivan County, Tennessee and currently supports monitoring for SO₂. The Ross N Robinson monitor is located within the 3-km SO₂ nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational in July, 2016. This monitor is one of two monitors that satisfies PWEI requirements for the Kingsport, TN CBSA and secondly, to characterize the maximum expected concentrations in the nonattainment area.

Ross N Robinson Daily Air Quality

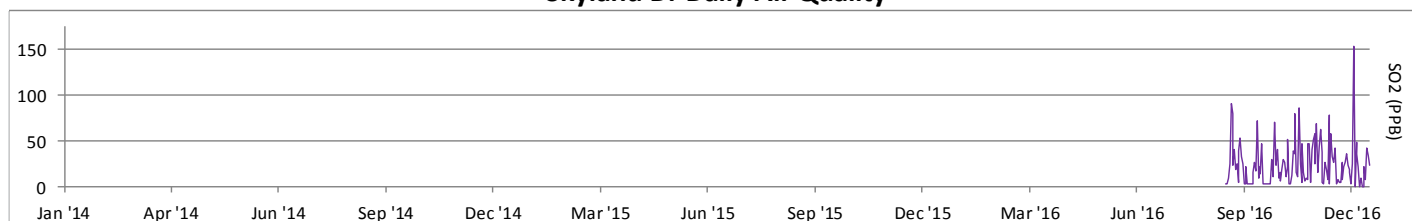


Skyland Dr. – Sullivan County

Address	Skyland Drive at Bagwell St.
AQSID	471636002
County Name	Sullivan
CBSA	28700
Lat, Lon	36.5210200009027, -82.50244
Parameter Code	42401
Parameter Name	SO ₂
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Api Model 100 E SO ₂ Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Population Exposure
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Skyland Drive ambient air monitoring site is located in Sullivan County, Tennessee and currently supports monitoring for SO₂. The site is located within the 3-km SO₂ nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational in September, 2016. The monitor was established in order, to characterize the maximum expected concentrations in the nonattainment area. This monitor is one of two monitors that satisfies PWEI requirements for the Kingsport, TN CBSA and secondly, to characterize the maximum expected concentrations in the nonattainment area.

Skyland Dr Daily Air Quality

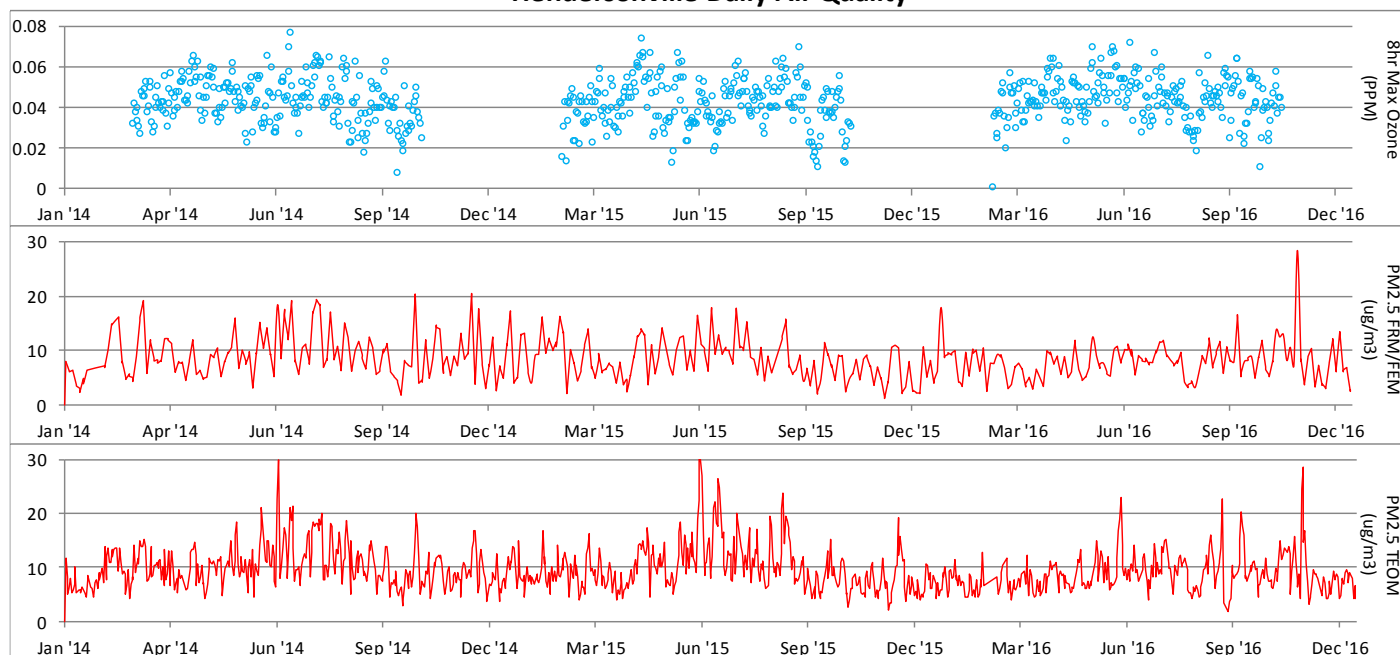


Hendersonville - Sumner County

Address	Rockland Recreational Area, Old Hickory Dam			
AQSID	471650007			
CBSA	34980			
Lat	36.297559999999997, -86.653137000000001			
Parameter Code	44201	88101	88101	88101
Parameter Name	O ₃	PM _{2.5}	PM _{2.5}	PM _{2.5} Cont
Monitor Type	SLAMS	SLAMS	SLAMS	SLAMS
POC	1	1	2	3
Int	W	7		1
Collection Frequency	Hourly	1 in 3		Hourly
Method	047	118		209
FRM/FEM Instrument	Thermo Electron 49	R&P Co Plus Model 2025		Met One BAM 1022
Analysis	Ultra violet	Gravimetric		Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0880-047	RFPS-0498-118		EQPM-1013-209
Monitor Objective	Highest Conc	Population Exposure		
Dominant Source	Area	Area		
Measurement Scale	Neighborhood	Neighborhood		
Land Use Type	Industrial	Industrial		
Location Setting	Rural	Rural		

The Hendersonville site is located in Sumner County, Tennessee and currently supports monitoring for ozone and PM_{2.5}. This site is located northeast of Nashville and west southwest of Gallatin, Tennessee. This site is downwind from the core Nashville MSA area. Sumner County is part of the Nashville MSA. Ozone monitoring began 01/01/1973 and this site is used with the ozone AQI forecasting program for verification and to help address NAAQS compliance in the Nashville MSA area. PM_{2.5} monitoring began 10/01/1998 as a part of the original PM_{2.5} state network. Continuous PM_{2.5} monitoring using a non FRM/FEM method was added 01/01/2003 to assist with the PM fine AQI forecasting program. This site also received an FEM continuous PM_{2.5} sampler on March 10, 2017 and the FRM sampler will be retired upon completion of routing correlation testing. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the ozone DV site for the Nashville MSA area and is downwind from the Nashville fine particulate precursor sources. The Nashville MSA has 5 ozone monitors operating and is only required to have 2. See Appendix I: Annual Site Evaluations for further details.

Hendersonville Daily Air Quality

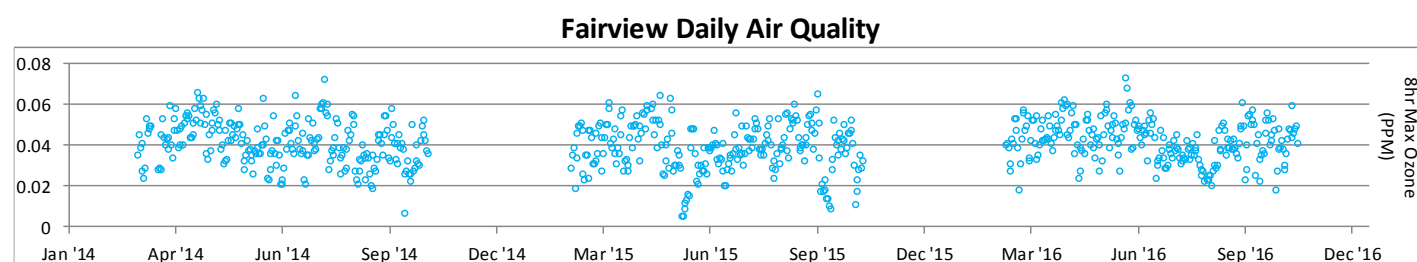


Fairview –Williamson County

Address	Fairview Middle School Crow Cut Road F
AQSID	471870106
CBSA	34980
Lat, Lon	35.94985, -87.13817
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Agricultural
Location Setting	Rural

The Fairview site is located in Williamson County, Tennessee and currently supports monitoring for ozone. This site is located southwest of Nashville and northwest of Franklin, Tennessee. This site is upwind from the core Nashville MSA area. Ozone monitoring began on 10/30/2001 and this site is used by the ozone AQI forecasting program for verification and to help address upwind ozone concentrations entering the Nashville MSA area. The Nashville MSA has 5 ozone sites operating and is only required to have 2. Due to this site importance in assessing the area ozone levels outside and upwind of the Nashville area, it was determined to remain in operation over 5 years (2015 through 2020). See Appendix I: Annual Site Evaluations for further details.

This site was relocated in March 2017 due to failing the siting criteria requirements stated in 40 CFR 58 Appendix D. For additional information refer to the relocation request package located in Appendix H: Fairview (471870106) Relocation Request.

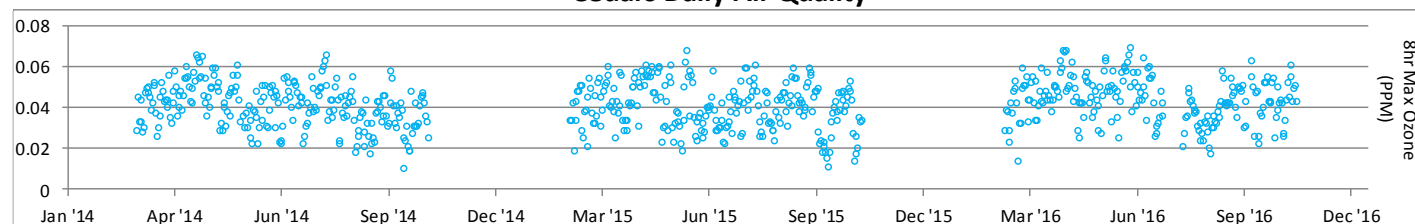


Cedars of Lebanon – Wilson County

Address	Cedars Of Lebanon State Park
AQSID	471890103
CBSA	34980
Lat, Lon	36.060833, -86.2862609999999
Parameter Code	44201
Parameter Name	O ₃
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	Unknown
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Forest
Location Setting	Rural

The Cedars site is located in Wilson County, Tennessee and currently supports monitoring for ozone. This site is located east of Nashville and north of Murfreesboro, Tennessee. This site is downwind from Franklin and is located within the Nashville MSA area. Ozone monitoring began 05/01/1988 and this site is used with the ozone AQI forecasting program for verification and to help address downwind ozone levels in the Nashville MSA area. The Nashville MSA has 5 ozone sites operating and is only required to have 2. Because of the importance this site serves in assessing the area ozone levels outside and downwind of the Nashville area, this site was determined to remain in operation over 5 years (2015 through 2020). See Appendix I: Annual Site Evaluations for further details.

Cedars Daily Air Quality



Tennessee Geographic Regions, Descriptions and Climate

Climate of Tennessee

Topographic Features - The topography of Tennessee is quite varied, stretching from the lowlands of the Mississippi Valley to the mountain peaks in the east. The westernmost part of the state, between the bluffs overlooking the Mississippi River and western valley of the Tennessee River, is a region of gently rolling plains sloping gradually from 200 to 250 feet in the west to about 600 feet above sea level in the hills overlooking the Tennessee River. The hilly Highland Rim, in a wide circle touching the Tennessee River Valley in the west and the Cumberland Plateau in the east, together with the enclosed Central Basin make up the whole of Middle Tennessee. The Highland Rim ranges from about 600 feet in elevation along the Tennessee River to 1,000 feet in the east and rises 300 to 400 feet above the Central Basin which is a rolling plain of about 600 feet average elevation, but with a crescent of hills reaching to over 1,000 feet south of Nashville. The Cumberland Plateau, with an average elevation of 2,000 feet extends roughly northeast-southwest across the state in a belt 30 to 50 miles wide, being bounded on the west by the Highland Rim and overlooking the Great Valley of East Tennessee on the east. The Great Valley, paralleling the Plateau to the west and the Great Smoky Mountains to the east, is a funnel shaped valley varying in width from about 30 miles in the south to about 90 miles in the north. Within the valley, which slopes from 1,500 feet in the north to 700 feet in the south, is a series of northeast-southwest ridges. Along the Tennessee-North Carolina border lie the Great Smoky Mountains, the most rugged and elevated portion of Tennessee, with numerous peaks from 4,000 to 6,000 feet.

Tennessee, except for a small area east of Chattanooga, lies entirely within the drainage of the Mississippi River system. The extreme western section of the state is drained through several relatively small rivers directly into the Mississippi River. Otherwise, drainage is into either the Cumberland or Tennessee Rivers, both of which flow northward near the end of their courses to join the Ohio River along the Kentucky-Illinois border. The Cumberland River, which drains north-central portions of Tennessee rises in the Cumberland Mountains in Kentucky, flows southwestward, then south into Tennessee reaching the Nashville area before turning northward to re-enter Kentucky. The Tennessee River is formed by the juncture of the Holston and French Broad rivers at Knoxville. It flows southwesterly along the Alabama-Mississippi line, and then flows northward across the state into Kentucky. Besides the headwater streams, other important tributaries include the: Clinch, Little Tennessee, Hiawassee, Elk and Duck Rivers.

Temperature - Most aspects of the state's climate are related to the widely varying topography within its borders. The decrease of temperature with elevation is quite apparent, amounting to, on the average, three degrees Fahrenheit (°F) per 1,000 feet increase in elevation. Thus higher portions of the state, such as the Cumberland Plateau and the mountains of the east, have lower average temperature than the Great Valley of East Tennessee, which they flank, and other lower parts of the state. In the Great Valley temperature increases from north to south, reaching a value at the south end comparable to that of Middle and West Tennessee where elevation variations are a generally minor consideration. Across the state, the average annual temperature varies from over 62° F in the extreme southwest to near 45 degrees atop the highest peaks of the east. It is of interest to note that average January temperature atop a 6,000 foot peak in the Great Smokies is equivalent to that in Central Ohio, while average July temperature is duplicated along the southern edge of the Hudson Bay in Canada. While most of the state can be described as having warm, humid summers and mild winters, this must be qualified to include variations with elevation. Thus with increasing elevation, summers become cooler and more pleasant while winters become colder and more blustery.

This dependence of temperature on elevation is of considerable importance to a variety of interests. Temperature, together with precipitation, plays an important role in determination what plant and animal life are adaptable to the area. In the Great Smoky Mountains, for example, the variations in elevation from 1,000 to 6,000 feet with attendant variations in temperature contribute to a remarkable variety of plant life. The relative coolness of the mountains also contributes to the popularity of that area during the warmer part of the year.

Length of growing season is linked to topography in a way similar to temperature, varying from an average of 237 days at low-lying Memphis to a near 130 days on the highest mountains in the east. Most of the state is included in the range of 180 to 220 days. Shorter growing seasons than this are confined to the mountains forming the state's eastern border and to the northern part of the Cumberland Plateau. Longer growing seasons are found in counties bordering the Mississippi River, parts of the Central Basin of the Middle Tennessee, and the southern end of the Great Valley of East Tennessee.

Precipitation - Since the principal source of moist air for this area is the Gulf of Mexico, there exists a gradual decrease of average precipitation from south to north. This effect is largely obscured however, by the overruling influence of topography. Air forced to ascend, cools and condenses out a portion of its moisture. Thus, average precipitation ranges from 46 to 54 inches, increasing from Mississippi bottomlands to the slight hills farther east. In Middle Tennessee the variation is from a minimum of 45 inches in the Central Basin to 50 to 55 inches in the surrounding hilly Highland Rim. Over the elevated Cumberland Plateau average annual precipitation is generally from 50 to 55 inches. In contrast, average annual precipitation in the Great Valley of East Tennessee increases from near 40 inches in northern portions to over 50 inches in the south. The northern minimum, lowest for the entire state, results from the shielding influence of the Great Smoky Mountains to the southeast and the Cumberland Plateau to the northwest. The mountainous eastern border of the state is the wettest, having average annual precipitation ranging up to 80 inches on the higher, and well-exposed peaks of the Smokies.

Over most of the state, the greatest precipitation occurs during the winter and early spring due to the more frequent passage of large-scale storms over and near the state during those months. A secondary maximum of precipitation occurs in midsummer in response to thunderstorm activity. This is especially pronounced in the mountains of the east where July rainfall exceeds the precipitation of any other month. Lightest precipitation, observed in the fall, is brought about by the maximum occurrence of slow moving, rain suppressing high pressure areas. Although all parts of Tennessee are generally well supplied with precipitation, there occurs on the average one or more prolonged dry spells each year during summer and fall. Studies illustrate the beneficial effects of supplemental irrigation of crops, despite usually bountiful annual precipitation.

Average annual snowfall varies from four to six inches in the southern and western parts of the state and in most of the Great Valley of East Tennessee to more than 10 inches over the northern Cumberland Plateau and the mountains of the east. Over most of the state, due to relatively mild winter temperatures, snow cover rarely persists for more than a few days.

The most important flood season is during the winter and early spring when the frequent migratory storms bring general rains of high intensity. During this period both widespread flooding and local flash floods can occur. During the summer, heavy thunderstorm rains frequently result in local flash flooding. In the fall, while flood producing rains are rare, a decadent tropical system on occasion causes serious floods. The numerous dams constructed along the Tennessee and Cumberland rivers are major features in the control of flood waters in the state.

The dams of the Tennessee and Cumberland River systems and the lakes so formed, in addition to vastly reducing flood damage have: facilitated water transportation, provided abundant low cost hydroelectric power and created extensive recreation areas. Fishing, boating, swimming and camping along the many lakes, together with the several state and national parks, have made tourism one of the major industries in the state.

Climate and the Economy - Water resources of Tennessee have been a major factor in the state's industrial growth. The bountiful and good quality water supply has influenced the location of industry, especially chemical processing plants. Three major waterways, the Mississippi, Cumberland and Tennessee Rivers, are suitable for commercial traffic. Finally, the availability of low cost hydroelectric power from the multipurpose dams of the Cumberland and Tennessee rivers and tributaries has been stimulus to industry of all types. The principal types of manufacturing products are: textile mill products, primary metals, fabricated metals and lumber products.

Although surpassed in monetary value by industrial activity, agriculture remains a vital feature of Tennessee's economic life. The wide range of climates in Tennessee, from river bottom to mountaintop, coupled with a wide range of soils, has resulted in a large number of crops which thrive in the state.

Forests represent an additional important segment of Tennessee's natural resources related to the climate of the state. Timberland, containing principally hardwood types, covers approximately one-half of the total area of Tennessee. This has led to a highly diversified woodworking industry and made the area around Memphis the center of production for wood flooring. The temperate climate of the state is very favorable for logging operations, allowing full-scale activity during nine months of the year and to a lesser extent during the winter months.

Climate descriptions of Tennessee - Generally, Tennessee has a temperate climate, with warm summers and mild winters. However, the state's varied topography leads to a wide range of climatic conditions.

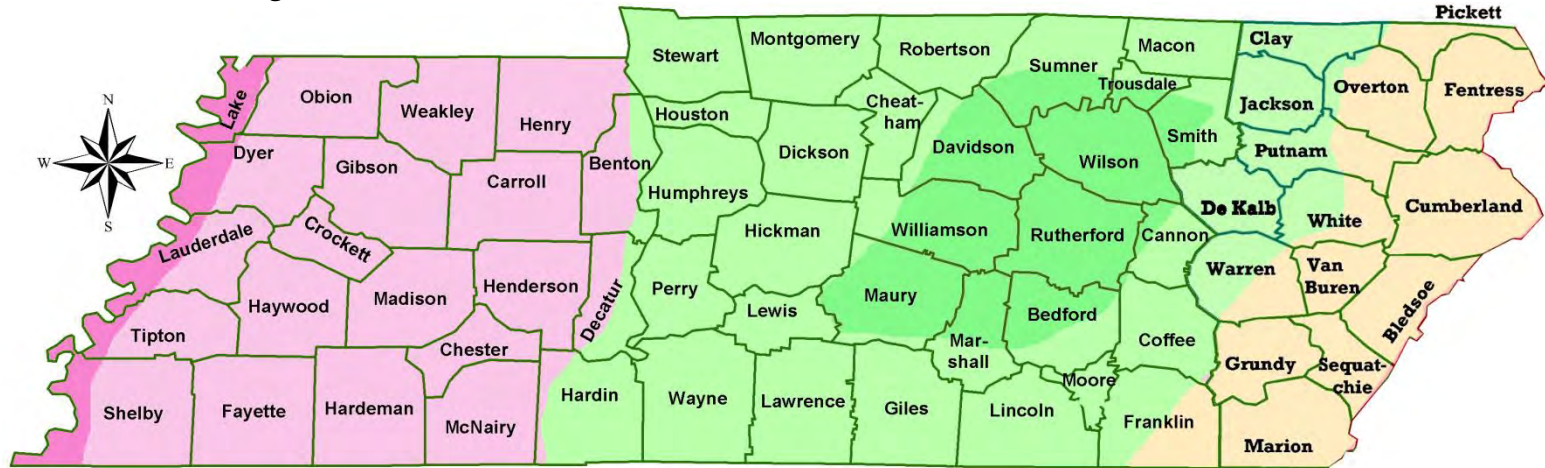
The warmest parts of the state, with the longest growing season, are the Gulf Coastal Plain, the Central Basin, and the Sequatchie Valley. In the Memphis area in the southwest, the average date of the last killing frost is 20 March, and the growing season is about 235 days. Memphis has an annual mean temperature of 62°F (17°C), 40°F (4°C) in January, and 83°F (28°C) in July. In the Nashville area, the growing season lasts about 225 days. Nashville has an annual mean of 59°F (15°C), ranging from 36°F (2°C) in January to 79°F (26°C) in July. The Knoxville area has a growing season of 220 days. The city's annual mean temperature is 60°F (16°C), with averages of 41°F (5°C) in January and 78°F (26°C) in July. In some parts of the mountainous east, where the temperatures are considerably lower, the growing season is as short as 130 days. The record high temperature for the state is 113°F (45°C), set at Perryville on 9 August 1930; the record low, -32°F (-36°C), was registered at Mountain City on 30 December 1917.

Severe storms occur infrequently. The greatest rainfall occurs in the winter and early spring, especially March; the early fall months, particularly September and October, are the driest. Average annual precipitation (1971–2000) was 54.7 in (138.9 cm) in Memphis and 48 in (122 cm) in Nashville. Snowfall varies and is more prevalent in East Tennessee than in the western section; Nashville gets about 10 in (25.4 cm) a year, Memphis only 5 in (12.7 cm).

UT Institute of Agriculture > Tennessee Climatological Service > Climate Data for Tennessee

Table 5: Map of Tennessee Geographic Regions

Central Time Zone Regions (CST UTC-6:00, CDT UTC-5:00)



Eastern Time Zone Regions (CST UTC-5:00, CDT UTC-4:00)



Climate Synopsis for Tennessee

The highly varied topography of Tennessee has a significant impact on the state's climate. The landscape varies generally from west to east, starting with the gently rolling lowlands (200-600' above sea level) in the west, rising to the Highland Rim (600-1000') enclosing the Central Basin, and on up to the Cumberland Plateau (~2000') which trends northeast-southwest across the state in a belt 30-50 miles wide. East of the Plateau is the Great Valley of East Tennessee (elevations ranging from 1500' in the north down to 700' in the south) containing a series of northeast-southwest ridges. The eastern border of the state is dominated by the Great Smoky Mountains, with numerous peaks rising 4000' to 6000' above sea level.

Average annual temperatures across the state range from around 57°F to 60°F (1981-2010). Winter mean temperatures are near 39°F (1981-2010) over most of the state, while summer temperatures average between 74°F and 78°F (1981-2010). Of course, these general patterns are affected by topography: the higher mountain areas tend to have milder summers as well as colder, more blustery winters. The length of the growing season is also linked to topography: most of the state has a growing season between 180 and 220 days, but this stretches to over 235 days in the lowlands around Memphis and drops to near 130 days in the highest mountains to the east.

The principal source of moisture for the state is the Gulf of Mexico to the south, which results in a gradual decrease of precipitation from south to north. This gradient is largely obscured, however, by orographic effects. In West Tennessee, annual precipitation amounts range from 46 inches to 54 inches, increasing from the Mississippi bottomlands to the slight hills farther east. In Middle Tennessee, the variation is from around 45 inches in the Central Basin to 50-55 inches in the surrounding Highland Rim. The Cumberland Plateau also averages 50-55 inches per year. In the Great Valley of Eastern Tennessee, annual precipitation rises from a minimum of 40 inches in the north (the driest part of the state due to the rain shadow effect of the Great Smoky Mountains and the Cumberland Plateau) to over 50 inches in the south. The mountainous eastern border of the state is the wettest part, with annual totals of up to 80 inches in the higher, well-exposed peaks.

Over most of the state, the greatest precipitation occurs in winter and early spring owing to the more frequent passage of large-scale (frontal) storms over the region. A secondary maximum of precipitation occurs in midsummer in response to shower and thunderstorm activity, especially in July in the mountains of the east. Fall tends to be the dry season for the state, due to the higher frequency of slow-moving high pressure areas during this season. Average annual snowfall ranges from 4-6 inches in the south and west to over 10 inches in the east. Due to the relatively mild winter conditions over most of the state, snow cover rarely persists for more than a few days.

Severe storms are relatively infrequent in the state, being east of the center of tornado activity, south of most blizzard conditions, and too far inland to be often affected by hurricanes. Averages of 26 (1991-2011) tornadoes are observed in the state each year, mostly confined to areas west of the Cumberland Plateau. Hailstorms (>1") at a given location are observed 3 to 6 (2003-2012) times a year, and damaging glaze storms occur in the state every 3 or 4 years (1996-2013). Thunderstorms are frequent in the warm season, and severe thunderstorms with damaging winds are experienced at scattered locations throughout the state each year.

Adapted from: Climatology of the United States, No. 60, National Climatic Data Center
Updated 2/26/2014 by TDAPC using data from NCDC

Table 6: Wind rose Data for Tennessee

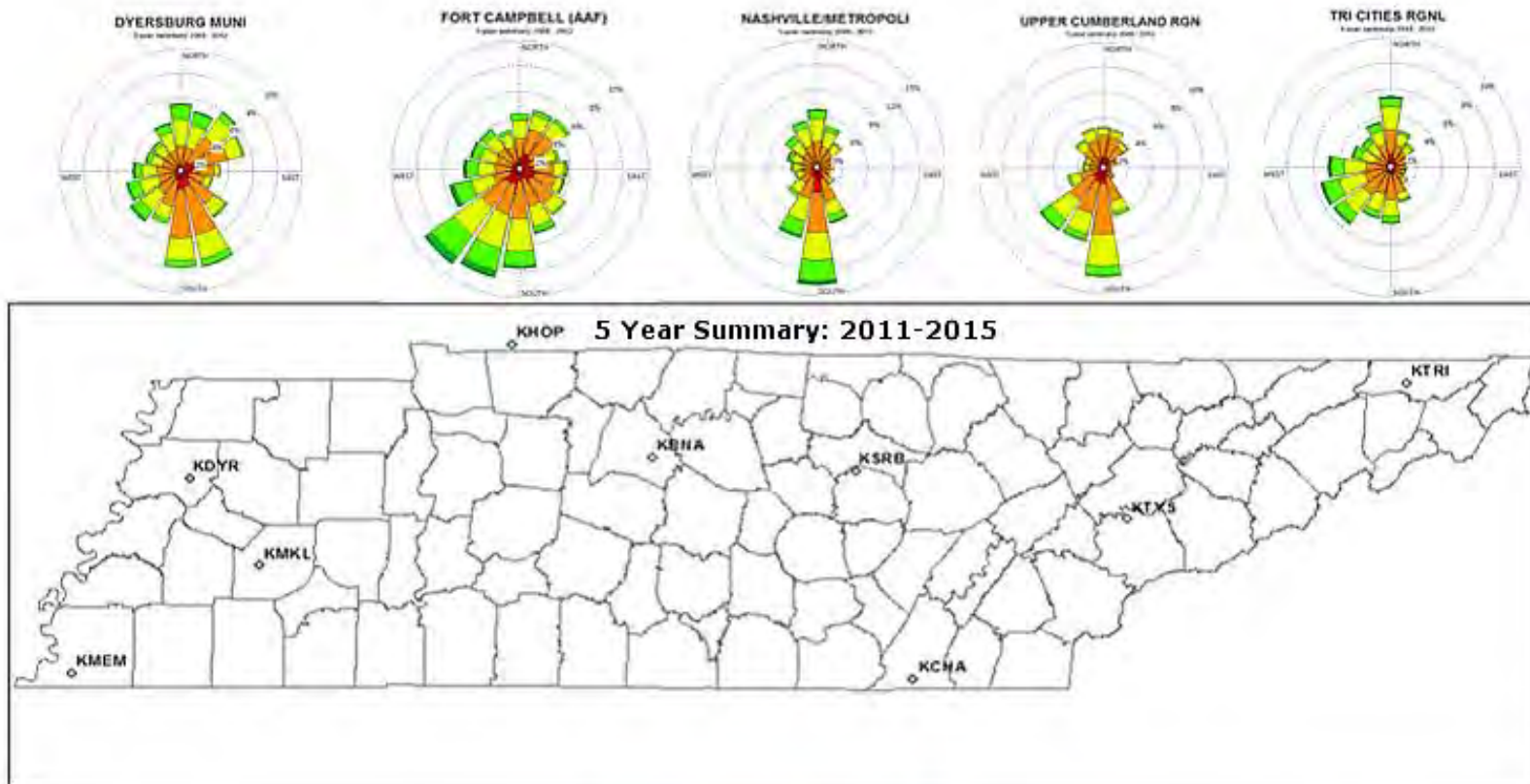


Table 7: Tennessee Metropolitan Statistical Areas and Population Estimates

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2016
16860		Chattanooga, TN-GA	Metropolitan Statistical Area	528143	551632
16860	13047	Catoosa County, GA	County or equivalent	63942	66398
16860	13083	Dade County, GA	County or equivalent	16633	16257
16860	13295	Walker County, GA	County or equivalent	68756	67896
16860	47065	Hamilton County, TN	County or equivalent	336463	357738
16860	47115	Marion County, TN	County or equivalent	28237	28446
16860	47153	Sequatchie County, TN	County or equivalent	14112	14897
17300		Clarksville, TN-KY	Metropolitan Statistical Area	260625	282349
17300	21047	Christian County, KY	County or equivalent	73955	72351
17300	21221	Trigg County, KY	County or equivalent	14339	14264
17300	47125	Montgomery County, TN	County or equivalent	172331	195734
17420		Cleveland, TN	Metropolitan Statistical Area	115788	121262
17420	47011	Bradley County, TN	County or equivalent	98963	104490
17420	47139	Polk County, TN	County or equivalent	16825	16772
27180		Jackson, TN	Metropolitan Statistical Area	130011	129527
27180	47023	Chester County, TN	County or equivalent	17131	17453
27180	47033	Crockett County, TN	County or equivalent	14586	14411
27180	47113	Madison County, TN	County or equivalent	98294	97663
27740		Johnson City, TN	Metropolitan Statistical Area	198716	201661
27740	47019	Carter County, TN	County or equivalent	57424	56502
27740	47171	Unicoi County, TN	County or equivalent	18313	17719
27740	47179	Washington County, TN	County or equivalent	122979	127440
28700		Kingsport-Bristol-Bristol, TN-VA	Metropolitan Statistical Area	309544	306334
28700	47073	Hawkins County, TN	County or equivalent	56833	56563
28700	47163	Sullivan County, TN	County or equivalent	156823	156667
28700	51169	Scott County, VA	County or equivalent	23177	21930
28700	51191	Washington County, VA	County or equivalent	54876	54214
28700	51520	Bristol city, VA	County or equivalent	17835	16960
28940		Knoxville, TN	Metropolitan Statistical Area	837571	868546
28940	47001	Anderson County, TN	County or equivalent	75129	75936
28940	47009	Blount County, TN	County or equivalent	123010	128670
28940	47013	Campbell County, TN	County or equivalent	40716	39714
28940	47057	Grainger County, TN	County or equivalent	22657	23072
28940	47093	Knox County, TN	County or equivalent	432226	456132
28940	47105	Loudon County, TN	County or equivalent	48556	51454
28940	47129	Morgan County, TN	County or equivalent	21987	21554
28940	47145	Roane County, TN	County or equivalent	54181	52874
28940	47173	Union County, TN	County or equivalent	19109	19140
32820		Memphis, TN-MS-AR	Metropolitan Statistical Area	1324829	1342842
32820	5035	Crittenden County, AR	County or equivalent	50902	49235
32820	28009	Benton County, MS	County or equivalent	8729	8264
32820	28033	DeSoto County, MS	County or equivalent	161252	175611
32820	28093	Marshall County, MS	County or equivalent	37144	35801
32820	28137	Tate County, MS	County or equivalent	28886	28201
32820	28143	Tunica County, MS	County or equivalent	10778	10234
32820	47047	Fayette County, TN	County or equivalent	38413	39590
32820	47157	Shelby County, TN	County or equivalent	927644	934603
32820	47167	Tipton County, TN	County or equivalent	61081	61303
34100		Morristown, TN	Metropolitan Statistical Area	113951	117320
34100	47063	Hamblen County, TN	County or equivalent	62544	63785
34100	47089	Jefferson County, TN	County or equivalent	51407	53535
34980		Nashville-Davidson--Murfreesboro--Franklin, TN	Metropolitan Statistical Area	1670890	1865298
34980	47015	Cannon County, TN	County or equivalent	13801	14027

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2016
34980	47021	Cheatham County, TN	County or equivalent	39105	39880
34980	47037	Davidson County, TN	County or equivalent	626681	684410
34980	47043	Dickson County, TN	County or equivalent	49666	52170
34980	47081	Hickman County, TN	County or equivalent	24690	24295
34980	47111	Macon County, TN	County or equivalent	22248	23450
34980	47119	Maury County, TN	County or equivalent	80956	89981
34980	47147	Robertson County, TN	County or equivalent	66283	69165
34980	47149	Rutherford County, TN	County or equivalent	262604	308251
34980	47159	Smith County, TN	County or equivalent	19166	19447
34980	47165	Sumner County, TN	County or equivalent	160645	180063
34980	47169	Trousdale County, TN	County or equivalent	7870	8271
34980	47187	Williamson County, TN	County or equivalent	183182	219107
34980	47189	Wilson County, TN	County or equivalent	113993	132781

Table 8: Tennessee Micropolitan Statistical Areas and Population Estimates

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2016
11940		Athens, TN	Micropolitan Statistical Area	52266	52850
11940	47107	McMinn County, TN	County or equivalent	52266	52850
18260		Cookeville, TN	Micropolitan Statistical Area	106042	109548
18260	47087	Jackson County, TN	County or equivalent	11638	11566
18260	47133	Overton County, TN	County or equivalent	22083	22051
18260	47141	Putnam County, TN	County or equivalent	72321	75931
18900		Crossville, TN	Micropolitan Statistical Area	56053	58655
18900	47035	Cumberland County, TN	County or equivalent	56053	58655
19420		Dayton, TN	Micropolitan Statistical Area	31809	32442
19420	47143	Rhea County, TN	County or equivalent	31809	32442
20540		Dyersburg, TN	Micropolitan Statistical Area	38335	37708
20540	47045	Dyer County, TN	County or equivalent	38335	37708
24620		Greeneville, TN	Micropolitan Statistical Area	68831	68615
24620	47059	Greene County, TN	County or equivalent	68831	68615
29980		Lawrenceburg, TN	Micropolitan Statistical Area	41869	43081
29980	47099	Lawrence County, TN	County or equivalent	41869	43081
30280		Lewisburg, TN	Micropolitan Statistical Area	30617	31915
30280	47117	Marshall County, TN	County or equivalent	30617	31915
32280		Martin, TN	Micropolitan Statistical Area	35021	33507
32280	47183	Weakley County, TN	County or equivalent	35021	33507
32660		McMinnville, TN	Micropolitan Statistical Area	39839	40516
32660	47177	Warren County, TN	County or equivalent	39839	40516
35460		Newport, TN	Micropolitan Statistical Area	35662	35219
35460	47029	Cocke County, TN	County or equivalent	35662	35219
37540		Paris, TN	Micropolitan Statistical Area	32330	32310
37540	47079	Henry County, TN	County or equivalent	32330	32310
42940		Sevierville, TN	Micropolitan Statistical Area	89889	96673
42940	47155	Sevier County, TN	County or equivalent	89889	96673
43180		Shelbyville, TN	Micropolitan Statistical Area	45058	47484
43180	47003	Bedford County, TN	County or equivalent	45058	47484
46100		Tullahoma-Manchester, TN	Micropolitan Statistical Area	100210	102705
46100	47031	Coffee County, TN	County or equivalent	52796	54682
46100	47051	Franklin County, TN	County or equivalent	41052	41700
46100	47127	Moore County, TN	County or equivalent	6362	6323
46460		Union City, TN-KY	Micropolitan Statistical Area	38620	36757
46460	21075	Fulton County, KY	County or equivalent	6813	6179
46460	47131	Obion County, TN	County or equivalent	31807	30578

<https://www.census.gov/data/datasets/2016/demo/popest/total-metro-and-micro-statistical-areas.html>

Table 9: Tennessee County Population Data Trends

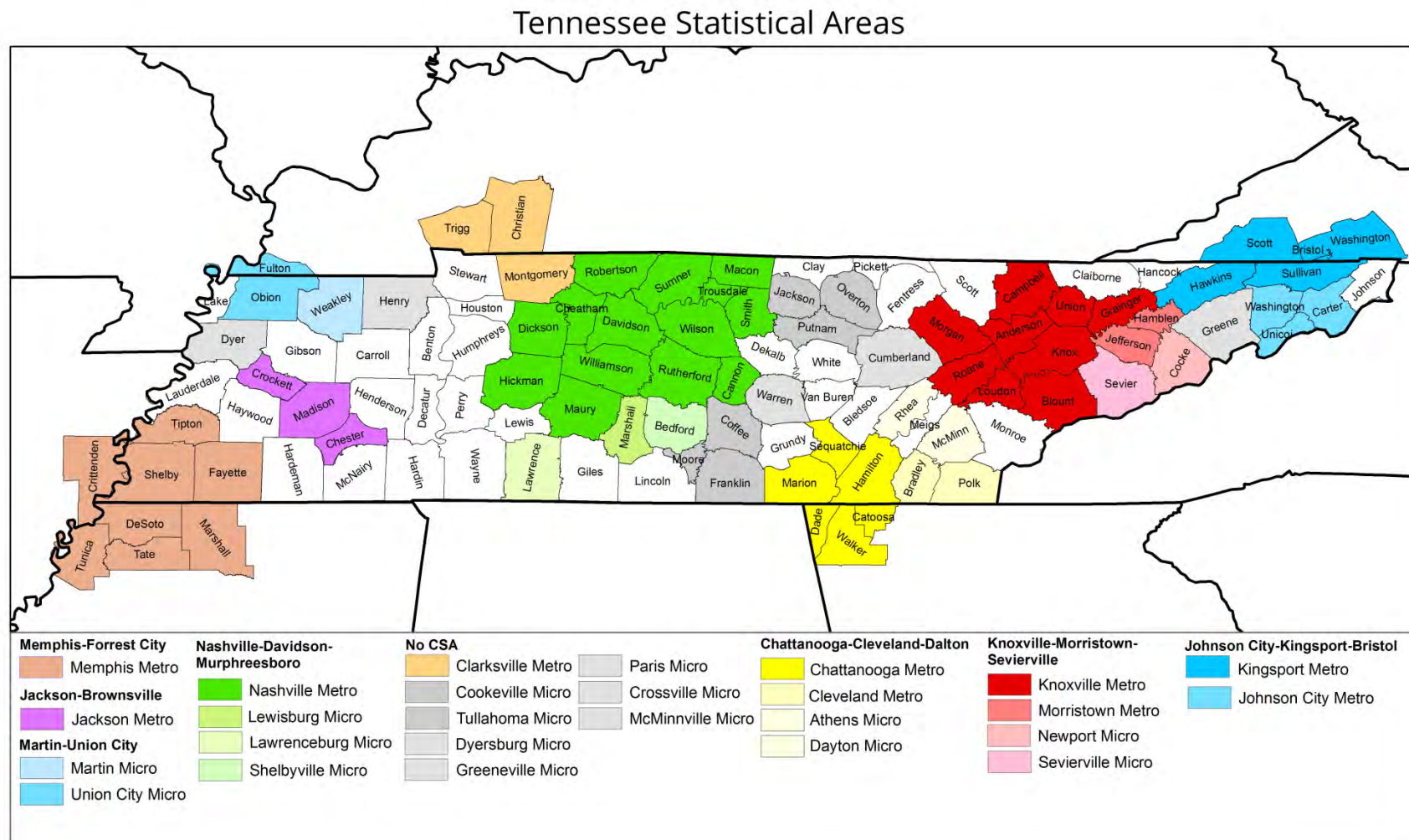
(2010 Census and Estimates to 2016 by US Census Bureau)

Geography	April 1, 2010		Population Estimate (as of July 1, 2016)						
	Census	Estimate	2010	2011	2012	2013	2014	2015	2016
Anderson	75,129	75,094	75,126	75,179	75,326	75,420	75,347	75,698	75,936
Bedford	45,058	45,056	45,100	45,271	45,307	45,638	46,284	46,940	47,484
Benton	16,489	16,491	16,493	16,423	16,354	16,280	16,109	16,107	16,014
Bledsoe	12,876	12,872	12,874	12,847	12,791	13,785	14,535	14,580	14,675
Blount	123,010	123,100	123,241	123,704	124,069	124,985	126,092	127,142	128,670
Bradley	98,963	98,932	99,126	99,883	101,101	101,881	102,921	103,907	104,490
Campbell	40,716	40,723	40,722	40,579	40,460	40,229	39,909	39,728	39,714
Cannon	13,801	13,816	13,814	13,764	13,868	13,800	13,725	13,854	14,027
Carroll	28,522	28,480	28,445	28,533	28,707	28,685	28,471	28,131	28,092
Carter	57,424	57,375	57,313	57,434	57,309	56,982	56,312	56,430	56,502
Cheatham	39,105	39,103	39,115	38,986	39,245	39,387	39,674	39,690	39,880
Chester	17,131	17,143	17,184	17,222	17,213	17,340	17,358	17,413	17,453
Claiborne	32,213	32,212	32,234	32,088	31,770	31,661	31,630	31,687	31,757
Clay	7,861	7,860	7,843	7,827	7,801	7,784	7,733	7,773	7,752
Cocke	35,662	35,642	35,644	35,372	35,450	35,287	35,230	35,096	35,219
Coffee	52,796	52,800	52,783	52,882	53,132	53,324	53,623	54,279	54,682
Crockett	14,586	14,576	14,574	14,550	14,607	14,590	14,614	14,566	14,411
Cumberland	56,053	56,062	56,210	56,620	57,073	57,513	57,958	58,278	58,655
Davidson	626,681	626,580	628,077	635,503	649,004	658,990	668,699	678,323	684,410
Decatur	11,757	11,750	11,729	11,684	11,660	11,697	11,733	11,657	11,769
DeKalb	18,723	18,720	18,716	18,794	18,911	19,108	19,211	19,205	19,361
Dickson	49,666	49,658	49,701	49,946	50,177	50,211	50,609	51,461	52,170
Dyer	38,335	38,330	38,313	38,148	38,246	38,148	37,868	37,878	37,708
Fayette	38,413	38,439	38,435	38,569	38,662	38,810	39,072	39,220	39,590
Fentress	17,959	17,960	17,928	18,026	17,924	17,937	17,867	17,917	18,033
Franklin	41,052	41,064	40,970	40,862	40,786	41,313	41,428	41,514	41,700
Gibson	49,683	49,691	49,732	49,873	49,689	49,483	49,541	49,442	49,401
Giles	29,485	29,489	29,401	29,337	29,006	28,859	28,917	29,079	29,307
Grainger	22,657	22,656	22,714	22,733	22,649	22,681	22,830	22,835	23,072
Greene	68,831	68,825	68,826	68,996	68,654	68,272	68,416	68,551	68,615
Grundy	13,703	13,726	13,738	13,657	13,653	13,509	13,464	13,456	13,389
Hamblen	62,544	62,533	62,550	62,816	62,712	63,082	63,022	63,414	63,785
Hamilton	336,463	336,484	337,332	340,939	345,783	348,853	350,545	353,604	357,738
Hancock	6,819	6,815	6,808	6,711	6,675	6,638	6,602	6,554	6,577
Hardeman	27,253	27,247	27,154	26,851	26,528	26,251	25,927	25,732	25,435
Hardin	26,026	26,012	26,039	25,868	26,005	25,981	25,810	25,718	25,679
Hawkins	56,833	56,829	56,867	56,617	56,561	56,740	56,529	56,443	56,563
Haywood	18,787	18,807	18,787	18,568	18,281	18,256	18,226	18,028	17,853
Henderson	27,769	27,782	27,786	28,020	28,006	27,958	27,991	27,984	27,822
Henry	32,330	32,354	32,404	32,379	32,373	32,253	32,315	32,205	32,310
Hickman	24,690	24,689	24,648	24,344	24,132	24,153	24,360	24,315	24,295
Houston	8,426	8,425	8,443	8,338	8,408	8,275	8,220	8,131	8,134
Humphreys	18,538	18,535	18,569	18,396	18,271	18,230	18,109	18,122	18,347
Jackson	11,638	11,632	11,596	11,514	11,524	11,533	11,492	11,517	11,566
Jefferson	51,407	51,660	51,697	52,008	52,428	52,352	52,651	53,288	53,535
Johnson	18,244	18,244	18,285	18,210	18,121	17,998	17,919	17,821	17,754
Knox	432,226	432,266	433,056	436,551	440,793	444,325	448,125	451,444	456,132
Lake	7,832	7,832	7,821	7,778	7,710	7,711	7,662	7,572	7,560
Lauderdale	27,815	27,822	27,742	27,697	27,676	27,559	27,340	26,959	26,773
Lawrence	41,869	41,851	41,988	42,059	42,133	41,990	42,297	42,531	43,081
Lewis	12,161	12,171	12,162	12,152	11,918	11,969	11,878	11,866	11,904
Lincoln	33,361	33,350	33,411	33,416	33,442	33,574	33,556	33,695	33,645
Loudon	48,556	48,548	48,738	49,073	49,732	50,374	50,646	50,978	51,454

Geography	April 1, 2010		Population Estimate (as of July 1, 2016)						
	Census	Estimate	2010	2011	2012	2013	2014	2015	2016
McMinn	52,266	52,278	52,197	52,356	52,429	52,405	52,710	52,636	52,850
McNairy	26,075	26,077	26,056	26,050	26,160	26,078	26,114	25,997	25,935
Macon	22,248	22,227	22,245	22,462	22,501	22,619	22,942	23,108	23,450
Madison	98,294	98,299	98,258	98,022	98,523	98,715	98,130	97,609	97,663
Marion	28,237	28,222	28,224	28,075	28,218	28,316	28,373	28,462	28,446
Marshall	30,617	30,606	30,678	30,885	30,928	31,082	31,233	31,518	31,915
Mauzy	80,956	80,930	81,188	81,415	81,969	83,611	85,541	87,735	89,981
Meigs	11,753	11,768	11,795	11,684	11,701	11,696	11,744	11,872	12,005
Monroe	44,519	44,505	44,618	44,930	45,150	45,223	45,390	45,677	45,970
Montgomery	172,331	172,362	173,218	176,655	185,225	184,637	189,655	193,294	195,734
Moore	6,362	6,345	6,340	6,401	6,336	6,302	6,317	6,290	6,323
Morgan	21,987	21,986	21,999	22,058	21,947	21,707	21,742	21,492	21,554
Obion	31,807	31,807	31,815	31,683	31,346	31,068	30,875	30,633	30,578
Overton	22,083	22,084	22,096	22,193	22,222	22,021	22,002	22,156	22,051
Perry	7,915	7,928	7,944	7,863	7,854	7,878	7,845	7,914	7,964
Pickett	5,077	5,077	5,072	5,132	5,070	5,044	5,081	5,142	5,142
Polk	16,825	16,826	16,810	16,737	16,606	16,640	16,722	16,744	16,772
Putnam	72,321	72,347	72,580	72,981	73,487	73,992	74,878	74,974	75,931
Rhea	31,809	31,802	31,859	32,051	32,338	32,526	32,607	32,392	32,442
Roane	54,181	54,193	54,159	53,856	53,506	53,035	52,773	52,726	52,874
Robertson	66,283	66,349	66,391	66,693	66,743	67,244	67,923	68,452	69,165
Rutherford	262,604	262,592	263,776	269,136	274,386	281,289	289,095	298,423	308,251
Scott	22,228	22,232	22,240	22,121	22,175	22,024	22,026	21,974	21,947
Sequatchie	14,112	14,121	14,137	14,280	14,426	14,663	14,773	14,789	14,897
Sevier	89,889	89,725	89,977	91,123	92,299	93,356	94,696	95,661	96,673
Shelby	927,644	927,684	928,652	933,011	938,965	938,091	937,162	936,131	934,603
Smith	19,166	19,149	19,124	19,145	19,114	19,050	19,014	19,253	19,447
Stewart	13,324	13,313	13,337	13,228	13,311	13,308	13,243	13,240	13,182
Sullivan	156,823	156,806	156,820	156,929	156,547	156,562	156,784	156,661	156,667
Sumner	160,645	160,617	161,249	163,882	166,101	169,110	172,790	175,866	180,063
Tipton	61,081	61,006	61,077	61,282	61,609	61,599	61,672	61,605	61,303
Trousdale	7,870	7,864	7,862	7,800	7,774	7,782	7,990	8,035	8,271
Unicoi	18,313	18,315	18,277	18,285	18,227	18,047	17,914	17,820	17,719
Union	19,109	19,109	19,102	19,213	19,120	19,055	18,964	19,126	19,140
Van Buren	5,548	5,558	5,557	5,540	5,635	5,570	5,625	5,686	5,689
Warren	39,839	39,824	39,851	39,869	39,745	39,893	40,003	40,338	40,516
Washington	122,979	123,065	123,423	123,920	124,907	125,516	125,999	126,357	127,440
Wayne	17,021	17,027	16,985	17,012	16,996	16,918	16,846	16,738	16,713
Weakley	35,021	35,015	35,027	34,907	34,594	34,186	34,001	33,831	33,507
White	25,841	25,836	25,838	26,050	26,096	26,273	26,346	26,495	26,653
Williamson	183,182	183,252	184,143	188,342	193,095	199,032	205,317	211,674	219,107
Wilson	113,993	114,057	114,671	116,780	119,109	122,014	125,404	128,772	132,781

Table 10: 2010 Metropolitan/Micropolitan Areas of Tennessee

No proposed changes



Appendix A: DAPC Monitoring Equipment Evaluation 2017 AMP Field Sites

Site	Monitor		Data Backup		Data Logger		Calibrator		Shelter	
	Model	Condition	Model	Condition	Model	Condition	Model	Condition	Model	Condition
Blountville	Teledyne T400	Good	Agilaire 8872	Good	ESC8832	Good	Teledyne 703E	Good		
Blountville	API 400A (spare)									
Kingsport	Teledyne T400	Good	Agilaire 8872	Good	ESC8832	Good	Teledyne T703	Good	x	Good
Kingsport					ESC8832	Good				
Cookeville	R&P 2025	Good					Streamline Pro	Good		
Cookeville	BAM1022	Good								
Freel's Bend	Teledyne T400	Good	Agilaire 8872	Good	ESC8832	Good	Teledyne T703	Good	820	Good
Freel's Bend					ESC8832	Good(spare)				
Freel's Bend	Teledyne M100E	Good					Teledyne T700	Good		
New Market	API 400E	Good	Agilaire 8872	Good	ESC8832	Good	Teledyne T703	Good	820	Good
New Market					ESC8832	Good(spare)				
Loudon Pope	R&P 2025	Good					Streamline Pro			
Loudon Pope	ATEC2200	Poor								Good
Loudon Elementary School	Teledyne T400	Good	Agilaire 8872	Good	ESC8832	Good	Teledyne 703E	Good	ODI, Model 818	Good
					ESC 8832	Good(spare)				
Kingsport	R&P 2025	Good					Streamline Pro	Good		
Kingsport	BAM 1022	Good								
Kingsport	TEOM1400a	Good			ESC8832	Good	ESC 8832(spare)			
Bristol	Hivol	Good								
Bristol	Hivol	Good					Kit #9	Good		
Clarksville	TEOM1400a	poor			ESC 8816	Good			432SP	Good
Clarksville	MetOne BAM1022	Good								
Centerhill	MIC AUC	Good			ESC 8816	Good				
Centerhill	Climatronics 101156-GO	Good								
Cedars of Leb	TEI49C	Good	E&A	Poor	ESC8832	Good	Teledyne 703E	Good	Trailer	Good
Cedars of Leb					ESC8832	Good				
Dyersburg	R&P 2025	Good								
Dyersburg	BAM 1022	Good							TEOM	
Hendersonville	TEI49C	Good	Agilaire 8872	Good	ESC8832	Good	Teledyne 703E	Good	Trailer	Good
Hendersonville					ESC8832	Good (spare)				
Hendersonville	R&P 2025	Good								
Hendersonville	R&P 2025	Good								
Hendersonville	TEOM1400a	Good								
Hendersonville	MetOne BAM1022	Good								
Jackson	R&P 2025	Good								
Jackson	R&P 2025	Good								
Jackson	TEOM1400a	Good			ESC 8832	Good			432SP	Good
Maryville	R&P 2025	Good								
Maryville	TEOM1400a	Good			ESC 8832	Good	Streamline Pro	Good	TEOM	Good
Fairview	TEI49C	Good	Agilaire 8872	Good	ESC8832	Good	Teledyne T703	Good	T&R	Good
Fairview					ESC8832	Good (spare)				
Columbia	R&P 2025	Good					Streamline Pro			
	BAM1022	Good								
Lawrence	R&P 2025	Good								
Lawrence	TEOM1400a	Good			ESC 8832	Good			432SP	Good
Athens	R&P 2025	Good					Streamline Pro	Good		
Athens	TEOM1400a	Good			ESC8832	Good			Ext 432SP	Good
Athens	BAM1022	Good								
Harriman	R&P 2025	Good								
Harriman	TEOM1400a	Good			ESC 8816	Good			x	Good
Harriman	BAM1022	Good								
Skyland Drive	Teledyne 100E	Good	Agilaire 8872		ESC 8832		Teledyne T700			
Ross N Robinson	Teledyne T100	Good	Agilaire 8872		ESC 8832		Teledyne T700			
Hatchie Refuge									x	Poor

Appendix B: DAPC Monitoring Equipment Evaluation 2017

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
Nashville Field Office	Multi-gas calibrator	Portable Calibrator T750U	good
Nashville Field Office	Multi-gas calibrator	Portable Calibrator T750U	good
Bristol	HiVol variable oriface	Kit #9	good
Athens	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Athens	Data logger	ESC 8832	good
Athens	PM 2.5 filter sampler	R&P 2025, FRM	good
Athens	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
Athens	TEOM shelter	Ekto	good
Blountville	Data logger	Agilaire 8872	good
Blountville	Chart recorder	L&N	poor
Blountville	Data logger	ESC 8832	good
Blountville	Data logger	ESC 8832	good
Blountville	Ozone analyzers	API 400A	good
Blountville	Trailer	T&R 8X20	poor
Loudon Elementary School	Ozone Calibrator	703E Ozone Calibrator	good
Blountville	Teledyne 400A	Teledyne 400A	good
Chattanooga	Flow Check Device	Streamline Pro	good
Bristol	HiVol TSP/Lead	Tisch Housing	good
Bristol	HiVol TSP/Lead	Tisch Housing	good
Columbia	Flow Check Device	Streamline Pro	good
Cedars of Lebanon	Data logger	Agilaire 8872	good
Cedars of Lebanon	Chart recorder	E&A	poor
Cedars of Lebanon	Data logger	ESC 8832	good
Cedars of Lebanon	Data logger	ESC 8832	good
Cedars of Lebanon	TEI49C	TEI49C	good
Cedars of Lebanon	Ozone Calibrator	703E Ozone Calibrator	good
Cookeville	Flow Check Device	Streamline Pro	good
Cedars of Lebanon	Ozone analyzers	T400	good
NFO Storage	Ozone Calibrator	703E Ozone Calibrator	good
Centerhill	Data logger	ESC 8816	good
Centerhill	Weather	MIC AUC	good
Centerhill	Rain gauge	Climatronics 101156-GO	good
Centerhill	Trailer	Ozone shelter 820	poor
Central Office	Data logger	Agilaire 8872	good
Central Office	Data logger	Agilaire 8872	good
JCFO	Flow Check Device	Streamline Pro	good
Clarksville	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Clarksville	Data logger	ESC 8816	good
Clarksville	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	poor
Clarksville	TEOM shelter	Ekto	good
Columbia	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Columbia	PM 2.5 filter sampler	R&P 2025, FRM	good
JFO	Flow Check Device	Streamline Pro	good
Cookeville	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Cookeville	PM 2.5 filter sampler	R&P 2025, FRM	good
KFO	Flow Check Device	Streamline Pro	good
Dyersburg	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Dyersburg	PM 2.5 filter sampler	R&P 2025, FRM	good
Dyersburg	TEOM shelter	Ekto	good
Fairview	Data logger	Agilaire 8872	good
Fairview	Data logger	ESC 8832	good
Fairview	Data logger	ESC 8832	good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
Blountville	Ozone Calibrator	703E Ozone Calibrator	good
Fairview	TEI49C	TEI49C	good
Freel's Bend	Data logger	Agilaire 8872	good
Freel's Bend	Data logger	ESC 8832	good
Freel's Bend	Data logger	ESC 8832	good
Loudon Elementary School	Ozone analyzers	T400	good
Fairview	Ozone Calibrator	T703 Ozone Calibrator	good
Nashville Field Office	Air Compressor (1 of 2)	0.5 HP	good
Freel's Bend	SO2 analyzers	Teledyne M100E	good
Freel's Bend	SO2 Calibrator	T700 SO2 Calibrator	good
Harriman	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Harriman	Data logger	ESC 8816	good
Nashville Field Office	Air Compressor (2 of 2)	0.5 HP	good
Harriman	PM 2.5 filter sampler	R&P 2025, FRM	good
Harriman	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
Harriman	TEOM shelter	Ekto	good
Hatchie Refuge	Trailer	Ozone shelter 820	poor
Hendersonville	Data logger	Agilaire 8872	good
Hendersonville	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Hendersonville	Data logger	ESC 8832	good
Hendersonville	Data logger	ESC 8832	good
Hendersonville	PM 2.5 filter sampler	R&P 2025, FRM	good
Hendersonville	PM 2.5 filter sampler	R&P 2025, FRM	good
Hendersonville	TEI49C	TEI49C	good
Freel's Bend	Ozone Calibrator	T703 Ozone Calibrator	good
Hendersonville	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
Plan to purchase*	Zero air supply	Purchase additional T701 Zero Air Supplies	good
Jackson	Data logger	ESC 8832	good
Jackson	PM 2.5 filter sampler	R&P 2025, FRM	good
Jackson	PM 2.5 filter sampler	R&P 2025, FRM	good
Jackson	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
Jackson	TEOM shelter	Ekto	good
Blountville	Trailer	Ozone shelter 820	poor
JCFO	Trailer	Ozone shelter 820	poor
Cedars of Lebanon	Trailer	Ozone shelter 820	poor
Freel's Bend	Trailer	Ozone shelter 820	poor
Kingsport	Data logger	Agilaire 8872	good
Kingsport	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
Kingsport	Data logger	ESC 8832	good
Kingsport	Data logger	ESC 8832	good
Kingsport	Data logger	ESC 8832	good
Kingsport	Data logger	ESC 8832	good
Kingsport	PM 2.5 filter sampler	R&P 2025, FRM	good
Kingsport	Ozone Calibrator	T703 Ozone Calibrator	good
Kingsport	Teledyne T400	Teledyne T400	good
Kingsport	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
Kingsport	TEOM shelter	Ekto	good
Harriman	TEOM shelter	Ekto	poor
Lawrence	Data logger	ESC 8832	good
Lawrence	PM 2.5 filter sampler	R&P 2025, FRM	good
Lawrence	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
Lawrence	TEOM shelter	Ekto	good
Loretto County Site	BAM 1020 Enclosure	432SP	good
Loudon Elementary School	Data logger	Agilaire 8872	good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
Loudon Elementary School	Data logger	ESC 8832	good
Loudon Elementary School	Data logger	ESC 8832	good
New Market	Ozone Calibrator	T703 Ozone Calibrator	good
Blountville	Ozone Calibrator	T703 Ozone Calibrator	good
NFO Storage and QA	Ozone analyzers	T400	good
Hendersonville	Trailer	Ozone shelter 820	poor
Loudon Pope	PM 2.5 filter sampler	R&P 2025, FRM	good
Loudon Pope	Toxic monitor	ATEC2200	poor
Maryville	Data logger	ESC 8832	good
Maryville	PM 2.5 filter sampler	R&P 2025, FRM	good
Maryville	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
Maryville	TEOM shelter	Ekto	good
Kingsport	Trailer	Ozone shelter 820	poor
Loudon Elementary School	Trailer	O D I, Model 818	poor
Nashville Field Office	Equinox, SUV	Quality Assurance Audit Vehicle	good
Nashville Field Office	HiVol calibration	Orifice, variable; plan to be replaced	good
New Market	Data logger	Agilaire 8872	good
NFO Storage	Ozone Calibrator	T703 Ozone Calibrator	good
New Market	Trailer	Ozone shelter 820	poor
New Market	Data logger	ESC 8832	good
New Market	Ozone analyzers	API 400E	good
NFO	Flow Check Device	Streamline Pro	good
NFO -Quality Assurance	Flow Check Device	Streamline Pro	good
NFO -Quality Assurance	Flow Check Device	Streamline Pro	good
NFO -Quality Assurance	Flow Check Device	Streamline Pro	good
NFO -Quality control	Flow Check Device	Streamline Pro	good
NFO Storage	Flow Check Device	Streamline Pro	good
NFO Storage	Flow Check Device	Streamline Pro	good
NFO Storage	Flow Check Device	Streamline Pro	good
NFO Storage and QA	Data logger	Agilaire 8872	good
NFO Storage and QA	Data logger	Agilaire 8872	good
NFO Storage and QA	Data logger	Agilaire 8872	good
NFO Storage and QA	Aircheck 224-PCXR7	Aircheck 224-PCXR7	poor
NFO Storage and QA	Aircheck 224-PCXR7	Aircheck 224-PCXR7	poor
NFO Storage and QA	Aircheck 224-PCXR7	Aircheck 224-PCXR7	poor
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FRM PM 2.5	good
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	poor
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	poor
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	poor
NFO Storage and QA	Data logger	ESC 8816	poor
NFO Storage and QA	Data logger	ESC 8816	poor
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	good
NFO Storage and QA	Data logger	ESC 8816	poor
NFO Storage and QA	Data logger	ESC 8816	poor
NFO Storage and QA	Data logger	ESC 8832	good
NFO Storage and QA	Data logger	ESC 8832	good
NFO Storage and QA	Data logger	ESC 8832	good
NFO Storage and QA	Data logger	ESC 8832	good
NFO Storage and QA	Data logger	ESC 8832	good
NFO Storage and QA	Flow bench standard, multi gas standard QA	Mesa Labs Drycal	good
NFO Storage and QA	Flow bench standard, multi gas standard QA	Seirra Cal Bench	poor
NFO Storage and QA	Flow Check Device	BGI Challenger	good
NFO Storage and QA	Flow Check Device	BGI TetraCal	good
NFO Storage and QA	HiVol TSP/Lead	GMW 2000	good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	good
NFO Storage and QA	HiVol TSP/Lead	Anderson 2000	good
NFO Storage and QA	HiVol TSP/Lead	Tisch Housing	good
NFO Storage and QA	HiVol TSP/Lead	Tisch Housing	good
NFO Storage and QA	HiVol TSP/Lead	Tisch Housing	good
NFO Storage and QA	Multi-gas calibrator	EnviroNics 6100	good
NFO Storage and QA	Multi-gas calibrator	EnviroNics Calibrator 6103	good
NFO Storage and QA	Multi-gas calibrator	EnviroNics Calibrator 6103	poor
NFO Storage and QA	Multi-gas calibrator	EnviroNics Calibrator 6103	poor
NFO Storage and QA	Ozone analyzers	API 400A	poor

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
NFO Storage and QA	Ozone analyzers	API 400A	poor
NFO Storage and QA	Ozone analyzers	API 400A	good
NFO Storage and QA	Ozone analyzers	API 400A	poor
NFO Storage and QA	Ozone analyzers	API 400E	good
NFO Storage and QA	Ozone analyzers	API 400E	good
NFO Storage and QA	Ozone analyzers	API 400E	poor
NFO Storage and QA	Ozone analyzers	API 400E	poor
NFO Storage and QA	Ozone analyzers	T400	good
Blountville	Ozone analyzers	T400	good
Freel's Bend	Ozone analyzers	T400	good
NFO Storage and QA	Ozone analyzers	TEI 49C, plan to replace with T400	good
NFO Storage and QA	Ozone analyzers	TEI 49C, plan to replace with T400	good
Hendersonville	Ozone Calibrator	T703 Ozone Calibrator	good
NFO Storage and QA	Ozone analyzers	TEI 49i (ref photometer)	good
NFO Storage and QA	Ozone analyzers	TEI 49i (ref photometer)	good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	poor
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	good
NFO Storage and QA	PM10 inlet	Graseby	good
NFO Storage and QA	PM10 inlet	Graseby	good
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	poor
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	good
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	good
NFO Storage and QA	Orifice certification HiVol	Roots meter	good
NFO Storage and QA	Orifice certification HiVol	Roots meter 5M125TC	good
NFO Storage and QA	Flow Check Device	BGI TetraCal	good
NFO Storage and QA	T100 SO2 Analyzer	gas monitor	good
NFO Storage and QA	T100 SO2 Analyzer	gas monitor	good
NFO Storage and QA	SO2 Calibrator	T700 SO2 Calibrator	good
NFO Storage and QA	SO2 Calibrator	T700 SO2 Calibrator	good
Ross N Robinson	Portable zero air	T701 Zero Air Supply	good
Ross N Robinson	Data logger	Agilaire 8872	good
NFO Storage and QA	Multi-gas calibrator	TEI 146	poor
NFO Storage and QA	TEI49C	TEI49C	good
NFO Storage and QA	TEI49C	TEI49C	good
NFO Storage and QA	Ozone analyzers	TEI 49i	good
NFO Storage and QA	Ozone analyzers	Teledyne API 400E	good
NFO Storage and QA	Ozone analyzers	Teledyne API 400E	good
NFO Storage and QA	Ozone analyzers	Teledyne API 400E	good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	good
NFO Storage and QA	SO2 analyzers	Teledyne M100E	good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
NFO Storage and QA	SO2 analyzers	Teledyne M100E	good
NFO Storage and QA	SO2 analyzers	Teledyne T100	good
NFO Storage and QA	SO2 Calibrator	T700 SO2 Calibrator	good
NFO Storage and QA	Multi-gas calibrator	Teledyne T750U, plan to order two additional units	good
NFO Storage and QA	Multi-gas calibrator	Teledyne T750U	good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	poor
NFO Storage and QA	TEOM shelter	Ekto	good
NFO Storage and QA	Flow Check Device	Tetracal, for TEOM	good
NFO Storage and QA	Flow Check Device	Tetracal, for TEOM	good
NFO Storage and QA	Trailer	Ozone shelter 820	poor
NFO Storage and QA	Trailer	Ozone shelter 820	poor
NFO Storage and QA	Carbon speciation PM 2.5	URG3000N	good
NFO Storage and QA	Carbon speciation PM 2.5	URG3000N	good
NFO Storage and QA	Weather	Climatronics Sonic	good
NFO Storage and QA	SO2 analyzers	Teledyne M100E	good
Pope	Trailer	Ozone shelter 820	poor
Ross N Robinson	Data logger	ESC 8832	good
Ross N Robinson	SO2 analyzers	Teledyne T100	good
Ross N Robinson	SO2 Calibrator	T700 SO2 Calibrator	good
Skyland Drive	34 foot tower	T700 SO2 Calibrator	good
Skyland Drive	Portable zero air	T700 SO2 Calibrator	good
Skyland Drive	Data logger	Agilaire 8872	good
Skyland Drive	Data logger	ESC 8832	good
Skyland Drive	SO2 Calibrator	T700 SO2 Calibrator	good

Appendix C: Tennessee Monitoring Site Agreement Letters

Kentucky



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Air Pollution Control
William R. Snodgrass TN Tower
312 Rosa L. Parks Ave., 15th Floor
Nashville, Tennessee 37243

July 2, 2014

Sean Alteri, Director
Kentucky Division for Air Quality
Kentucky Department for Environmental Protection
200 Fair Oaks Lane
Frankfort, KY 40601

Dear Mr. Alteri:

The United States Environmental Protection Agency (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D states in part: "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants, including continuous PM 2.5 as it applies to MSA areas where the population is sufficient to warrant monitoring for that pollutant. Tennessee and Kentucky share the Clarksville, TN-KY MSA, which is comprised of Trigg and Christian counties in Kentucky and Montgomery county in Tennessee. The US Census Bureau lists this area as containing a population in excess of 260,000.

CBSA Code	Geographic area	Legal/statistical Area description	July 1, 2013 Estimate	2010 Census
17300	Clarksville, TN-KY	Metropolitan Statistical Area	272,579	260,625

The Tennessee Division of Air Pollution Control (TDAPC) currently operates one (1) PM 2.5 FRM monitor and one (1) continuous PM 2.5 monitor in this area. The TDAPC believes the operation of the existing PM 2.5 monitors; (FRM and continuous), are sufficient to properly characterize the particulate air quality in the entire Clarksville, TN-KY MSA and comply with the requirements for both population and concentration based monitoring identified in the revised monitoring regulations as found at 40 CFR58, AppD. The TDAPC would like to invite the

Sean Alteri
July 2, 2014
Page 2

Kentucky Division for Air Quality to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to sharing with Kentucky any and all quality assured ambient air monitoring data collected in the Tennessee portion of the Clarksville, TN-KY MSA. Tennessee also will notify Kentucky in advance of the intent to relocate or shutdown any of the PM 2.5 monitors referenced above so that adequate monitoring arrangements can be made to meet the entire MSA monitoring requirements for PM 2.5.

Sincerely,

A handwritten signature in black ink, appearing to read "Barry R. Stephens", written over a horizontal line.

Barry R. Stephens, PE
Director, Air Pollution Control Division

BRS/lb

Cc: Heather McTeer-Toney, US EPA Region IV



Energy and Environment Cabinet
Department for Environmental Protection

Division for Air Quality
200 Fair Oaks Lane, 1st Floor
Frankfort, Kentucky 40601-1403
Web site: air.ky.gov

May 15, 2015

Mr. Barry R. Stephens, PE
Director
Tennessee Division of Air Pollution Control
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Dear Mr. Stephens:

In a letter from your office dated July 1, 2014, the Tennessee Division of Air Pollution Control (TDAPC) agreed to operate a continuous PM_{2.5} monitor and an intermittent FRM PM_{2.5} sampler, to meet the minimum network design requirements stated in 40 CFR 58, Appendix D for the Clarksville, TN-KY metropolitan statistical area (MSA). The Kentucky Division for Air Quality (Division) appreciates TDAPC's cooperation and looks forward to participating in TDAPC's annual air monitoring network review.

The Division currently operates one (1) intermittent FRM PM_{2.5} sampler and one (1) continuous ozone monitor at the Hopkinsville site (21-047-0006) in Christian County. In accordance with Table D-2 of 40 CFR 58, Appendix D, one (1) ozone monitor is required to be operated in the Clarksville, TN-KY MSA, based upon the most current population estimates from the US Census Bureau, as well as 2012-2014 ozone design values.

Geographic Area	Area Description	2014 USCB Population Estimate	2014 Three-Year Ozone DV (ppm)
Christian County, KY	County	74,250	0.067
Trigg County, KY	County	14,142	0.069 (CASTNET)
Montgomery County, TN	County	189,961	N/A
Clarksville, TN-KY	MSA	278,353	0.069

To satisfy the regulatory requirement, the Division agrees to operate one ozone monitor at the Hopkinsville site. Also, the Division agrees to notify TDAPC in the event that shutdown or relocation of the ozone monitor is necessary.

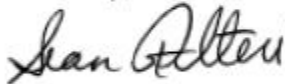
Despite the fact that 2012-2014 design values show that no FRM PM_{2.5} samplers are required in the Clarksville MSA, the Division will continue to operate the PM_{2.5} sampler at

Mr. Barry Stephens
May 15, 2015
Page 2

Hopkinsville. The Division also agrees to notify TDAPC in the event that the Hopkinsville FRM PM_{2.5} sampler must be shutdown or relocated, as it is the design value monitor for the MSA.

The Division commits to sharing with TDAPC any and all quality-assured ambient monitoring data collected in the Kentucky portion of the Clarksville, TN-KY MSA. The Division also welcomes TDAPC participation in Kentucky's annual network review process. If you have any questions or concerns, please contact me at 502-564-3999.

Sincerely,



Sean Alteri,
Director

SA/jfm

c: -Heather McTeer Toney, USEPA Region IV
-Daniel Garver, USEPA Region IV

Virginia



May 13, 2016

Michael Dowd
Director of Air Division
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Mr. Dowd,

This letter is in regard to ambient air monitoring in the MSA/CSA that our two states share.

The United States Environmental Protection Agency's (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D state in part: "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants.

Tennessee and Virginia share the Kingsport-Bristol-Bristol, TN-VA MSA, which is comprised of Scott and Washington counties in Virginia, and Hawkins and Sullivan counties in Tennessee. The US Census Bureau estimates the 2015 population under 309,000; however in 2010 the census population was 309,544.

CBSA Code	Geographic Area	Legal/Statistical Area Description	2015 Estimate	2010 Census
28700	Kingsport-Bristol-Bristol, TN-VA MSA	Metropolitan Statistical Area	307,120	309,544

The Tennessee Division of Air Pollution Control (DAPC) currently operates a PM_{2.5}, TEOM continuous monitor at site 47-163-1007, two ozone monitors at sites 47-163-2002 and 47-163-2003, and a lead monitor at site 47-163-3004, all in Sullivan County. In addition, we are establishing two SO₂ monitoring sites in the Kingsport, Sullivan County nonattainment area.

Upon a 3 year data review, the records show the ozone concentrations recorded by the two ozone monitors are similar. DAPC will propose that the ozone monitor site 47-163-2002 be shut down in 2017 or at the conclusion of the 2016 ozone monitoring season. The other sites with

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We value your opinion. Please take a few minutes to complete our customer service survey.

existing monitors in operation: (ozone, PM_{2.5} FRM, and PM_{2.5} continuous TEOM), are sufficient to properly characterize the air quality in the entire Kingsport-Bristol-Bristol, TN-VA MSA and comply with the requirements for both population and concentration-based monitoring, identified in the revised monitoring regulations found in 40 CFR Part 58, Appendix D. The TEOM monitor is used for air quality forecasting.

TDAPC would like to invite the Virginia Department of Environmental Quality Air Division to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to notifying the Virginia Department of Environmental Quality Air Division in advance of any proposed relocation or shut down of ozone or PM_{2.5} monitors referenced above so that adequate monitoring arrangements can be made to meet the entire MSA monitoring requirements.

If you have technical questions contact Jason Stephens at 615-532-0584/jason.stephens@tn.gov. I may be contacted at 615-532-9668/michelle.b.walker@tn.gov.

Sincerely,

A handwritten signature in blue ink that reads "Michelle W. Owenby". The signature is fluid and cursive, with the first name being the most prominent.

Michelle Walker Owenby
Director
Department of Environment and Conservation
Division of Air Pollution Control

Cc: Heather McTeer-Toney, US EPA Region IV

Appendix D: Sections of the CFR Referred to in the 2017/18 NMP

§ 58.10 Annual monitoring network plan and periodic network assessment.

(a)(1) Beginning July 1, 2007, the state, or where applicable local, agency shall submit to the Regional Administrator an annual monitoring network plan which shall provide for the documentation of the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations that can include FRM, FEM, and ARM monitors that are part of SLAMS, NCore, CSN, PAMS, and SPM stations. The plan shall include a statement of whether the operation of each monitor meets the requirements of appendices A, B, C, D, and E of this part, where applicable. The Regional Administrator may require additional information in support of this statement. The annual monitoring network plan must be made available for public inspection and comment for at least 30 days prior to submission to the EPA and the submitted plan shall include and address, as appropriate, any received comments.

(2) Any annual monitoring network plan that proposes network modifications (including new or discontinued monitoring sites, new determinations that data are not of sufficient quality to be compared to the NAAQS, and changes in identification of monitors as suitable or not suitable for comparison against the annual PM_{2.5} NAAQS) to SLAMS networks is subject to the approval of the EPA Regional Administrator, who shall approve or disapprove the plan within 120 days of submission of a complete plan to the EPA.

(3) The plan for establishing required NCore multipollutant stations shall be submitted to the Administrator not later than July 1, 2009. The plan shall provide for all required stations to be operational by January 1, 2011.

(4) A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting 1.0 tpy or greater shall be submitted to the EPA Regional Administrator no later than July 1, 2009, as part of the annual network plan required in paragraph (a)(1) of this section. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting 1.0 tpy or greater to be operational by January 1, 2010. A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy shall be submitted to the EPA Regional Administrator no later than July 1, 2011. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy to be operational by December 27, 2011.

(5)(i) A plan for establishing or identifying an area-wide NO₂ monitor, in accordance with the requirements of Appendix D, section 4.3.3 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(ii) A plan for establishing or identifying any NO₂ monitor intended to characterize vulnerable and susceptible populations, as required in Appendix D, section 4.3.4 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(iii) A plan for establishing a single near-road NO₂ monitor in CBSAs having 1,000,000 or more persons, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2013. The plan shall provide for these required monitors to be operational by January 1, 2014.

(iv) A plan for establishing a second near-road NO₂ monitor in any CBSA with a population of 2,500,000 or more persons, or a second monitor in any CBSA with a population of 500,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitors to be operational by January 1, 2015.

(v) A plan for establishing a single near-road NO₂ monitor in all CBSAs having 500,000 or more persons, but less than 1,000,000, not already required by paragraph (a)(5)(iv) of this section, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2016. The plan shall provide for these monitors to be operational by January 1, 2017.

(6) A plan for establishing SO₂ monitoring sites in accordance with the requirements of Appendix D to this part shall be submitted to the EPA Regional Administrator by July 1, 2011 as part of the annual network plan required in paragraph (a) (1). The plan shall provide for all required SO₂ monitoring sites to be operational by January 1, 2013.

(7) A plan for establishing CO monitoring sites in accordance with the requirements of Appendix D to this part shall be submitted to the EPA Regional Administrator. Plans for required CO monitors shall be submitted at least six months prior to the date such monitors must be established as required by section 58.13.

(8)(i) A plan for establishing near-road PM_{2.5} monitoring sites in CBSAs having 2.5 million or more persons, in accordance with the requirements of Appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitoring stations to be operational by January 1, 2015.

(ii) A plan for establishing near-road PM_{2.5} monitoring sites in CBSAs having 1 million or more persons, but less than 2.5 million persons, in accordance with the requirements of Appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2016. The plan shall provide for these required monitoring stations to be operational by January 1, 2017.

(9) The annual monitoring network plan shall provide for the required O₃ sites to be operating on the first day of the applicable required O₃ monitoring season in effect on January 1, 2017 as listed in Table D-3 of Appendix D of this part.

(10) A plan for making Photochemical Assessment Monitoring Stations (PAMS) measurements, if applicable, in accordance with the requirements of Appendix D paragraph 5(a) of this part shall be submitted to the EPA Regional Administrator no later than July 1, 2018. The plan shall provide for the required PAMS measurements to begin by June 1, 2019.

(11) An Enhanced Monitoring Plan for O₃, if applicable, in accordance with the requirements of Appendix D paragraph 5(h) of this part shall be submitted to the EPA Regional Administrator no later than October 1, 2019 or two years following the effective date of a designation to a classification of Moderate or above O₃ nonattainment, whichever is later.

(12) A detailed description of the PAMS network being operated in accordance with the requirements of Appendix D to this part shall be submitted as part of the annual monitoring network plan for review by the EPA Administrator. The PAMS Network Description described in section 5 of Appendix D may be used to meet this requirement.

(b) The annual monitoring network plan must contain the following information for each existing and proposed site:

(1) The AQS site identification number.

(2) The location, including street address and geographical coordinates.

(3) The sampling and analysis method(s) for each measured parameter.

(4) The operating schedules for each monitor.

(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.

(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in Appendix D to this part.

(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM_{2.5} NAAQS as described in §58.30.

(8) The MSA, CBSA, CSA or other area represented by the monitor.

(9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.

(10) Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.

(11) Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM₁₀ monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.

(12) The identification of required NO₂ monitors as near-road, area-wide, or vulnerable and susceptible population monitors in accordance with Appendix D, section 4.3 of this part.

(13) The identification of any PM_{2.5} FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS. For required SLAMS where the agency identifies that the PM_{2.5} Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in §58.12 or other Class III PM_{2.5} FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in Appendix D to this part.

(c) The annual monitoring network plan must document how state and local agencies provide for the review of changes to a PM_{2.5} monitoring network that impact the location of a violating PM_{2.5} monitor. The affected state or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

(d) The state, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in Appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby states and tribes or health effects studies. The state, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The assessments are due every five years beginning July 1, 2010.

(e) All proposed additions and discontinuations of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to approval according to §58.14.

[71 FR 61298, Oct. 17, 2006, as amended at 72 FR 32210, June 12, 2007; 73 FR 67059, Nov. 12, 2008; 73 FR 77517, Dec. 19, 2008; 75 FR 6534, Feb. 9, 2010; 75 FR 35601, June 22, 2010; 75 FR 81137, Dec. 27, 2010; 76 FR 54341, Aug. 31, 2011; 78 FR 16188, Mar. 14, 2013; 78 FR 3282, Jan. 15, 2013; 80 FR 65466, Oct. 26, 2015; 81 FR 17279, Mar. 28, 2016]

Appendix E: Monitoring Network Requirements

Ozone Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

4.1 Ozone (O₃) Design Criteria. (a) State, and where appropriate, local agencies must operate O₃ sites for various locations depending upon area size (in terms of population and geographic characteristics) and typical peak concentrations (expressed in percentages below, or near the O₃ NAAQS). Specific SLAMS O₃ site minimum requirements are included in Table D-2 of this appendix. The NCore sites are expected to complement the O₃ data collection that takes place at single-pollutant SLAMS sites, and both types of sites can be used to meet the network minimum requirements. The total number of O₃ sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding O₃-related atmospheric processes will include more sites than these minimum numbers required in Table D-2 of this appendix. The EPA Regional Administrator and the responsible State or local air monitoring agency must work together to design and/or maintain the most appropriate O₃ network to service the variety of data needs in an area.

TABLE D-2 OF APPENDIX D TO PART 58 SLAMS MINIMUM O₃ MONITORING REQUIREMENTS

MSA population ^{1,2}	Most recent 3-year design value concentrations \geq 85% of any O ₃ NAAQS ³	Most recent 3-year design value concentrations <85% of any O ₃ NAAQS ^{3,4}
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000 ⁵	1	0

1. Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

2. Population based on latest available census figures.

3. The ozone (O₃) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

4. These minimum monitoring requirements apply in the absence of a design value.

5. Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

CO Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

4.2.1 General Requirements. (a) Except as provided in subsection (b), one CO monitor is required to operate collocated with one required near-road NO₂ monitor, as required in Section 4.3.2 of this part, in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO₂ monitor, only one CO monitor is required to be collocated with a near-road NO₂ monitor within that CBSA.

(b) If a state provides quantitative evidence demonstrating that peak ambient CO concentrations would occur in a near-road location which meets microscale siting criteria in Appendix E of this part but is not a near-road NO₂ monitoring site, then the EPA Regional Administrator may approve a request by a state to use such an alternate near-road location for a CO monitor in place of collocating a monitor at near-road NO₂ monitoring site.

NO₂ Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

4.3.2 Requirement for Near-road NO₂ Monitors

(a) Within the NO₂ network, there must be one microscale near-road NO₂ monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high AADT counts as specified in paragraph 4.3.2(a)(1) of this appendix. An additional near-road NO₂ monitoring station is required for any CBSA with a population of 2,500,000 persons or more, or in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts to monitor a second location of expected maximum hourly concentrations. CBSA populations shall be based on the latest available census figures.

(1) The near-road NO₂ monitoring sites shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, where maximum hourly NO₂ concentrations are expected to occur and siting criteria can be met in accordance with appendix E of this part. Where a state or local air monitoring agency identifies multiple acceptable candidate sites where maximum hourly NO₂ concentrations are expected to occur, the monitoring agency shall consider the potential for population exposure in the criteria utilized to select the final site location. Where one CBSA is required to have two near-road NO₂ monitoring stations, the sites shall be differentiated from each other by one or more of the following factors: fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation.

(b) Measurements at required near-road NO₂ monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO₂, and NO_x.

SO₂ Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

4.4 Sulfur Dioxide (SO₂) Design Criteria.

4.4.1 General Requirements. (a) State and, where appropriate, local agencies must operate a minimum number of required SO₂ monitoring sites as described below.

4.4.2 Requirement for Monitoring by the Population Weighted Emissions Index. (a) The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA) they contain or share with another State or States for use in the implementation of or adjustment to the SO₂ monitoring network. The PWEI shall be calculated by multiplying the population of each CBSA, using the most current census data or estimates, and the total amount of SO₂ in tons per year emitted within the CBSA area, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting product shall be divided by one million, providing a PWEI value, the units of which are million persons-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO₂ monitor is required within that CBSA.

(1) The SO₂ monitoring site(s) required as a result of the calculated PWEI in each CBSA shall satisfy minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types (as defined in section 1.1.1 of this appendix): population exposure, highest concentration, source impacts, general background, or regional transport. SO₂ monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors under this part. Any monitor that is sited outside of a CBSA with minimum monitoring requirements to assess the highest concentration resulting from the impact of significant sources or source categories existing within that CBSA shall be allowed to count towards minimum monitoring requirements for that CBSA.

Table 11: TDEC DAPC Interpretation of the PWEI SO₂ Monitoring Requirements

CBSA AREA NAME	POP ESTIMATE 2016	2011 NEI SO ₂ Total CBSA 03232016	2011 NEI Data 03/23/2016							2014 NEI SO ₂ Total CBSA 05052017	2014 V1 NEI Data 5/5/2017	
			PWEI 2010	PWEI 2011	PWEI 2012	PWEI 2013	PWEI 2014	PWEI 2015	SO ₂ Monitors Required		PWEI 2016	SO ₂ Monitors Required*
Chattanooga, TN-GA	551632	953	503	508	512	516	519	525	FALSE	3965.06	2187	FALSE
Clarksville, TN-KY	282349	431	112	114	119	118	120	122	FALSE	693.81	196	FALSE
Cleveland, TN	121262	5	1	1	1	1	1	1	FALSE	172.17	21	FALSE
Jackson, TN	129527	154	20	20	20	20	20	20	FALSE	211.51	27	FALSE
Johnson City, TN	201661	4	1	1	1	1	1	1	FALSE	123.17	25	FALSE
Kingsport-Bristol-Bristol, TN-VA	306334	39082	12098	12080	12071	12051	12040	11972	1	22223.36	6808	1
Knoxville, TN	868546	28722	24057	24207	24351	24470	24632	24947	1	4946.87	4297	FALSE
Memphis, TN-MS-AR	1342842	15025	19905	20025	20144	20159	20182	20176	1	14628.18	19643	1
Morristown, TN	117320	21	2	2	2	2	2	3	FALSE	64.14	8	FALSE
Nashville-Davidson--Murfreesboro--Franklin, TN	1865298	24560	41038	41710	42419	43191	44028	45812	1	21348.61	39822	1

4.4.3 Regional Administrator Required Monitoring. (a) The Regional Administrator may require additional SO₂ monitoring stations above the minimum number of monitors required in 4.4.2 of this part, where the minimum monitoring requirements are not sufficient to meet monitoring objectives. The Regional Administrator may require, at his/her discretion, additional monitors in situations where an area has the potential to have concentrations that may violate or contribute to the violation of the NAAQS, in areas impacted by sources which are not conducive to modeling, or in locations with susceptible and vulnerable populations, which are not monitored under the minimum monitoring provisions described above. The Regional Administrator and the responsible State or local air monitoring agency shall work together to design and/or maintain the most appropriate SO₂ network to provide sufficient data to meet monitoring objectives.

4.4.5 NCore Monitoring. (a) SO₂ measurements are included within the NCore multipollutant site requirements as described in paragraph (3)(b) of this appendix. NCore-based SO₂ measurements are primarily used to characterize SO₂ trends and assist in understanding SO₂ transport across representative areas in urban or rural locations and are also used for comparison with the SO₂ NAAQS. SO₂ monitors at NCore sites that exist in CBSAs with minimum monitoring requirements per section 4.4.2 above shall be allowed to count towards those minimum monitoring requirements.

Lead Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

4.5 Lead (Pb) Design Criteria. (a) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year based on either the most recent National Emission Inventory (<http://www.epa.gov/ttn/chief/eiinformation.html>) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure.

(i) One monitor may be used to meet the requirement in paragraph 4.5(a) for all sources involved when the location of the maximum Pb concentration due to one Pb source is expected to also be impacted by Pb emissions from a nearby source (or multiple sources). This monitor must be sited, taking into account logistics and the

potential for population exposure, where the Pb concentration from all sources combined is expected to be at its maximum.

(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under §58.10(d).

(iii) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near each of the airports listed in Table D-3A for a period of 12 consecutive months commencing no later than December 27, 2011. Monitors shall be sited to measure the maximum Pb concentration in ambient air, taking into account logistics and the potential for population exposure, and shall use an approved Pb-TSP Federal Reference Method or Federal Equivalent Method. Any monitor that exceeds 50 percent of the Pb NAAQS on a rolling 3-month average (as determined according to 40 CFR part 50, Appendix R) shall become a required monitor under paragraph 4.5(c) of this Appendix, and shall continue to monitor for Pb unless a waiver is granted allowing it to stop operating as allowed by the provisions in paragraph 4.5(a)(ii) of this appendix. Data collected shall be submitted to the Air Quality System database according to the requirements of 40 CFR part 58.16.

PM_{2.5} Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

4.7.1 General Requirements. (a) State, and where applicable local, agencies must operate the minimum number of required PM_{2.5} SLAMS sites listed in Table D-5 of this appendix. The NCore sites are expected to complement the PM_{2.5} data collection that takes place at non-NCore SLAMS sites, and both types of sites can be used to meet the minimum PM_{2.5} network requirements. Deviations from these PM_{2.5} monitoring requirements must be approved by the EPA Regional Administrator.

Table D-5 of Appendix D to Part 58—PM_{2.5} Minimum Monitoring Requirements

MSA population ^{1 2}	Most recent 3-year design value ≥85% of any PM _{2.5} NAAQS ³	Most recent 3-year design value <85% of any PM _{2.5} NAAQS ^{3 4}
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000 ⁵	1	0

¹Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

²Population based on latest available census figures.

³The PM_{2.5} National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

⁴These minimum monitoring requirements apply in the absence of a design value.

⁵Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

(b) Specific Design Criteria for PM_{2.5}. The required monitoring stations or sites must be sited to represent area-wide air quality. These sites can include sites collocated at PAMS. These monitoring stations will typically be at neighborhood or urban-scale; however, micro-or middle-scale PM_{2.5} monitoring sites that represent many such locations throughout a metropolitan area are considered to represent area-wide air quality.

(1) At least one monitoring station is to be sited at neighborhood or larger scale in an area of expected maximum concentration.

(2) For CBSAs with a population of 1,000,000 or more persons, at least one PM_{2.5} monitor is to be collocated at a near-road NO₂ station required in section 4.3.2(a) of this appendix.

(3) For areas with additional required SLAMS, a monitoring station is to be sited in an area of poor air quality.

(4) Additional technical guidance for siting PM_{2.5} monitors is provided in references 6 and 7 of this appendix.

(c) The most important spatial scale to effectively characterize the emissions of particulate matter from both mobile and stationary sources is the neighborhood scale for PM_{2.5}. For purposes of establishing monitoring sites to represent large homogenous areas other than the above scales of representativeness and to characterize regional transport, urban or regional scale sites would also be needed. Most PM_{2.5} monitoring in urban areas should be representative of a neighborhood scale.

(1) *Micro-scale*. This scale would typify areas such as downtown street canyons and traffic corridors where the general public would be exposed to maximum concentrations from mobile sources. In some circumstances, the micro-scale is appropriate for particulate sites. SLAMS sites measured at the micro-scale level should, however, be limited to urban sites that are representative of long-term human exposure and of many such microenvironments in the area. In general, micro-scale particulate matter sites should be located near inhabited buildings or locations where the general public can be expected to be exposed to the concentration measured. Emissions from stationary sources such as primary and secondary smelters, power plants, and other large industrial processes may, under certain plume conditions, likewise result in high ground level concentrations at the micro-scale. In the latter case, the micro-scale would represent an area impacted by the plume with dimensions extending up to approximately 100 meters. Data collected at micro-scale sites provide information for evaluating and developing hot spot control measures.

(2) *Middle scale*—People moving through downtown areas, or living near major roadways, encounter particle concentrations that would be adequately characterized by this spatial scale. Thus, measurements of this type would be appropriate for the evaluation of possible short-term exposure public health effects of particulate matter pollution. In many situations, monitoring sites that are representative of microscale or middle-scale impacts are not unique and are representative of many similar situations. This can occur along traffic corridors or other locations in a residential district. In this case, one location is representative of a number of small scale sites and is appropriate for evaluation of long-term or chronic effects. This scale also includes the characteristic concentrations for other areas with dimensions of a few hundred meters such as the parking lot and feeder streets associated with shopping centers, stadia, and office buildings.

(3) *Neighborhood scale*—Measurements in this category would represent conditions throughout some reasonably homogeneous urban sub-region with dimensions of a few kilometers and of generally more regular shape than the middle scale. Homogeneity refers to the particulate matter concentrations, as well as the land use and land surface characteristics. Much of the PM_{2.5} exposures are expected to be associated with this scale of measurement. In some cases, a location carefully chosen to provide neighborhood scale data would represent the immediate neighborhood as well as neighborhoods of the same type in other parts of the city. PM_{2.5} sites of this kind provide good information about trends and compliance with standards because they often represent conditions in areas where people commonly live and work for periods comparable to those specified in the NAAQS. In general, most PM_{2.5} monitoring in urban areas should have this scale.

(4) *Urban scale*—This class of measurement would be used to characterize the particulate matter concentration over an entire metropolitan or rural area ranging in size from 4 to 50 kilometers. Such measurements would be useful for assessing trends in area-wide air quality, and hence, the effectiveness of large scale air pollution control strategies. Community-oriented PM_{2.5} sites may have this scale.

(5) *Regional scale*—These measurements would characterize conditions over areas with dimensions of as much as hundreds of kilometers. As noted earlier, using representative conditions for an area implies some degree of homogeneity in that area. For this reason, regional scale measurements would be most applicable to sparsely populated areas. Data characteristics of this scale would provide information about larger scale processes of particulate matter emissions, losses and transport. PM_{2.5} transport contributes to elevated particulate concentrations and may affect multiple urban and State entities with large populations such as in the eastern United States. Development of effective pollution control strategies requires an understanding at regional geographical scales of the emission sources and atmospheric processes that are responsible for elevated PM_{2.5} levels and may also be associated with elevated O₃ and regional haze.

4.7.2 Requirement for Continuous PM_{2.5} Monitoring. The State, or where appropriate, local agencies must operate continuous PM_{2.5} analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of

the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies. State and local air monitoring agencies must use methodologies and quality assurance/quality control (QA/QC) procedures approved by the EPA Regional Administrator for these required continuous analyzers.

4.7.3 Requirement for PM_{2.5} Background and Transport Sites. Each State shall install and operate at least one PM_{2.5} site to monitor for regional background and at least one PM_{2.5} site to monitor regional transport. These monitoring sites may be at community-oriented sites and this requirement may be satisfied by a corresponding monitor in an area having similar air quality in another State. State and local air monitoring agencies must use methodologies and QA/QC procedures approved by the EPA Regional Administrator for these sites. Methods used at these sites may include non-federal reference method samplers such as IMPROVE or continuous PM_{2.5} monitors.

4.7.4 PM_{2.5} Chemical Speciation Site Requirements. Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the PM_{2.5} Speciation Trends Network (STN). The selection and modification of these STN sites must be approved by the Administrator. The PM_{2.5} chemical speciation urban trends sites shall include analysis for elements, selected anions and cations, and carbon. Samples must be collected using the monitoring methods and the sampling schedules approved by the Administrator. Chemical speciation is encouraged at additional sites where the chemically resolved data would be useful in developing State implementation plans and supporting atmospheric or health effects related studies.

Index reporting requirements

40 CFR 58 Subpart F, 58.50 Revised as of July 1, 2016

58.50 Index reporting.

(a) The state or where applicable, local agency shall report to the general public on a daily basis through prominent notice an air quality index that complies with the requirements of Appendix G: Annual Site Evaluations to this part.

(b) Reporting is required for all individual MSA with a population exceeding 350,000.

(c) The population of a MSA for purposes of index reporting is the most recent decennial U.S. census population.

Geographic area	2010 Census	2016 Census Est.	Required to Have AQI Reporting	Daily AQI/Air Quality Forecasts Provided
Chattanooga, TN-GA	528143	551632	Yes	Yes
Clarksville, TN-KY	260625	282349	No	Yes
Cleveland, TN	115788	121262	No	No
Jackson, TN	130011	129527	No	No
Johnson City, TN	198716	201661	No	Yes Based on the combined population of both areas.
Kingsport-Bristol-Bristol, TN-VA	309544	306334	No	
Knoxville, TN	837571	868546	Yes	Yes In addition, the GSMNP has a separate AQI/Forecast provided.
Memphis, TN-MS-AR	1324829	1342842	Yes	Yes
Morristown, TN	113951	117320	No	No
Nashville-Davidson--Murfreesboro, TN	1670890	1865298	Yes	Yes

NCore Monitoring Network Requirements and PM_{10-2.5}

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

(a) Each State (i.e. the fifty States, District of Columbia, Puerto Rico, and the Virgin Islands) is required to operate at least one NCore site. States may delegate this requirement to a local agency. States with many MSAs often also have multiple air sheds with unique characteristics and, often, elevated air pollution. These States include, at a minimum, California, Florida, Illinois, Michigan, New York, North Carolina, Ohio, Pennsylvania, and Texas. These States are required to identify one to two additional NCore sites in order to account for their unique situations.

These additional sites shall be located to avoid proximity to large emission sources. Any State or local agency can propose additional candidate NCore sites or modifications to these requirements for approval by the Administrator. The NCore locations should be leveraged with other multipollutant air monitoring sites including PAMS sites, National Air Toxics Trends Stations (NATTS) sites, CASTNET sites, and STN sites. Site leveraging includes using the same monitoring platform and equipment to meet the objectives of the variety of programs where possible and advantageous.

(b) The NCore sites must measure, at a minimum, PM_{2.5} particle mass using continuous and integrated/filter-based samplers, speciated PM_{2.5}, PM_{10-2.5} particle mass, O₃, SO₂, CO, NO/NO_y, wind speed, wind direction, relative humidity, and ambient temperature.

(1) Although the measurement of NO_y is required in support of a number of monitoring objectives, available commercial instruments may indicate little difference in their measurement of NO_y compared to the conventional measurement of NO_x, particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NO_y and NO_x measured concentrations, the Administrator may allow for waivers that permit NO_x monitoring to be substituted for the required NO_y monitoring at applicable NCore sites.

(2) The EPA recognizes that, in some cases, the physical location of the NCore site may not be suitable for representative meteorological measurements due to the site's physical surroundings. It is also possible that nearby meteorological measurements may be able to fulfill this data need. In these cases, the requirement for meteorological monitoring can be waived by the Administrator.

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of July 1, 2016

Coarse Particulate Matter (PM_{10-2.5}) Design Criteria.

4.8.1 General Monitoring Requirements. (a) The only required monitors for PM_{10-2.5} are those required at NCore Stations.

(b) Although microscale monitoring may be appropriate in some circumstances, middle and neighborhood scale measurements are the most important station classifications for PM_{10-2.5} to assess the variation in coarse particle concentrations that would be expected across populated areas that are in proximity to large emissions sources.

NCore Look Rock Monitoring Site

Air quality monitoring at the Look Rock monitoring site has a long history dating at least back to about 1980. Monitoring at this site has been a joint effort of the National Park Service (NPS), EPA and the state of Tennessee.

Siting

The coordinates are:
Latitude + 35.6334N
Longitude -83.9416W
Elevation 801 Meters.

Site is approved by the EPA as a rural NCore site.

Monitoring Objective

Determine compliance with NAAQS; observe pollution trends for national data analysis, provide pollution levels for daily index reporting; and provide data for scientific studies.

Quality Assurance

All Quality Assurance procedures shall be implemented in accordance with 40 CFR 58, Appendix A.

Area of Representativeness

40 CFR Part 58 Appendix D provides design criteria for ambient air monitoring. In the case of urban NCore the spatial scales to be used are neighborhood and urban. Because the Look Rock site is located in a pristine high elevation area, it is understood that the site is ideally suited for both background and transport related measurements.

Spatial Scales for Each Pollutant

Generally regional scale.

Need For Additional Resources

All parties agree that the collaboration between the National Park Service, EPA and the state of Tennessee at the Look Rock sampling site has produced an extraordinarily diverse and in-depth air quality record and that the bulk of this data set has been validated and reported to the U.S. EPA AQS repository. However, under the present piecemeal funding by the various agencies, there is no assurance that this will continue at the site for the longer term needed for monitoring compliance with the PM NAAQS and with the regional haze rule (RHR). What is needed is a long-term commitment by EPA to coordinate the operation of this and other sites to maintain quality and relevance in the NCore network over the long term. This commitment should commence by the 2011 time frame when NCore sites are expected to become fully operational.

EPA has agreed to provide support and funding to continue the operation of the NCore site. This is the final equipment list currently in place at the site.

Air Monitoring Equipment at Look Rock

POLLUTANT INSTRUMENT	ANALYSIS METHOD	SAMPLING REPORTING FREQ	AQS CODE	PARAMETER CODE	POC	REP ORD CODE	DATE SAMPLING BEGAN	MONITOR		SAMPLING INSTRUMENT NAME AND DESIGNATION	FED AGENCY
								Type	Comment		
Sulfur Dioxide (SO ₂) trace-level	Pulsed fluorescence	Continuous/1hr	47-009-0101	42401	4	745	20070401	Special Purpose	Ncore	Thermo SO ₂ 43i TLE EQSA-0436-060	NPS
Carbon Monoxide (CO)	Trace-level NDIR-GFC	Continuous/1hr	47-009-0101	42101	1	745	20070401	Special Purpose	Ncore	Thermo CO 48i TLE RFNA-0981-054	NPS
Nitrogen oxide (NO) trace-level	Chemiluminescence with molybdenum convertor	Continuous/1hr	47-009-0101	42601	1	745	20070401	Special Purpose	Ncore	Thermo NO ₂ /NOy 42c TLE RFNA1289-074	NPS
Total reactive nitrogen (NOy) trace-level	Chemiluminescence with molybdenum convertor	Continuous/1hr	47-009-0101	42600	1	745	20070401	Special Purpose	Ncore	Thermo NO ₂ /NOy 42c TLE RFNA1289-074	NPS
Nitrogen dioxide (NO ₂) trace-level	Chemiluminescence with molybdenum convertor	Continuous/1hr	47-009-0101	42612	1	745	20070401	Special Purpose	Ncore	Thermo NO ₂ /NOy 42c TLE RFNA1289-074	NPS
Nitrogen dioxide (NO ₂) trace-level	Cavity attenuated phase shift	Continuous/1hr	47-009-0101	42602	4	745	20141102	Special Purpose	Ncore	Teledyne NO ₂ T500U CAPS	NPS
Calibrator	NA	Daily	NA	NA	NA	NA	20070401	NA	NA	Thermo Model 146c	NPS
Zero Air Supply	NA	NA	NA	NA	NA	NA	20070401	NA	NA	Thermo 111	NPS
Telemetry-Data Logger	NA	1 minute/ 1 hour	NA	NA	NA	NA	20070401	NA	NA	ESC 8832	NPS

Appendix F: EPA Approval and Special Request Letters

Blountville Monitoring Site



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

FEB 23 2017

Ms. Michelle Walker Owenby
Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Dear Ms. Owenby:

Thank you for submitting a request to relocate the Blountville monitoring site (AQS # 47-163-2002), dated February 10, 2017. In order to meet 40 CFR Part 58 Appendix E siting requirements, the Tennessee Department of Environment and Conservation stated the site would be moved approximately 25 meters southwest of the current site to address drip line obstructions. Due to the proximity to the current site, the U.S. Environmental Protection Agency Region 4 considers this a reconfiguration of the site rather than a relocation; therefore, public inspection and comment are not required. The EPA approves the reconfiguration of the ozone monitor at the Blountville monitoring site. The new location will continue to report data to AQS # 47-163-2002.

Thank you for working with us to monitor air pollution and promote healthy air quality in Tennessee and the nation. If you have any questions or concerns, please contact Gregg Worley at (404) 562-9141 or Sara Waterson at (404) 562-9061.

Sincerely,

A handwritten signature in black ink, appearing to read "Beverly H. Banister".

Beverly H. Banister
Director
Air, Pesticides and Toxics Management Division

cc: Mr. Jason Stephens
Manager 3, Tennessee Department
of Environment and Conservation

Lawrence and Jackson Monitoring Site



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAR 14 2017

Ms. Michelle Walker Owenby
Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Dear Ms. Owenby:

Thank you for your March 6, 2017, letter requesting waivers to the 40 CFR Part 58, Appendix E siting requirements for the Jackson monitoring site (Air Quality System (AQS) # 47-113-0006) Jackson, TN and the Lawrence monitoring site (AQS # 47-099-0002) located in Loretto, TN. Based on the information provided in your request, the U.S. Environmental Protection Agency Region 4 has determined that the Tennessee Department of Environment and Conservation (TDEC) has met the requirements for waiving the monitor siting requirements for both sites and is approving the waiver requests through December 31, 2017. Below is a more detailed explanation for our approval.

The basis for your request references 40 CFR Part 58, Appendix E, Section 10, which states a waiver can be granted if "the monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints (e.g., inability to locate the required type of site the necessary distance from roadways or obstructions)." The TDEC noted existing trees are encroaching on the monitoring sites and the property owners will not allow the trees to be trimmed or removed. The TDEC is in the process of investigating new sites to relocate both the Jackson and Lawrence PM_{2.5} monitoring sites. The new sites will be proposed in the TDEC's 2017 Annual Network Plan, and the sites will begin collecting data by January 1, 2018.

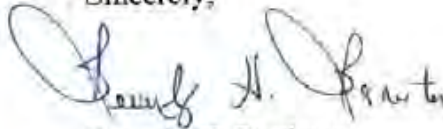
The EPA reviewed the information submitted by the TDEC and determined both sites meet the waiver requirement in 40 CFR Part 58, Appendix E, Section 10.2. The EPA also reviewed the 2015 design values (DV) and the preliminary 2016 DVs for the two sites. The Jackson site recorded a 2015 DV of 8.3 ug/m³ and a preliminary 2016 DV of 7.7 ug/m³. The Lawrence site recorded a 2015 DV of 7.7 ug/m³ and a preliminary 2016 DV of 7.4 ug/m³. These DVs are below the national ambient air quality standard (NAAQS) of 12 ug/m³.

The EPA has determined that the TDEC's request for a waiver of the siting requirements is justified because: 1) the Jackson and Lawrence sites meet the waiver request requirement, 2) the DVs are below the NAAQS, and 3) the TDEC will propose new locations that meet siting requirements in the 2017 Annual Network Plan (with relocation to occur by December 31, 2017). The EPA approves the waiver requests through December 31, 2017. If the sites are not relocated and operating by January 1, 2018, the TDEC will be required to submit a new waiver request.

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The EPA agrees with the TDEC that the PM_{2.5} data collected at the existing sites must be flagged with an "SX" qualifier in AQS during the time the siting issues remain. If you have any questions or concerns about this matter, please contact me or have your staff contact Ms. Sara Waterson at (404) 562-9061 or [waterson.sara@epa.gov](mailto:watson.sara@epa.gov).

Sincerely,

A handwritten signature in blue ink, appearing to read "Beverly H. Banister".

Beverly H. Banister

Director

Air, Pesticides and Toxics Management Division

cc: Dr. Jason Stephens, Environmental Manager 3
Division of Air Pollution Control

Exceptional Fire Event



April 5, 2017

Ms. Beverly Banister
Division Director
Air, Pesticides, and Toxics grant Management Unit
USEPA Region IV
61 Forsyth Street
Atlanta, GA 30303-8960

Dear Ms. Banister,

This letter is to inform EPA Region 4 of the State of Tennessee's intent to request exceptional event status for the PM_{2.5} monitors listed in Tables 1 and 2. Multiple fires were active from October thru December of 2016. Our PM_{2.5} monitors were impacted during November. Tennessee's §103 and §105 Clean Air Act grants require that TDEC DAPC report any exceedances of the national ambient air quality standards to the EPA. The State of Tennessee has identified exceedances of the 24-hour standard for PM_{2.5}. Refer to Table 1 for the list of monitors affected.

Table 1: Initial Notification Information Specific to Each Monitor by Day

Agency and Planning Area or Statistical Area	State	County	Event Name in AQ5	Type of Event in AQ5	NAAQS (24 Hr Standard greater than 35 $\mu\text{g}/\text{m}^3$)	Site	AQ5 ID	Filter ID	Sample Date(s) of the Event	Monitor Exceedance Concentration
TDEC APC	TN	McMinn	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Athens	47 107 1002	T6618756	11/14/2016	85.6
TDEC APC	TN	Roane	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Harriman	47 145 0001	T6618818	11/8/2016	77
TDEC APC	TN	Sullivan	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Kingsport	47 163 1007	T6618888	11/23/2016	46.1
TDEC APC	TN	Loudon	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Loudon	47 105 0108	T6618820	11/8/2016	66.4
TDEC APC	TN	Loudon	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Loudon	47 105 0108	T6618827	11/14/2016	80.5
TDEC APC	TN	Blount	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Maryville	47 009 0011	T6618822	11/8/2016	65
TDEC APC	TN	Blount	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Maryville	47 009 0011	T6618829	11/14/2016	70.2
TDEC APC	TN	Blount	US Wildfires	Flagged as "IT"	$> 35 \mu\text{g}/\text{m}^3$	Maryville	47 009 0011	T6618908	11/23/2016	37.3

Our agency intends to request exceptional event status for these exceedances based on smoke emissions travelling from various fires in TN, NC, KY, and GA. Refer to Table 2 for specific fire information for the possible fires responsible for these exceedances. Design values are given in Table 3; these values include the data from fire-impacted filters. This is an official notice of intent to request exceptional event status for the exceedances.

Division/Office: First Address Line • Second Address Line • City, State Zipcode
Tel: 615-000-1234 • Fax: 615-000-1234 • tn.gov/agency

Table 2: Associated Wildfire Information

Monitor	AQS ID	Exceedance Date	Associated Wildfire Information (Preliminary)					
			Fire Name	State	Fire Discovery	Size (acres)	Contained	100% Containment
Harriman	47 145 0001	11/8/2016	Boteler	NC	10/25/2016	9036	30%	12/3/2016
			Knob	NC	11/2/2016	1130	28%	11/26/2016
			Rough Ridge	GA	10/16/2016	27,870	11%	12/6/2016
Loudon	47 105 0108	11/8/2016	Boteler	NC	10/25/2016	9036	30%	12/3/2016
			Knob	NC	11/2/2016	1130	28%	11/26/2016
			Rough Ridge	GA	10/16/2016	27,870	11%	12/6/2016
Maryville	47 009 0011	11/8/2016	Boteler	NC	10/25/2016	9036	30%	12/3/2016
			Knob	NC	11/2/2016	1130	28%	11/26/2016
			Rough Ridge	GA	10/16/2016	27,870	11%	12/6/2016
Athens	47 107 1002	11/14/2016	Mowbray	TN	11/9/2016	830	N/A	11/16/2016
			White Oak Circle	TN	11/11/2016	1888	N/A	11/17/2016
			Clear Creek Road	TN	11/12/2016	100	N/A	11/15/2016
			Gatloff	KY	11/9/2016	1,800	N/A	11/24/2016
Loudon	47 105 0108	11/14/2016	Mowbray	TN	11/9/2016	830	N/A	11/16/2016
			White Oak Circle	TN	11/11/2016	1888	N/A	11/17/2016
			Clear Creek Road	TN	11/12/2016	100	N/A	11/15/2016
			Gatloff	KY	11/9/2016	1,800	N/A	11/24/2016
Maryville	47 009 0011	11/14/2016	Mowbray	TN	11/9/2016	830	N/A	11/16/2016
			White Oak Circle	TN	11/11/2016	1888	N/A	11/17/2016
			Clear Creek Road	TN	11/12/2016	100	N/A	11/15/2016
			Gatloff	KY	11/9/2016	1,800	N/A	11/24/2016
Kingsport	47 163 1007	11/23/2016	Clear Creek	NC	11/19/2016	3,163	15%	12/2/2016
Maryville	47 009 0011	11/23/2016	Boteler	NC	10/25/2016	9,036	77%	12/3/2016
			Tellico	NC	11/3/2016	13,874	91%	12/2/2016

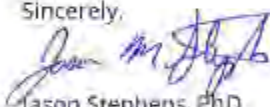
Division/Office • First Address Line • Second Address Line • City, State, Zip Code
Tel: 615-000-1234 • Fax: 615-000-1234 • tn.gov/agency

Table 3: Preliminary PM2.5 Design Values as of 4/3/2017

County	AQS ID	Address	2014-2016 Daily DV	Valid	2014-2016 Annual DV	Valid	Flagged for Wildfire Exclusion
Blount	470090011	2007 SEQUOYAH AVENUE MARYVILLE tn 37803	25	Y	8.7	Y	Y
Hamilton	470650031	1517 TOMBRAS AVENUE, EAST RIDGE	18	Y	8.6	Y	Y
Hamilton	470654002	RIVERSIDE SUBSTATION 911 SISKIN DR	17	Y	8.7	Y	Y
Knox	470930028	1000 FRANCIS ROAD	20	Y	9.3	Y	Y
Knox	470931013	939 Stewart St. Knoxville, TN 37917	33	Y	10.4	Y	Y
Knox	470931017	1613 VERMONT AVENUE	21	Y	9.9	Y	Y
Knox	470931020	4625 MILDRED DRIVE	20	N	9.2	Y	Y
Loudon	471050108	130 WEBB DRIVE Loudon TN 37774	20	Y	9.7	Y	Y
McMinn	471071002	SAINT MARK AME ZION CHURCH, 707 NORTH JACKSON ST. Athens TN 37303	21	Y	8.7	Y	Y
Roane	471450004	HARRIMAN HIGH 1002 N. ROAN ST Harriman TN 37748	18	Y	8.6	Y	Y
Sullivan	471631007	1649 D STREET Kingsport TN 37664	16	Y	8.1	Y	Y

1. The daily design value (DV) standard is 35 ug/m3.
2. The annual DV standard is 12 ug/m3
3. Invalid DVs may become valid upon further data loading or additional analysis.
4. This data is subject to change upon EPA's concurrence of exceptional event requests.

Sincerely,



Jason Stephens, PhD
Program Manager
Department of Environment and Conservation
Division of Air Pollution Control

CC: Ms. Beverly Banister, Mr. Gregg Worley, Mr. Todd Rinck, Mr. Darren Palmer, Ms. Sara Waterson, EPA
Worley.Gregg@epa.gov
Banister.Beverly@epa.gov
Kernker.Carol@epa.gov
Worley.Gregg@epa.gov
Rinck.Todd@epa.gov
Palmer.Darren@epa.gov

Division/Office • First Address Line • Second Address Line • City, State Zipcode
Tel: 615-000-1234 • Fax: 615-000-1234 • (n.gw/agency)

Loudon Pope Relocation Request



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAR 21 2016 PM 12:37

MAR 16 2016

Ms. Michelle Walker Owenby
Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Dear Ms. Owenby:

Thank you for submitting a request to relocate the Loudon Pope monitoring site (AQS # 47-105-0108) to Loudon Elementary School (AQS # 47-105-0109), dated March 4, 2016. The U.S. Environmental Protection Agency Region 4 understands that the Tennessee Department of Environment and Conservation (TDEC) provided the public a 30-day review period for its draft relocation request, and no comments were received. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, the EPA is not required to offer another comment period.

The TDEC requested relocation of the Loudon Pope Fine Particulate Matter (PM_{2.5}) and ozone monitoring site to the Loudon Elementary School (formerly the Loudon Middle School) monitoring site. The EPA approves the relocation of the PM_{2.5} and ozone monitors from the Loudon Pope monitoring site to the Loudon Elementary School monitoring site. In future requests to establish, discontinue, or relocate a State and Local Air Monitoring Station site, the EPA requests TDEC follow Region 4's Draft *Region 4 Policy on Establishing, Discontinuing, or Relocating a State and Local Air Monitoring Station*. In particular, for site relocation requests it would be helpful to document that the site selection process in the appropriate EPA guidance was followed, analyze the design value trend of the site and any nearby site(s) over the most recent 5 years or more, and provide documentation of special circumstances (if applicable).

Thank you for working with us to monitor air pollution and promote healthy air quality in Tennessee and the nation. If you have any questions or concerns, please contact Gregg Worley at (404) 562-9141 or Sara Waterson at (404) 562-9061.

Sincerely,

Beverly H. Banister
Director

Air, Pesticides and Toxics Management Division

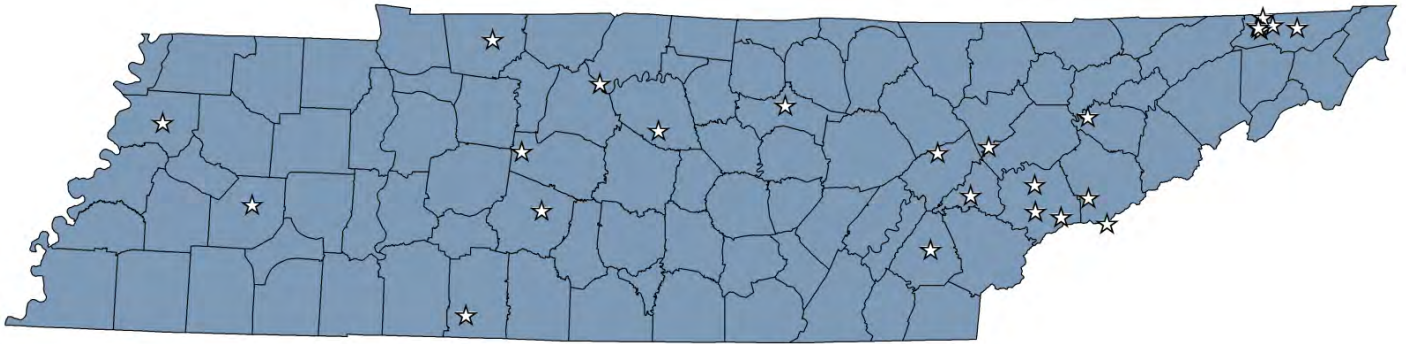
cc: Mr. Jason Stephens
Environmental Manager 3, TDEC

Internet Address (URL): <http://www.epa.gov>

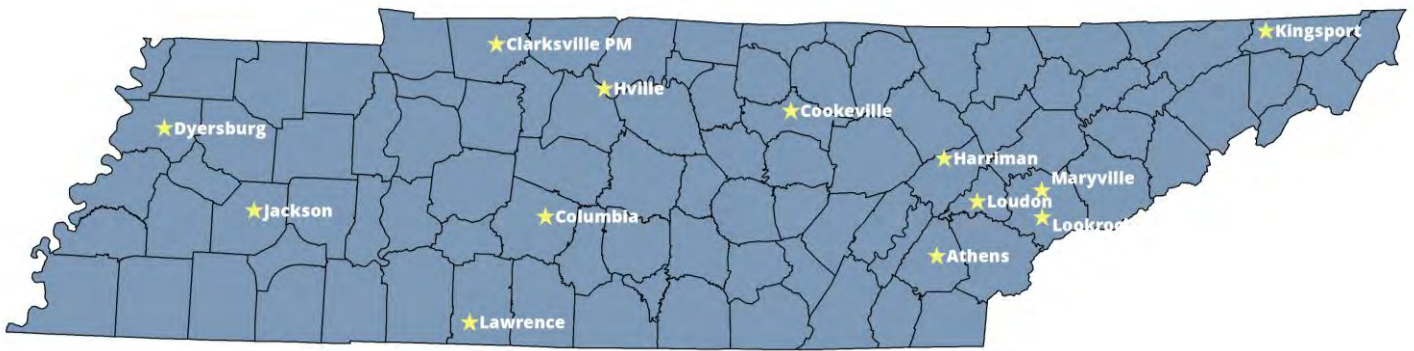
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Appendix G: Maps of TDEC DAPC Monitoring Site Locations

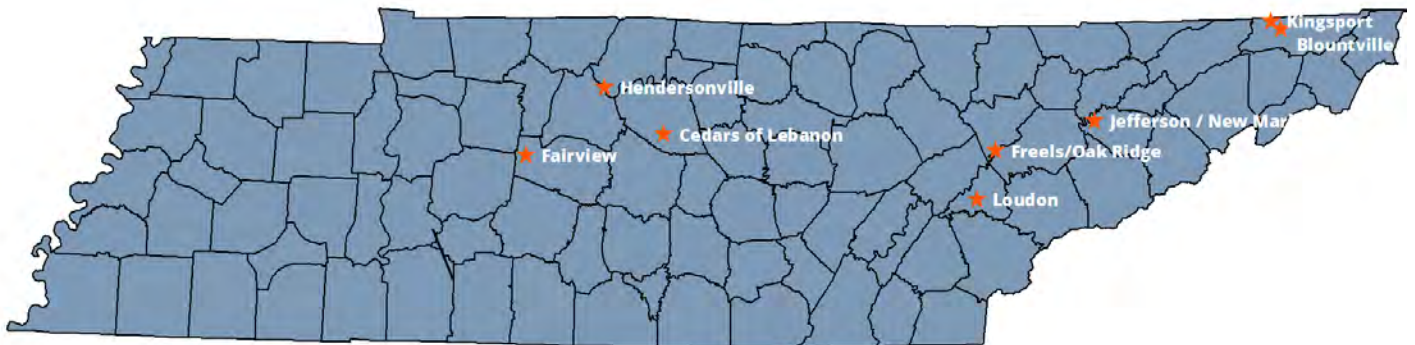
All Monitoring Sites Operated or Reported by TDEC DAPC



PM_{2.5} Monitor Locations



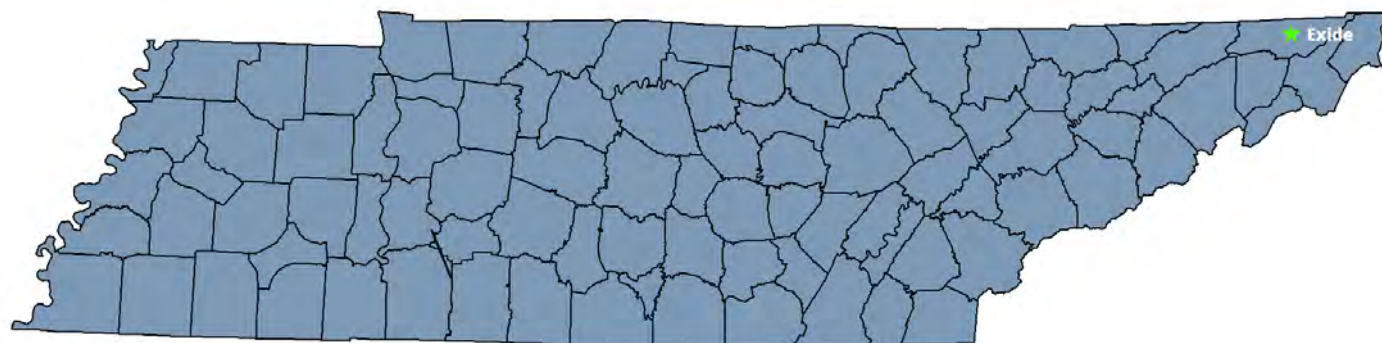
Ozone Monitor Locations



SO₂ Monitor Locations



Lead Monitor Locations



Appendix H: Fairview (471870106) Relocation Request



**STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT & CONSERVATION
DIVISION OF AIR POLLUTION CONTROL
WILLIAM R. SNODGRASS TENNESSEE TOWER
312 ROSA L. PARKS AVENUE, 15TH FLOOR
NASHVILLE, TENNESSEE 37243**

February 1, 2017

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

Dear Ms. Banister:

The State of Tennessee (TDEC DAPC) would like to request that the EPA approve the relocation of the Fairview ozone monitoring site located in Williamson County, Tennessee. This proposal is described in more detail in the enclosed document. The Fairview site contains one ozone monitor (AQS # 47- 187- 0106). Under the proposal, the site would be moved approximately 221.8 meters southwest of the current site to address drip line obscuration issues and render the site compliant with 40 CFR part 58 Appendix E. This monitor would cease operation and reporting data to the AQS database after the new site has begun to collect data. If approved, the State of Tennessee will start reporting data to the AQS database once the new site is fully functional. The estimated shutdown/startup would take place on or before June 2016.

The current site no longer meets EPA siting criteria. The Williamson Board of Education has agreed to allow TDEC DAPC to relocate the site. The proposed location will comply with EPA 40 CFR part 58 Appendix E requirements.

This proposal is in response to the technical systems audit (TSA) conducted on June 13-17, 2016 for the operational period from January 2013 through December 2015. The audit was conducted by EPA Region 4's Science and Ecosystem Support Division (SESD). The TSA team included Douglas Jager and Richard Guillot.

As a result of the TSA, SESD recommended that TDEC DAPC prioritize our corrective actions according to the findings detailed in Sections 4.1.1 of the TSA report:

Division of Air Pollution Control
William R. Snodgrass Tennessee Tower 15th Floor
312 Rosa L. Parks Avenue • Nashville, TN 37243
tel: 615-537-0560 • Fax: 615-537-0614
Air.PollutionControl@tn.gov

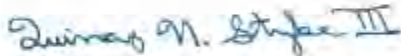
Nine out of eleven air monitoring stations did not meet established regulatory requirements for distance and spacing (40 CFR part 58 Appendix E).

DAPC must address these siting issues as quickly as possible. Because SESD only inspected a subset of the monitoring stations in the air monitoring network, DAPC must evaluate the remaining sites to ensure compliance with EPA siting requirements. Corrective action measures for nonconforming sites must be completed prior to the start of the 2017 ozone season. The trees may be removed or trimmed, the probe line location(s) may be adjusted, or the sites may be relocated away from these obstacles. For some locations, however, DAPC may need to submit to EPA Region 4 APTMD a request for a waiver, in accordance with the provisions stated in 40 CFR Part 58 Appendix E §10.

With regards to the data collected in the DAPC network, SESD recommends data associated with the violating sites (samplers/analyzers) be flagged in the AQS database. Because the length of time the sites have been out of compliance with the regulations cannot be precisely defined, data must be flagged from January 1, 2016, and continue to be flagged until evidence is provided to EPA demonstrating these siting issues have been corrected. Measurement results impacted by these siting issues must be flagged with the AQS "SX" quality assurance qualifier code (i.e., Does Not Meet Siting Criteria).

TDEC is committed to acting upon the EPA SESD recommendations. Thank you for working with us to monitor air pollution and promote healthy air quality in Tennessee. If you have any questions or concerns, please contact Jason Stephens at (615) 532-0584.

Sincerely,



for Michelle Walker Owenby, Director
Department of Environment and Conservation
Division of Air Pollution

Copy Via Email to: Todd Rinck – rinck.todd@epa.gov, Sara Waterson – waterson.sara@epa.gov
Attachment: Fairview Site Information 47-187-0106

Site Information

Fairview O3

47-187-0106

The following proposed siting information supplements the supporting documentation section immediately following this table. Where applicable, the section from 40CFR58 is included.

§58.10 (a)(1)	A statement of purposes for each monitor	The current monitoring site is located southwest of Nashville and northwest of Franklin, TN. This site is upwind from the core Nashville MSA area. Ozone monitoring began 10/30/2001 and this site is used by the AQI forecasting program for verification and to help address upwind ozone concentrations entering the Nashville MSA area. Current site does not meet siting criteria due to tree dripline and obstacle issues. Proposed site will meet siting criteria.
	Site photos facing from the site in each direction (N, S, E, W)	See photographs for general site information in the next sections. Photographs for the Fairview O3 proposed relocated site are included.
	Applicable measurements to any obstructions or trees	See measurement graphic provided in the next sections. The nearest obstruction (Small building east of proposed site) is over 37 meters away and the obstruction height is 3 meters est. height. The nearest roadway is 10 meters away (Service road for school).
	Estimated ozone probe height for the site and PM2.5 inlet height.	The ozone probe height is > 3 meters.
§58.10 (b)	(1) The AQS site identification number.	The AQS ID for the site is: 47-187-0106, Proposed relocation site is 221.8 meters SW of existing site.
	(2) The location, including street address and geographical coordinates.	Fairview Middle School, 7200 Cumberland Drive, Fairview, TN. Current Site: Lat. 35.951534, Long. -87.137005, Elev. 925 to 970 ft. Proposed relocated site: Lat. 35.949728, Long. -87.138132
	(3) The sampling and analysis method(s) for each measured parameter.	Ozone - API 400 E, Photometric ozone analyzer, Automated Equivalent Method; EQOA-0992-087.
	(4) The operating schedules for each monitor.	The ozone monitor operates continuously collecting 1 minute and hourly ozone data during the March 1 to October 31 ozone season.
	(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.	This is an existing site and will operate for at least 3 years. Current License Agreement currently being renewed and will cover the period 7-1-2017 to 12-31-2021.
	(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part.	Monitoring objective: NAAQS Compliance Spatial Scale: Urban scale—Defines citywide conditions with dimensions on the order of 4 to 50 kilometers. Site type: population exposure.

	(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the "Ozone and PM2.5 NAAQS"	The site is suitable for comparison to the ozone NAAQS. This site is a SLAMs site.
	(8) The MSA, CBSA, CSA or other area represented by the monitor.	The site is located in the Nashville, TN CBSA # 34980.

§58.10 (a)(1) Site photos facing from the site in each direction (N, S, E, W) Photos taken with TDEC-APC Nikon Cool-pix by Evelyn Haskin on 1/24/17.

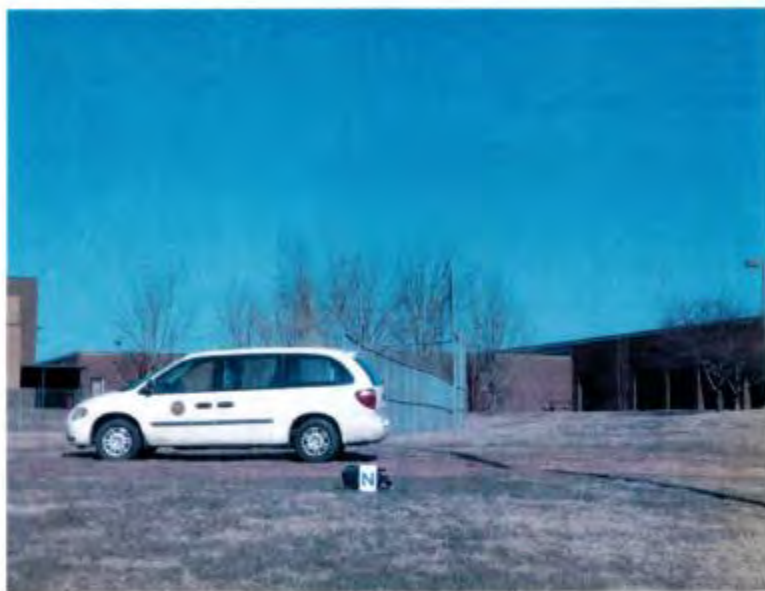
Proposed site location at 7200 Cumberland Drive, Fairview, TN.



View of the proposed site from the north (1/24/17)



View of the proposed site from the east (1/24/17)



Looking north from site (1/24/17)



Looking south from site (1/24/17)



Looking west from site (1/24/17)



Looking east from site (1/24/17)

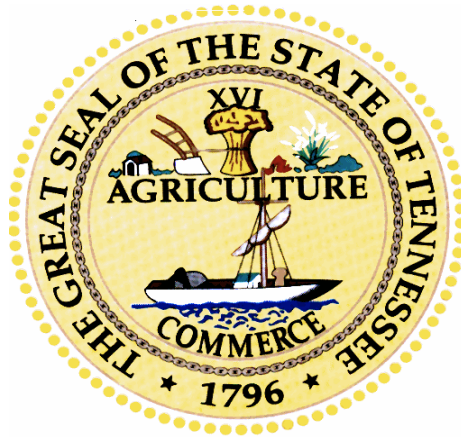




Appendix I: Annual Site Evaluations

[Attached]

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 3/30/17

Location: Athens, TN

AQS Number: 47-107-1002

Site Name: Athens

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Athens Initials: EMH Date: 3/30/17

Additional Comments:

Windy, partly cloudy 78 ° F

Electric: Athens Power Meter # 11223

Troubleshoot the internet connections for the BAM 1022, Tech Services now able to connect to internet and poll data

Mound of soil for college baseball field covered with plastic is located near air monitoring site

Data logger for TEOM is ESC 8832 Serial Number A0815

Distance between monitors: BAM to TEOM is 2.0 meters, TEOM to 2025 is 2.4 meters, and 2025 to BAM is 1.6 meters

Distance to closest road is Knoxville Ave (85.6 meters) and N. Jackson Street (105.5 meters) (Measured by using Google Earth Pro)

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Athens Initials: EMH Date: 3/30/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present [Y] Completed

Arrival Time: 1:45 pm Departure Time: 3:45 pm Primary Operator: Amelia Poe

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [NA] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1 per [week]

[NA] Leaking Roof [Damaged: ☐Ceiling / ☐Floor / ☐Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: _____

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒Ground / ☐Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5} BAM	Met One	BAM 1022	T21579
PM _{2.5} 2025	R&P	2025	22514
PM _{2.5} TEOM	R&P	1400a	24454

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Athens Initials: EMH Date: 3/30/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations [NA] Precision Checks [NA] Audits

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR:

(PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[NA] Temperature Sensor [NA] Uninterruptable Power Supply [NA] On-Site Computer

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: ☐Silica Gel ☐Pink / ☐Blue / ☐Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): ☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Athens Initials: EMH Date: 3/30/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / ☐ Not Present] [NA] Loose Decking (Trip Hazard)

Issues: NA

Height of Roof: _____ meters Roofing Material: _____

Issues: NA

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): WINS cleaned once every 5 runs; VSCC cleaned monthly

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐Rain Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐Stainless Steel / Other: _____]

Probe Line(s): [☐Teflon® / Other: _____] Probe Fitting(s): [☐Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

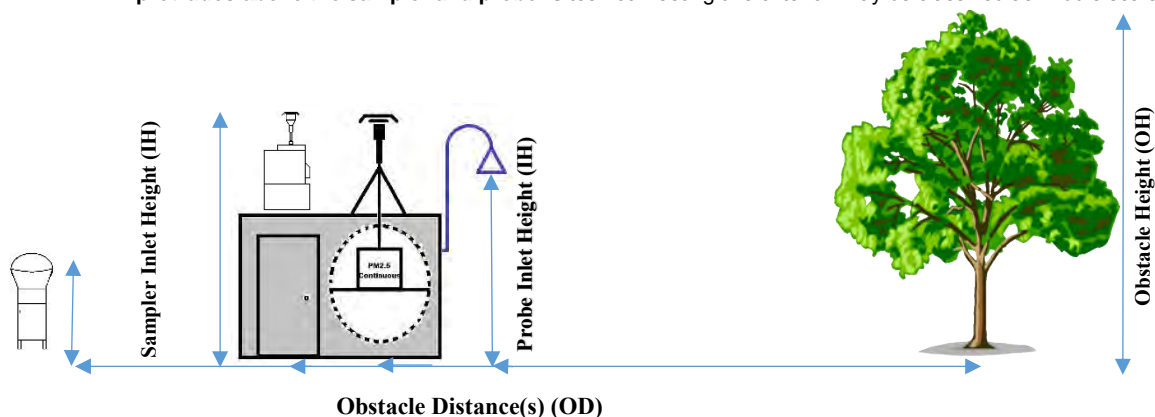
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5} TEOM	2.5	Ground	See Notes		Neighborhood	Neighborhood
PM _{2.5} BAM	2.3	Ground			Neighborhood	Neighborhood
PM _{2.5} 2025	2.5	Ground			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) **X No Trees Present**

(39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

_____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No obstacle issues

Minor Sources:

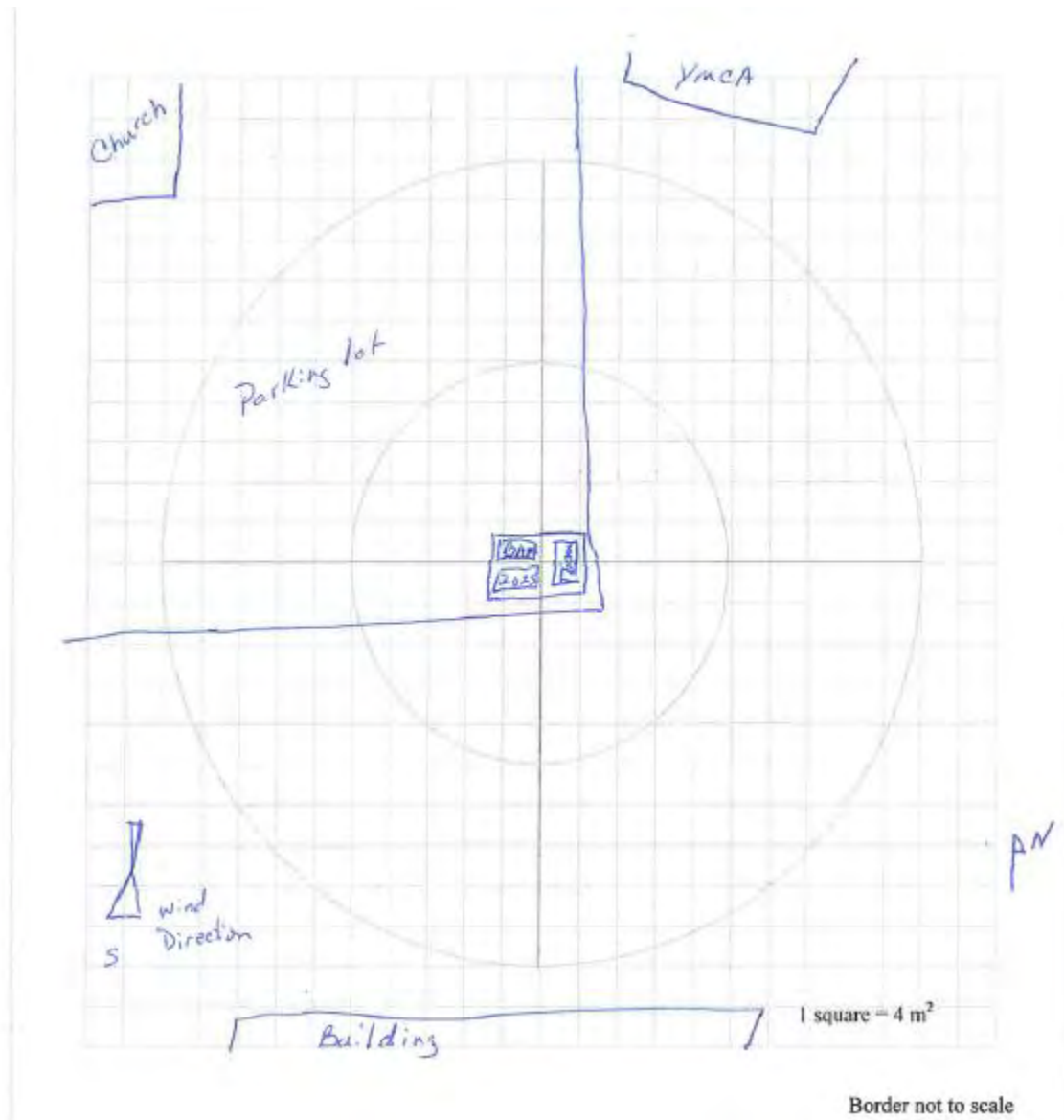
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimneys, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Athens Initials: EMH Date: 3/30/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Object	Object height (OH)	Probe Height (IH)	$[2*(OH - IH)]$	Object Distance
YMCA (N)	8.6 m	2.3 m	12.6 m	51.2 m
Church (W)	8.0 m	2.3 m	11.4 m	36.4 m
Green Building (S)	6.8 m	2.5 m	8.6 m	34.8 m

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Athens Initials: EMH Date: 3/30/17

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Nikon Coolpix

Filename: 001 Date: 3/30/17 Time: 1:50 pm Photographer: EMH

Description: View of site (taken from NW direction)

Filename: 002 Date: 3/30/17 Time: 1:50 pm Photographer: EMH

Description: View of site (taken from west direction)

Filename: 003 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: North view of site

Filename: 004 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: View north of site (N directional)

Filename: 005 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: South view of site

Filename: 006 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: View south of site (S directional)

Filename: 007 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: West view of site

Filename: 008 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: View west of site (W directional)

Filename: 009 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: East view of site

Filename: 010 Date: 3/30/17 Time: 3:25 pm Photographer: EMH

Description: View east of site (E directional)

001



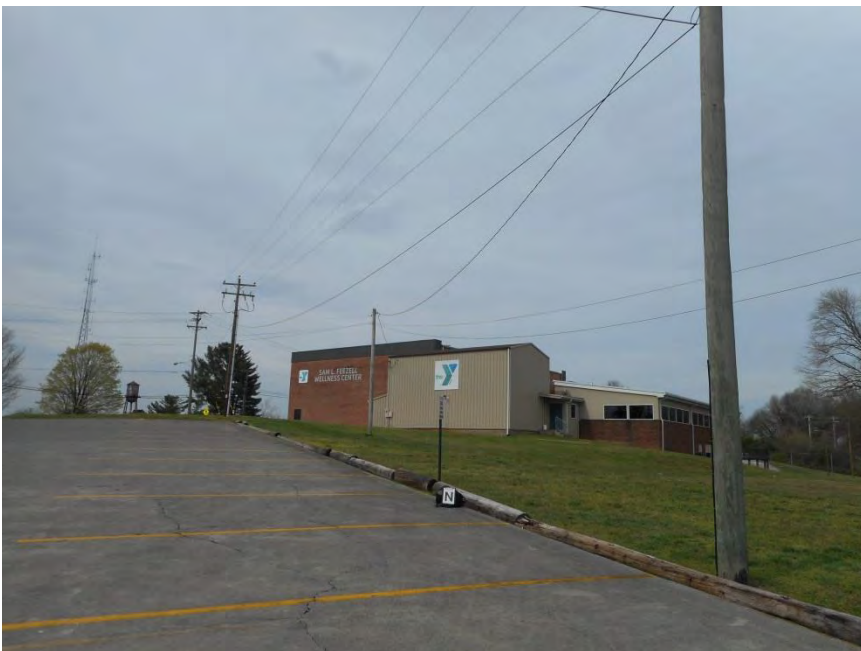
002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1 2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

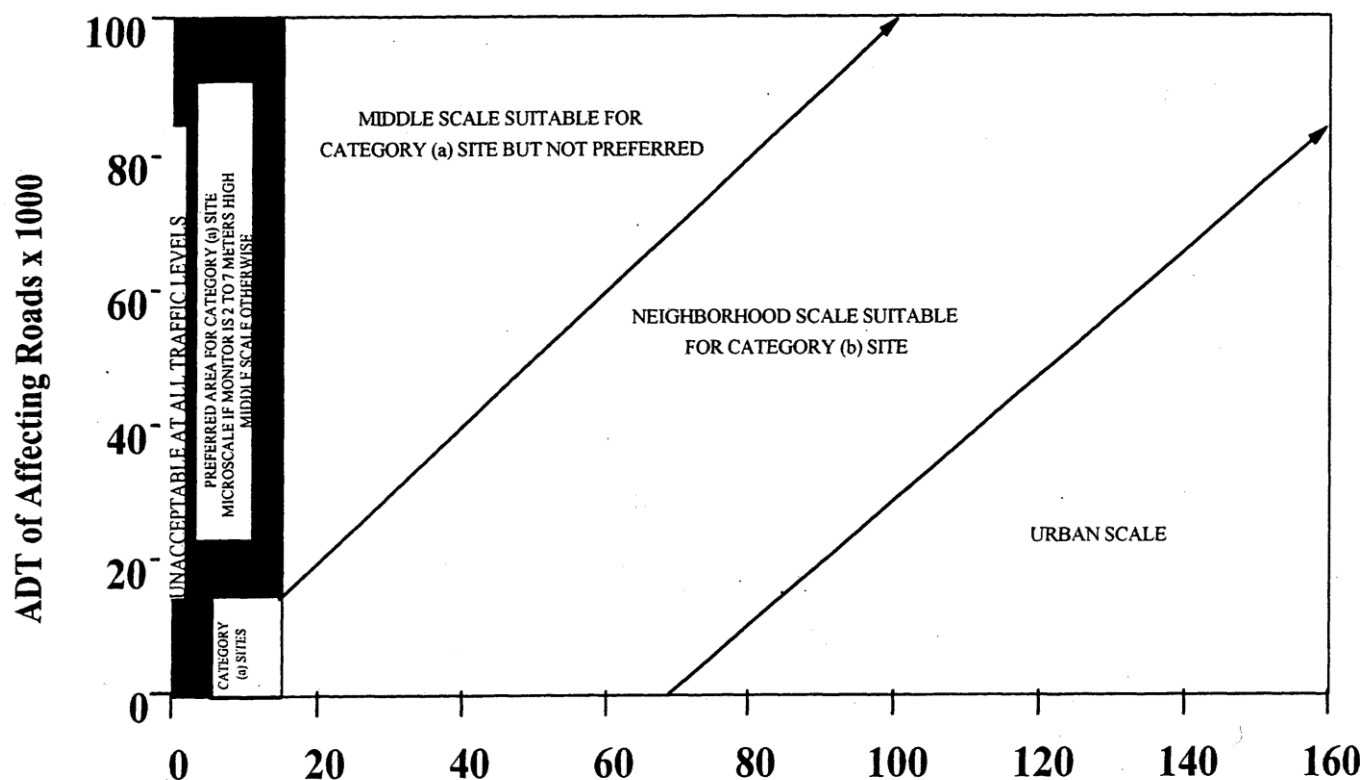


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of 1/4" OD tubing at given flow rate - using a 20 second residence time. The ID's shown are for thick (1/8"), intermediate (5/32") and thin (3/16") wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 data logger to collect data from the TEOM only. A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the data logger and to the other instruments at the site via a network switch.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure: Y**
2. **Trailer: N**
3. **None: N**
4. **Other: Y**

What are the shelter(s) made of?

1. Steel
2. _____
3. _____
4. Wood

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? **NA**

With roof top samplers or inlets – is a roof railing present? **NA**

Roof Access: Stairs or Ladder? **NA**

Stairs can be inside or outside – Ladders are usually permanently attached or removable? **NA**

Write additional comments on the shelters below:

TEOM enclosure is in good condition; TEOM platform is serviceable condition and 2025 platform is in fair condition; nails in both platforms have worked their way loose and need to be nailed down to prevent tripping hazard

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and may be specified in agency QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites eating shelter? Ants eating operator? Wasps/Bees attacking auditor? / Larger wildlife making shelter its home

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present. Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

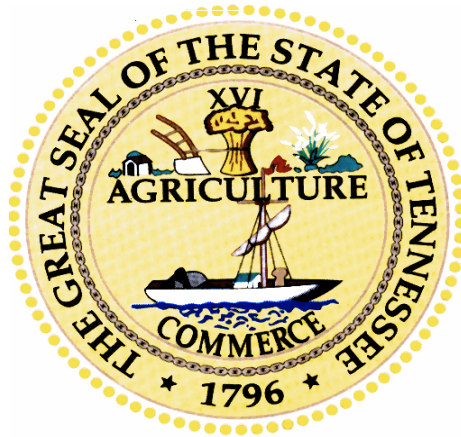
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/21/17 & 4/3/17

Location: Blountville, TN

AQS Number: 47-163-2002

Site Name: Blountsville

Pollutants: O₃

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: Justin E. Long JEL Site Evaluator

3: Thomas E. Dalton TED Site Evaluator

Air Monitoring Site Evaluation Summary

Local Site Name: Blountville Initials: TED Date: 2/21/17 & 4/3/17

Additional Comments:

Proposed site has been moved just east approximately 2.5 to 3 meters to provide space from driveway for the community center.

Contract to move the site has been provided with work to start prior to March 1, 2017

No obstructions were identified at the new location.

The exterior of the shelter appeared to be in bad shape due to age of the building. The electrical components for the shelter were rusted and in need of replacing. Insulation was falling out of the bottom.

Electricity was installed and the site set up for the 2017 O3 season on 3/8/17

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Blountville Initials: TED Date: 2/21/17 & 4/3/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 8:30 am Departure Time: 11:00 am Primary Operator: Preston Pierce

Observer(s): TED/PKP

SITE

[N]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [Y] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [Y/N] Police Report Filed

Issues: Bare soil and rock around power pole

SHELTER - Interior

Arrival Temperature: 21.0 °C (from data logger) Operator Site Visits: 1 per [week]

[N] Leaking Roof [Damaged: ☐Ceiling / ☐Floor / ☒ Walls – damaged slightly] [Y] Clean / Neat [N] Fire

Extinguisher [N] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: The exterior of the shelter appears to be in bad shape due to age of shelter. Insulation was falling out of the bottom but is correctable.

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2284

CALIBRATOR(s): ☒ Not Present

[Y/N] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	703E	303	2/8/17	2/7/18

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Blountville Initials: TED Date: 2/21/17 & 4/3/17

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits

Issues: _____

CYLINDER GAS STANDARDS: x Not Present

VENDOR:

(PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply [N] On-Site Computer

Zero Air System: Commercial System (Make / Model): Pump model 607CA22- Pressure regulator M01320NXX

Cartridge System: [☐Silica Gel [☐Pink / ☐Blue] / x Charcoal / ☐Purafil / ☐Hopcalite / Other: Dri-rite]

[N] Needs Service Last Service Date: 3/8/17 Condition: OK

Issues: Charcoal in line with dri-rite system

Probe Line(s): [xReplaced / ☐Cleaned] – Frequency: 1 per year Last Service Date: 3/8/17

[Y] Clean [Y] Heated [N] Insulated [N] Moisture [N] Retractable [N] Old / Unused Lines [N] Lo Flo

Manifold -> [Y/N] Any Open Ports? -> How many analyzers using manifold? 1

Issues: None noted

MSEF (Page 3/5): Local Site Name: Blountville Initials: TED Date: 2/21/17 & 4/3/17

SHELTER – Exterior

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Aluminum]

[Y] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / X Not Present] [N] Loose Decking (Trip Hazard)

Issues: Shelter needs to be washed and painted

Height of Roof: 3.7 meters Roofing Material: Sheet metal

Issues: None

OUTDOOR SAMPLERS

☒ Not Present

[NA] Locked [NA] Electrically Grounded [NA] Stabilized [Y/N] Clean Inside [NA] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): _____

COLLOCATED SAMPLERS: ☒ Not Present

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at least **1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [☒ Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)]

Funnel(s): [☒ Rain Shield / ☐ Part of Probe] Funnel Material: [☐ Teflon® / ☐ Glass / ☒ Stainless Steel / Other: _____]

Probe Line(s): [☒ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths) **unknown**

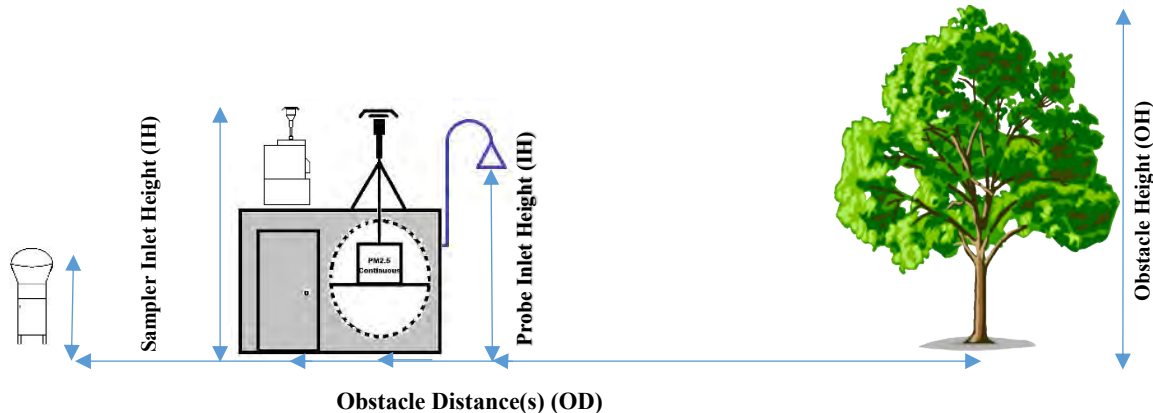
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
O ₃	5.0	Side of shelter			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2*(OH-IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)
NA				

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with dripline or obstacles

Minor Sources:

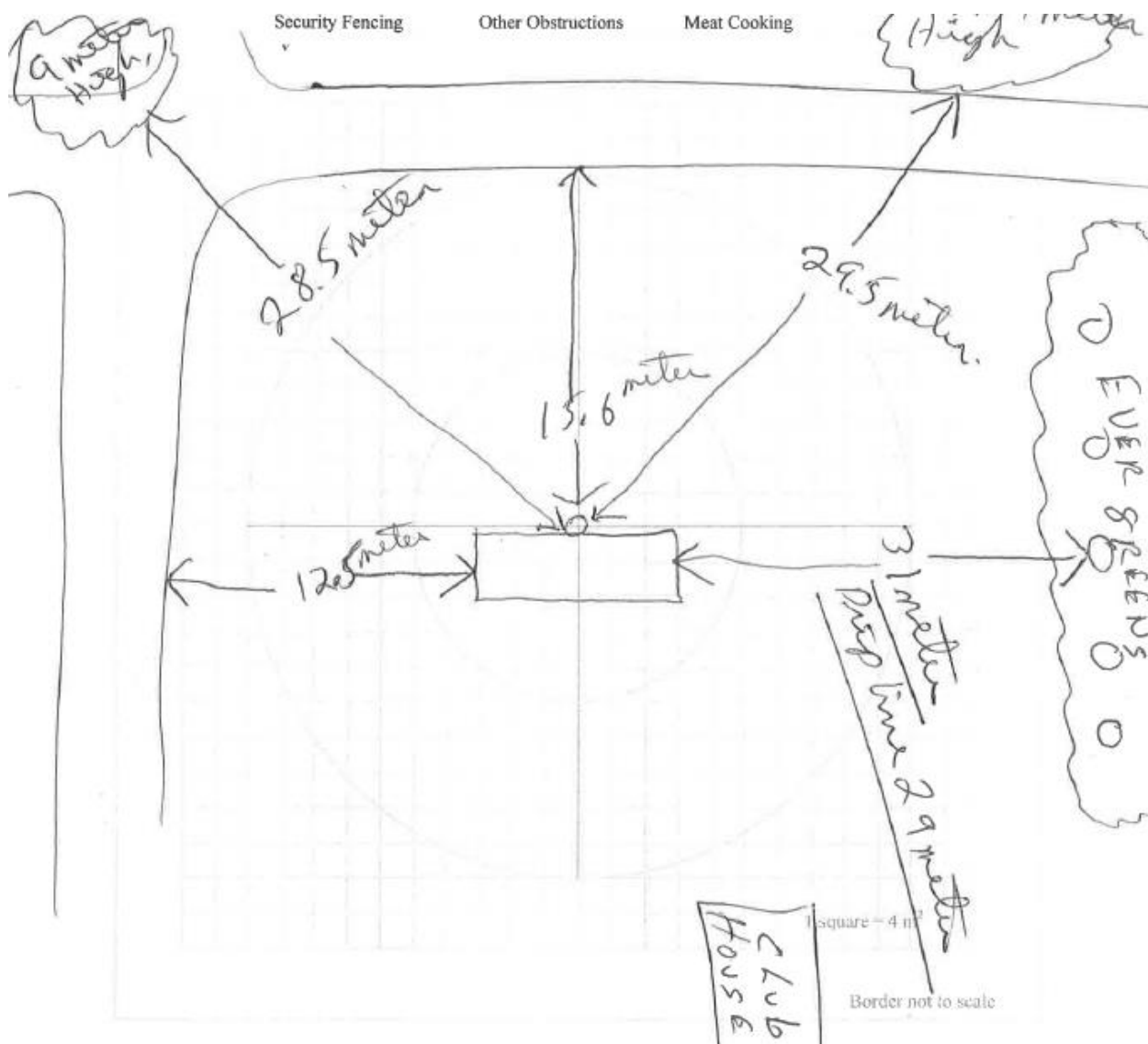
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Blountville Initials: TED Date: 2/21/17 & 4/3/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: > 270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

New location of monitor (Lat: 36.454351, Long: -82.42485)

Distance to closest road (Shawnee Dr.) is 16.87 meters

Aerial Photo with Wind Rose

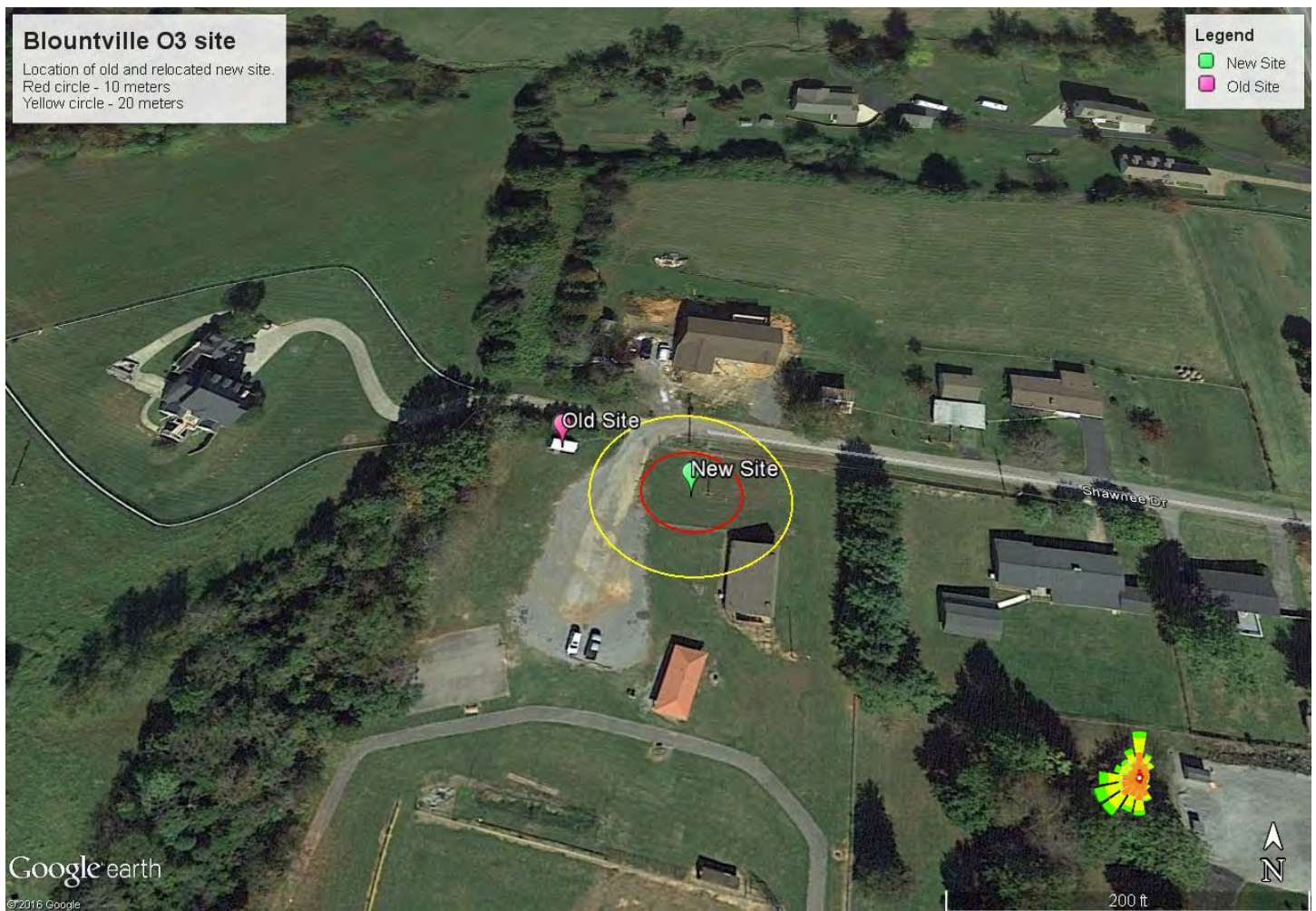


PHOTO LOG: Local Site Name: Blountville Initials: TED Date: 2/21/17 & 4/3/17

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Nikon Coolpix

Filename: 001 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: North toward shelter

Filename: 002 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: North away from shelter (North directional)

Filename: 002a Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: North away from shelter (North directional) (Second view)

Filename: 003 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: East toward shelter

Filename: 004 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: East away form shelter (East directional)

Filename: 004 a Date: 4.3/17 Time: 9:00 a Photographer: TED

Description: East away form shelter (East directional) (Second view)

Filename: 005 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: South away from shelter (South directional)

Filename: 006 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: South toward shelter

Filename: 007 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: West toward shelt

Filename: 008 Date: 4.3/17 Time: 9:00 am Photographer: TED

Description: West away from shelter (W directional)

001-North toward shelter



002-North away from shelter (north directional)



002a-North away from shelter (north directional) second view



003-East toward shelter



004-East away from shelter (east directional)



004a-East away from shelter (east directional) second view



005-South away from shelter (south directional)



006-South toward shelter



007-West toward shelter



008-West away from shelter (west directional)



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

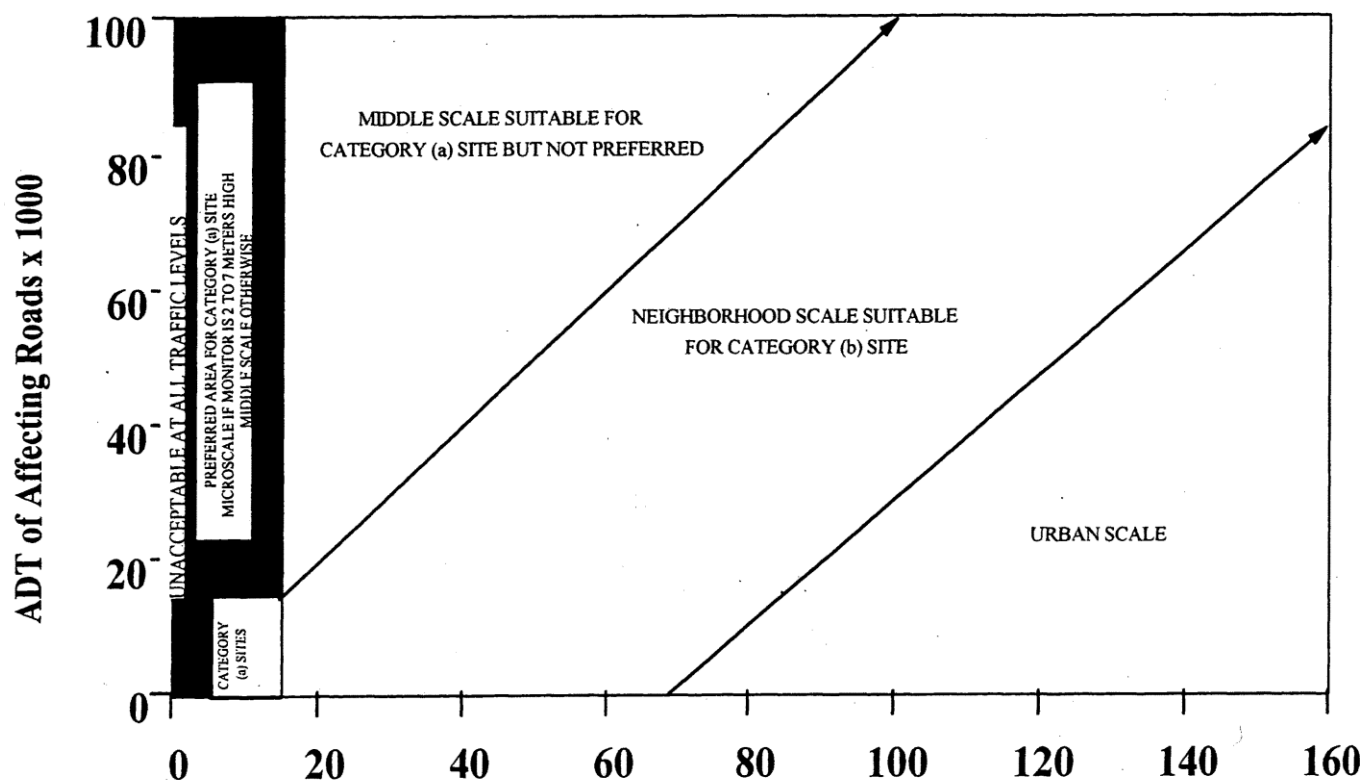


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of 1/4" OD tubing at given flow rate - using a 20 second residence time. The ID's shown are for thick (1/8"), intermediate (5/32") and thin (3/16") wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 data logger and an Agilaire 8872 PC/Data logger. The 8832 data logger serves as the primary logger and is directly connected via analog input to the analyzer at the site. The data is polled from the 8832 logger to the central server via a 4G cellular modem (Sierra Wireless RV50). The 8872 serves as a secondary, backup logger, and is used by the site operator to retrieve the electronic strip chart in local standard time. The 8872 polls data from the 8832 locally over the COM port or over the local tcp/ip network if the COM route is not working (via a network switch).

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. Aluminum
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

Write additional comments on the shelters below:

None _____

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and may be specified in agency QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites eating shelter? Ants eating operator? Wasps/Bees attacking auditor? / Larger wildlife making shelter its home

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

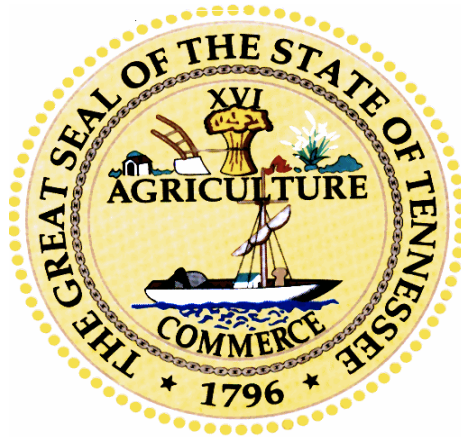
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/4/17

Location: Lebanon, TN

AQS Number: 47-189-0103

Site Name: Cedars

Pollutants: O3

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Cedars Initials: EMH Date: 2/4/17

Additional Comments:

Sunny 29 ° F

No logbook in shelter. Site closed down for winter; ozone season 2017 begins March 1. Calibrator was taken back to field office for beginning of the year calibration. Probe line will be replaced in Feb. prior to the beginning of ozone season.

Data loggers : ESC 8832 SN : 008802 and Agilaire 8872 SN 519

Distance to closest road (Cedar Forest) 54.3 meters

Setup of 2017 O3 season was on 2/17/17

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Cedars Initials: EMH Date: 2/4/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present [Y] Completed

Arrival Time: 10:45 am Departure Time: 12:26 pm Primary Operator: Ray Stubblefield

Observer(s): _____

SITE

[N]-Security Fence [N]-Razor/Barb Wire [NA] Grass/Shrubs Cut [Y] Bare Soil Area

[N] Vandalism – [☐ Inside / ☐ Outside] Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: 2.96 °C (from data logger) Operator Site Visits: 1 per [week]

[Y] Leaking Roof [Damaged: x Ceiling / x Floor / x Walls] [N] Clean / Neat [N] Fire Extinguisher

[Y] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: Temperature – see additional notes

MONITOR(s):

Location: Exterior Samplers [x Roof / ☐ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
Ozone	Teledyne	T400	2357

CALIBRATOR(s): x Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	326		

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Cedars Initials: EMH Date: 2/4/17

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits
(Not Required) (Required) (Required)

Issues: _____

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: ☐Silica Gel ☐Pink / ☐Blue / ☒ Charcoal / ☐Purafil / ☐Hopcalite / Other: Dri-rite]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: _____

Probe Line(s): [x Replaced / ☐Cleaned] – Frequency: 1 x per year Last Service Date: 2/17/17

[Y] Clean [Y] Heated [N] Insulated [N] Moisture [N] Retractable [N] Old / Unused Lines [N] Lo Flo

Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? _____

Issues: _____

MSEF (Page 3/5): Local Site Name: Cedars Initials: EMH Date: 2/4/17

SHELTER – Exterior ☐ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Aluminum]

[Y] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / **X Not Present**] [N] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: 3.1 meters Roofing Material: Aluminum

Issues: _____

OUTDOOR SAMPLERS ☒ Not Present

[NA] Locked [NA] Electrically Grounded [NA] Stabilized [NA] Clean Inside [NA] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): _____

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at least **1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [☒ Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)]

Funnel(s): [☒ Rain Shield / ☐ Part of Probe] Funnel Material: [☐ Teflon® / ☐ Glass / ☒ Stainless Steel / Other: _____]

Probe Line(s): [☒ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

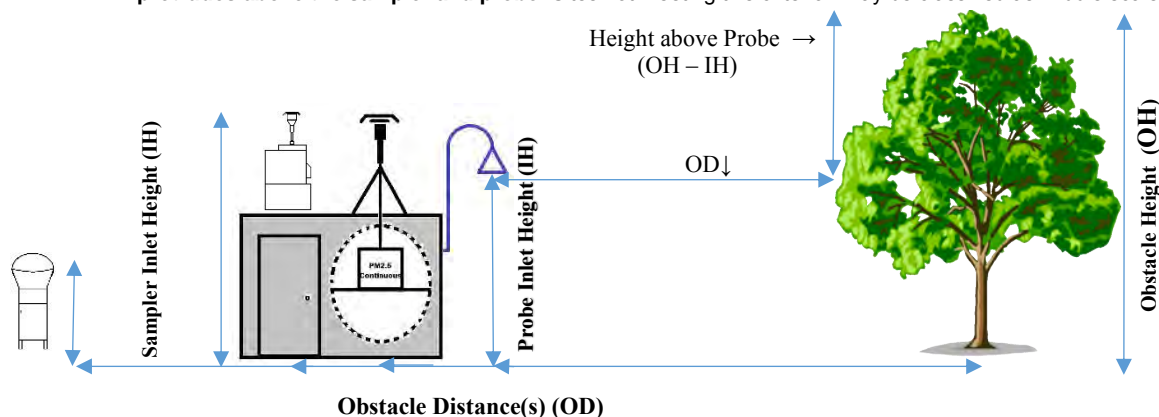
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
O3	4.2	Side of shelter			Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

Minor Sources:

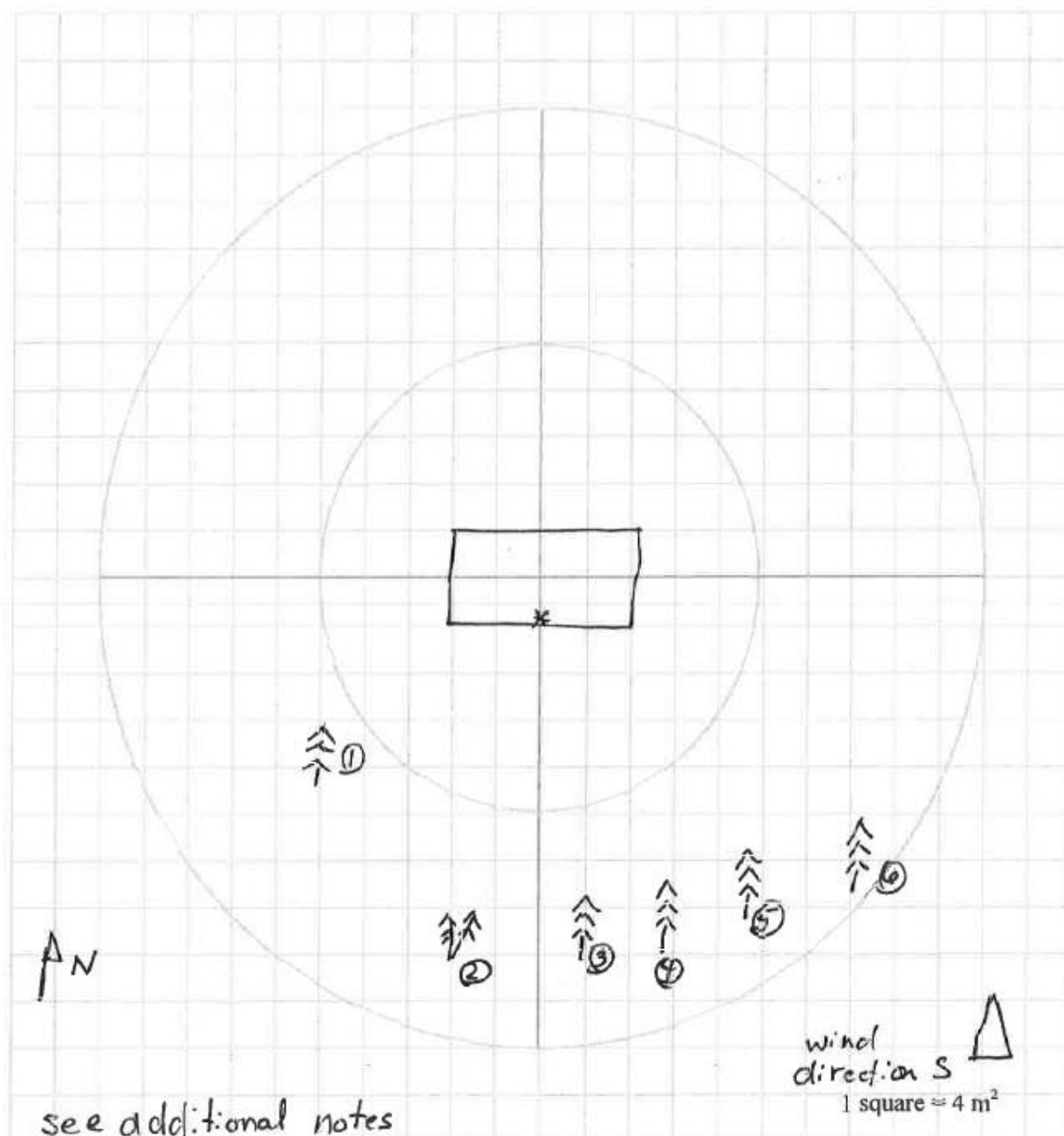
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimneys, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Cedars Initials: EMH Date: 2/4/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Tree	Height	$[2 * OH - IH (4.2)]$	Distance
1	6.4	4.4	11.4
2	11.0	13.6	14.4
3	6.4	4.4	12.4
4	7.8	7.2	11.4
5	7.8	7.2	12.8
6	9.2	10.0	17.2

Tree 4 has dripline of 10.8 meters (Cut down in future if branches get closer)

Soil is shallow to bedrock, trees grow at a slow rate

Aerial Photo with Wind Rose

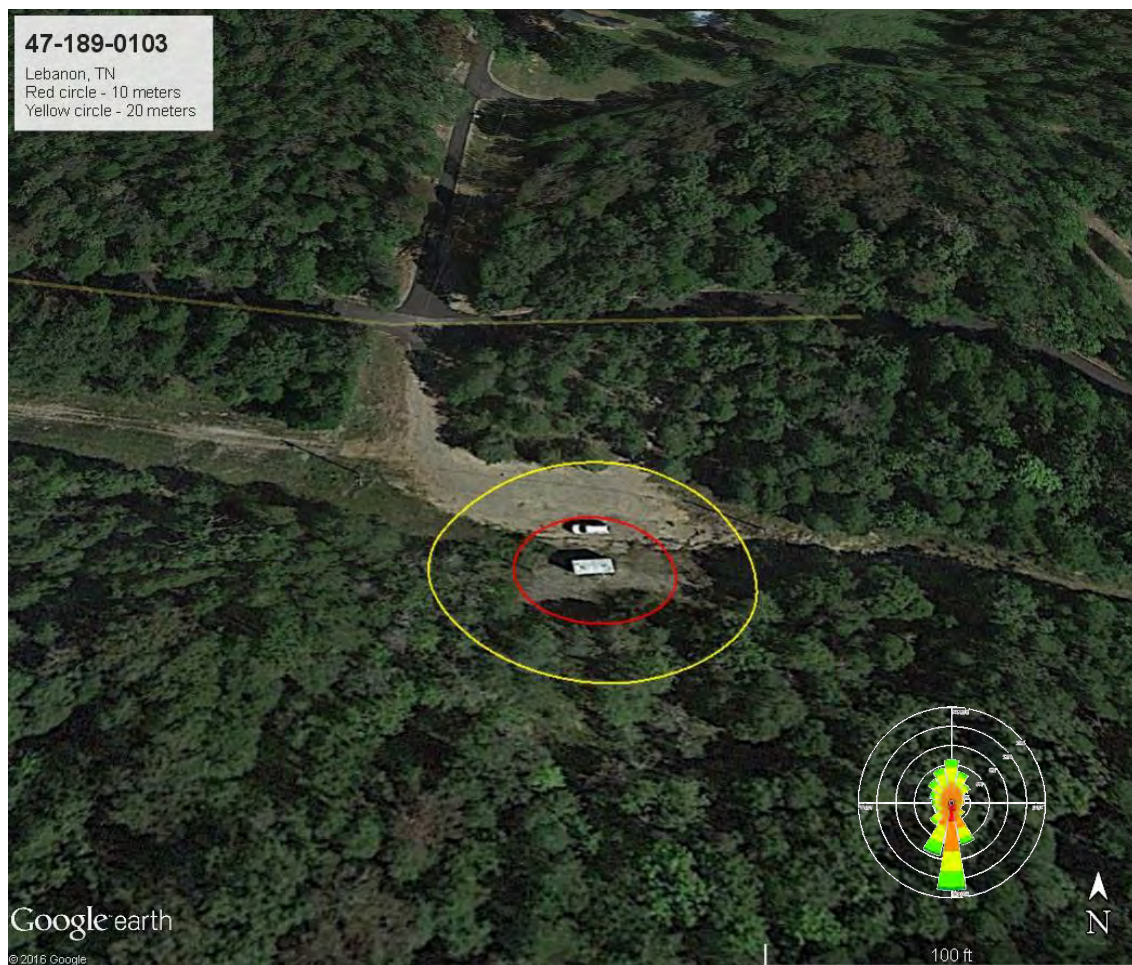


PHOTO LOG: Local Site Name: Cedars **Initials:** EMH **Date:** 2/4/17

Camera ☒ **APC** / ☐ **Personal** – **Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: Site view from north direction

Filename: 02 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: North side of site

Filename: 03 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: View North of site (N directional)

Filename: 04 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: South side of site

Filename: 05 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: View South of site (S directional)

Filename: 06 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: West side of site

Filename: 07 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: View West of site (W directional)

Filename: 08 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: East side of site

Filename: 09 **Date:** 2/4/17 **Time:** 12:00 **pm** **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



005



006



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008



009



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

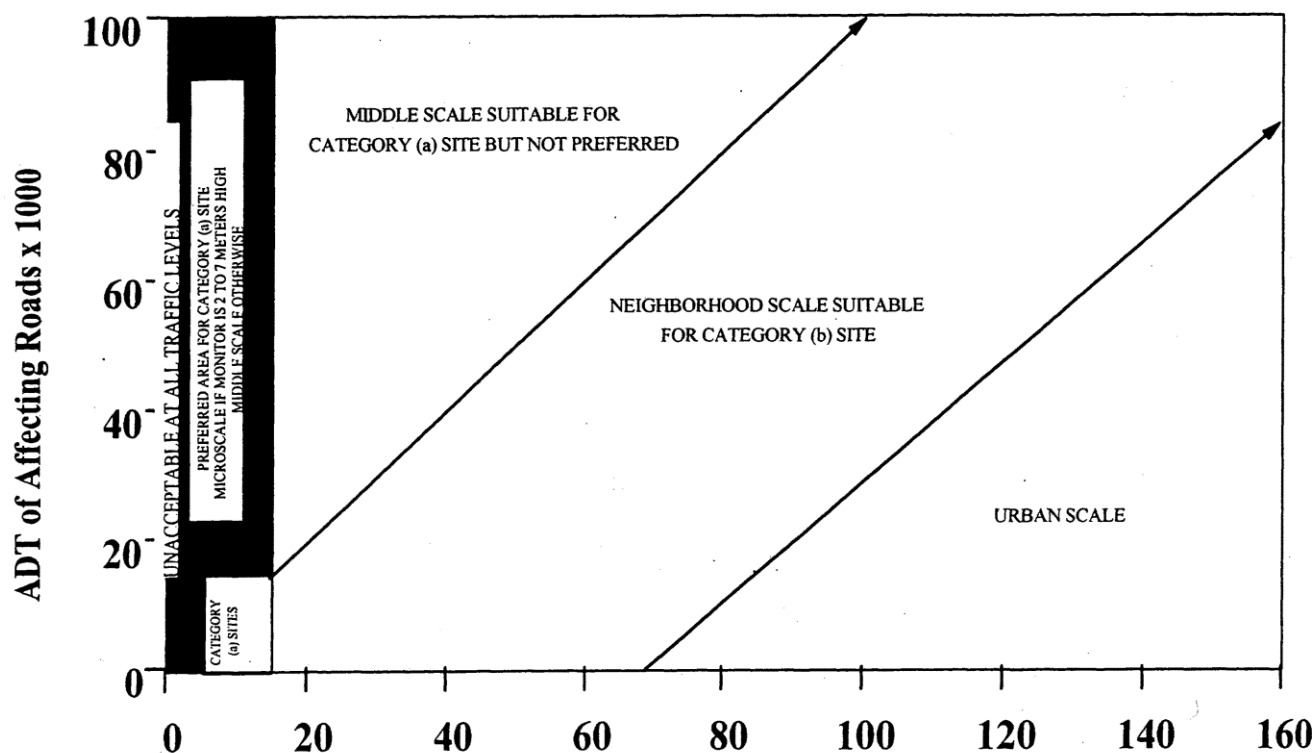


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 data logger and an Agilaire 8872 PC/Data logger. The 8832 data logger serves as the primary logger and is directly connected via analog input to the analyzer at the site. The data is polled from the 8832 logger to the central server via a 4G cellular modem (Sierra Wireless RV50). The 8872 serves as a secondary, backup logger, and is used by the site operator to retrieve the electronic strip chart in local standard time. The 8872 polls data from the 8832 locally over the COM port or over the local tcp/ip network if the COM route is not working (via a network switch).

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. Aluminum _____
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

Write additional comments on the shelters below:

Floor tiles broken, ceiling inside showed signs of previous leaks, insulation underneath shelter was exposed due to wildlife activity, roof rusted and needs caulking around seams

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

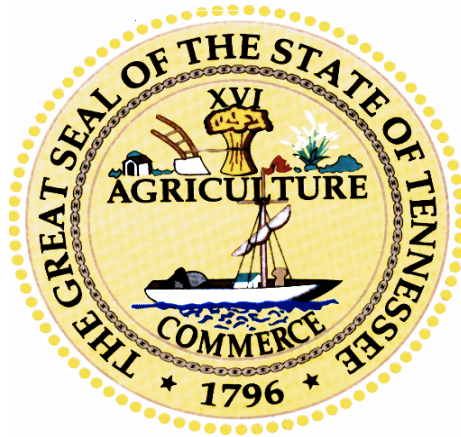
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 4/4/17

Location: Clarksville, TN

AQS Number: 47-125-1009

Site Name: Clarksville

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Clarksville Initials: EMH Date: 4/4/17

Additional Comments:

Sunny 74 ° F

Electric: CDE (Clarksville Dept. of Electricity) Meter Number: 251989

Electrical issues in December 2016 fired the PM 2.5 2025 and TEOM monitors. The 2025 monitor was removed from site. The TEOM monitor is on site but is not operational.

Site is located inside the fence of the Mason Rudolph Golf Course.

Measurement to closest roads are East Thompkins Lane (27.4 meters) and Crossland Ave. (90.7 meters) (measured using Google Earth Pro)

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Clarksville Initials: EMH Date: 4/4/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present [Y] Completed

Arrival Time: 11:40 am Departure Time: 12:45 pm Primary Operator: John Helton

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [NA] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [] Inside / [] Outside Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1 per [week]

[NA] Leaking Roof [Damaged: [] Ceiling / [] Floor / [] Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: _____

MONITOR(s):

Location: Exterior Samplers [] Roof / ☒ Ground / [] Not Present

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5} BAM	Met One	BAM 1022	T17009

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Clarksville Initials: EMH Date: 4/4/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations [NA] Precision Checks [NA] Audits

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR:

(PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[NA] Temperature Sensor [NA] Uninterruptable Power Supply [NA] On-Site Computer

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: ☐Silica Gel ☐Pink / ☐Blue / ☐Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): ☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Clarksville Initials: EMH Date: 4/4/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs ☐Interior/Exterior] / Ladder ☐attached/removable] / ☐ Not Present] [NA] Loose Decking (Trip Hazard)

Issues: NA

Height of Roof: _____ meters Roofing Material: _____

Issues: NA

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [NA] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: Monthly PM₁₀ Head Clean Schedule: _____

Issue(s): WINS changed every five runs

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐Rain Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐Stainless Steel / Other: _____]

Probe Line(s): [☐Teflon® / Other: _____] Probe Fitting(s): [☐Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

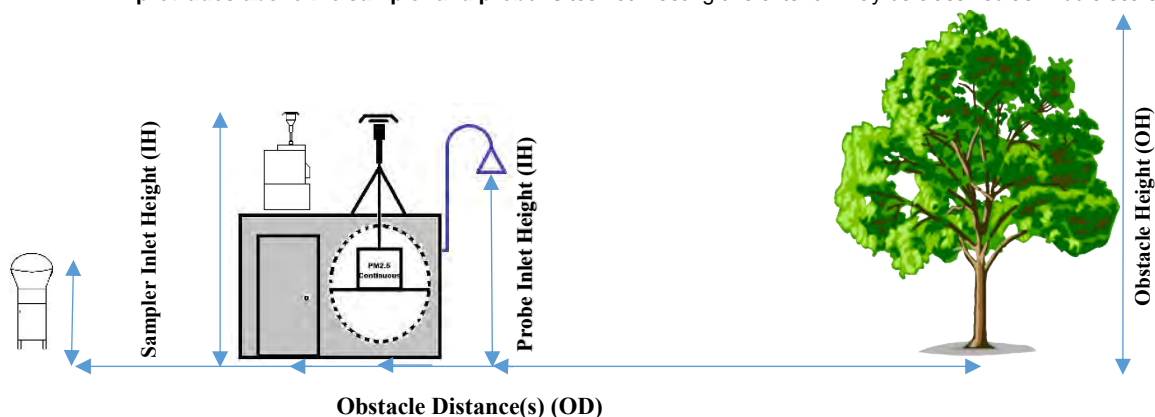
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5} BAM	4.4	Ground			Neighborhood	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2*(OH-IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**

(39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

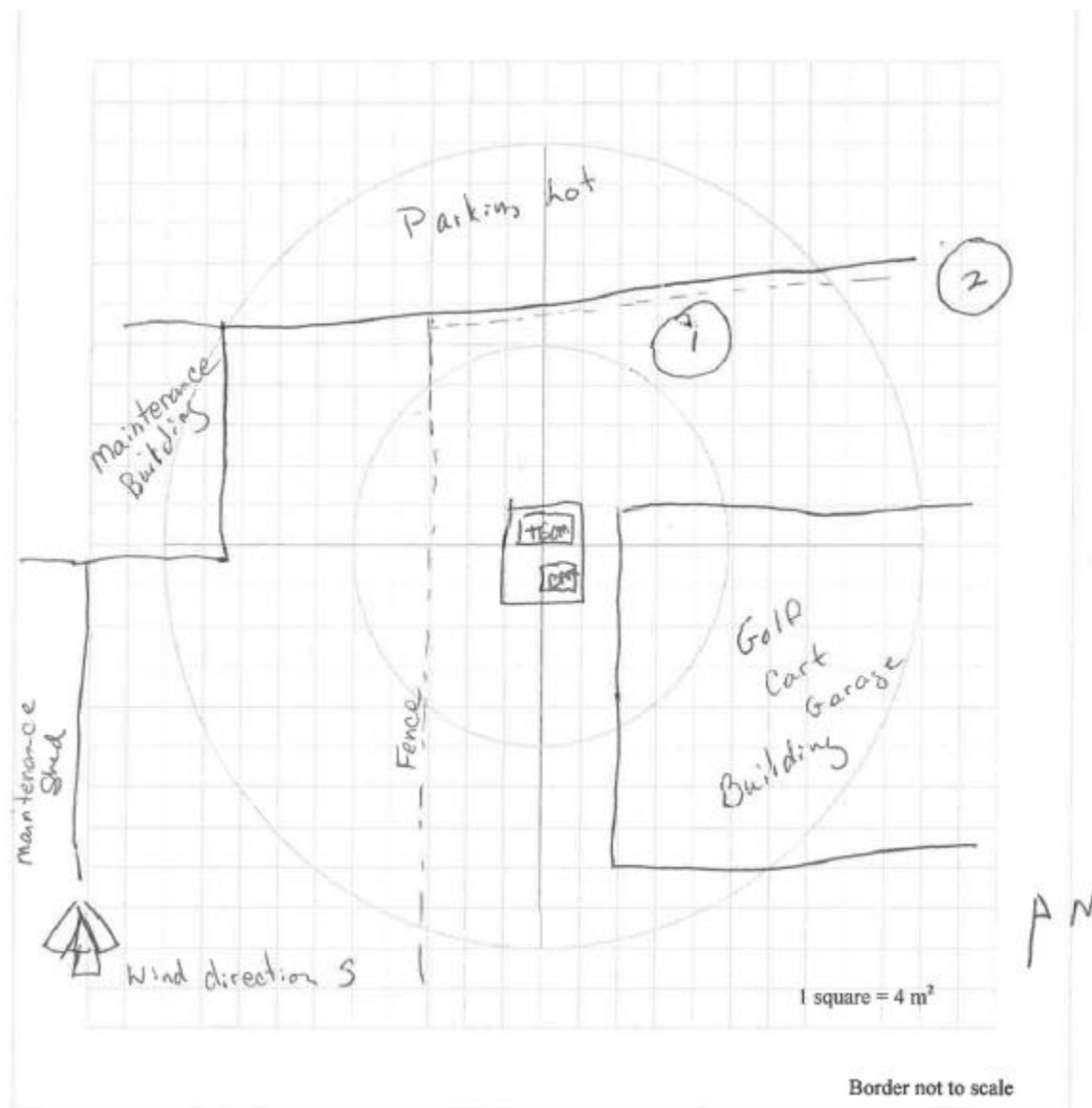
_____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with dripline or obstacles

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: > 270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Object	Object Height	Inlet Height	$2*(OH-IH)$	Object Distance
Tree 1	6.2 m	4.4 m	3.6 m	17.4 m
Tree 2	7.0 m	4.4 m	5.2 m	30.4 m
Golf Cart Garage	3.5 m	4.4 m	-1.8 m	1.4 m
Maint. Garage	3.8 m	4.4 m	-1.2 m	11.2 m
Maint. Shelter	5.0 m	4.4 m	1.2 m	13.8 m

Platform is 2.36 meters tall

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Clarksville Initials: EMH Date: 4/4/17

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Nikon Coolpix

Filename: 001 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: View of site (taken from NE direction)

Filename: 002 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: View of site (taken from north direction)

Filename: 003 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: North side of site

Filename: 004 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: View North of site (N directional)

Filename: 005 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: South side of site

Filename: 006 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: View South of site (S directional)

Filename: 007 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: West side of site

Filename: 008 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: View West of site (W directional)

Filename: 009 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: East side of site

Filename: 010 Date: 4.4/17 Time: 12:30 pm Photographer: EMH

Description: View East of site (E directional)

001



002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

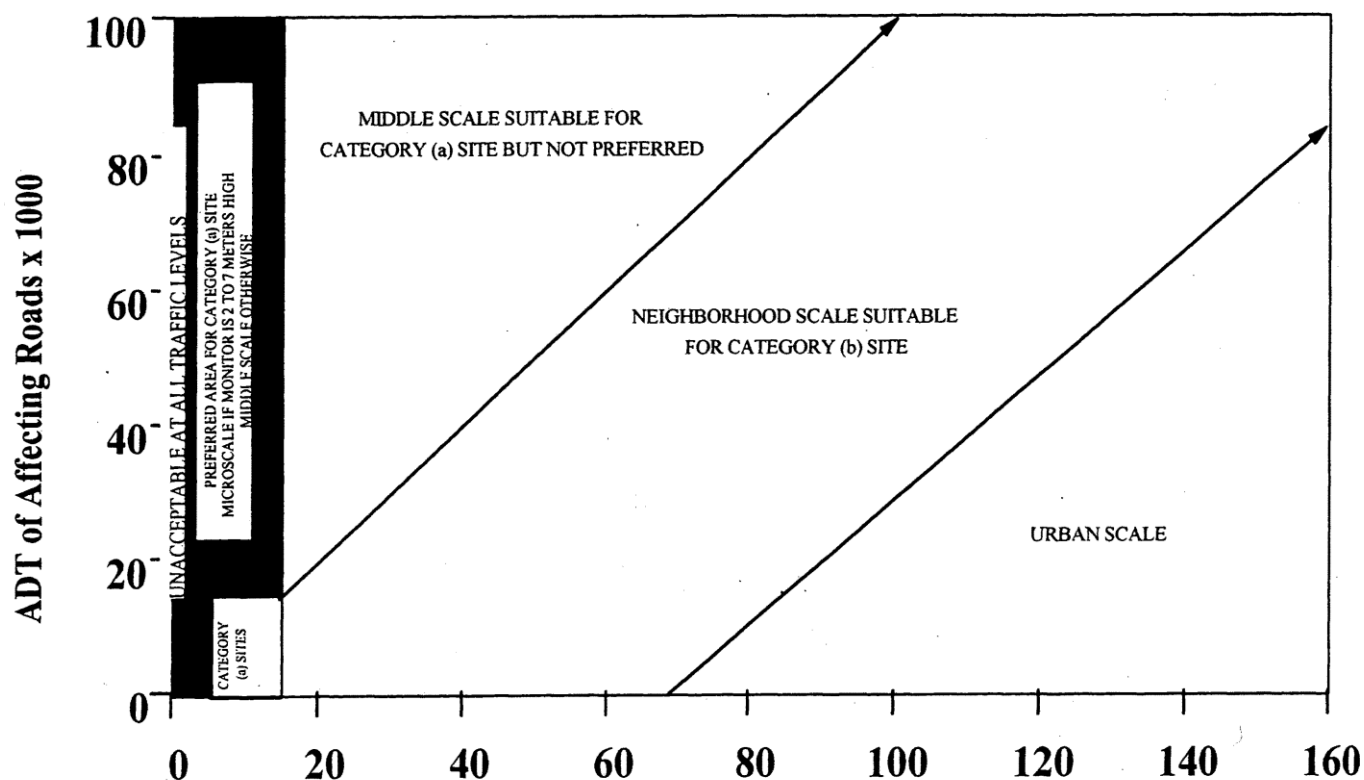


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of 1/4" OD tubing at given flow rate - using a 20 second residence time. The ID's shown are for thick (1/8"), intermediate (5/32") and thin (3/16") wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the BAM 1022 instrument at the site via a network switch.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** Y
2. **Trailer:** N
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. TEOM Shelter – steel
2. _____
3. _____
4. Platform - wood

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

With roof top samplers or inlets – is a roof railing present? N

Roof Access: Stairs or Ladder? N

Stairs can be inside or outside – Ladders are usually permanently attached or removable? N

Write additional comments on the shelters below:

Platform needs reinforcement if to remain at site for longer period of time. Boards located at the open end of platform are rotten
and/or split; need replacement. Boards are 5.5 inches wide by 1 inch thick by 72 inches long

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and may be specified in agency QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites eating shelter? Ants eating operator? Wasps/Bees attacking auditor? / Larger wildlife making shelter its home

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

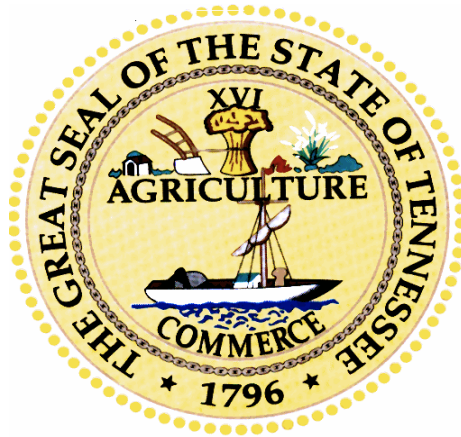
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/15/17

Location: Columbia, TN

AQS Number: 47-119-2007

Site Name: Columbia

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Columbia **Initials:** EMH **Date:** 2/15/17

Additional Comments:

Partly Sunny 45 ° F

Electric meter: Columbia Power & Water Systems Meter # 113050

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Columbia Initials: EMH Date: 2/15/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 12:25 pm Departure Time: 1:15 pm Primary Operator: Hattie Benet

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [Y] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1-2 per [week]

[NA] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: NA

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5}	R& P	2025	20972
PM _{2.5} BAM	Met one	BAM 1022	T21582

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Columbia Initials: EMH Date: 2/15/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations (Not Required) [NA] Precision Checks (Required) [NA] Audits (Required)

Issues: _____

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[N] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / ☐ Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Columbia Initials: EMH Date: 2/15/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs ☐Interior/Exterior] / Ladder ☐attached/removable / ☐ Not Present [NA] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: _____ meters Roofing Material: _____

Issues: _____

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS changed once every 5 runs : VSCC monthly

COLLOCATED SAMPLERS: ☒ Not Present

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐ Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐ Rank Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☐ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

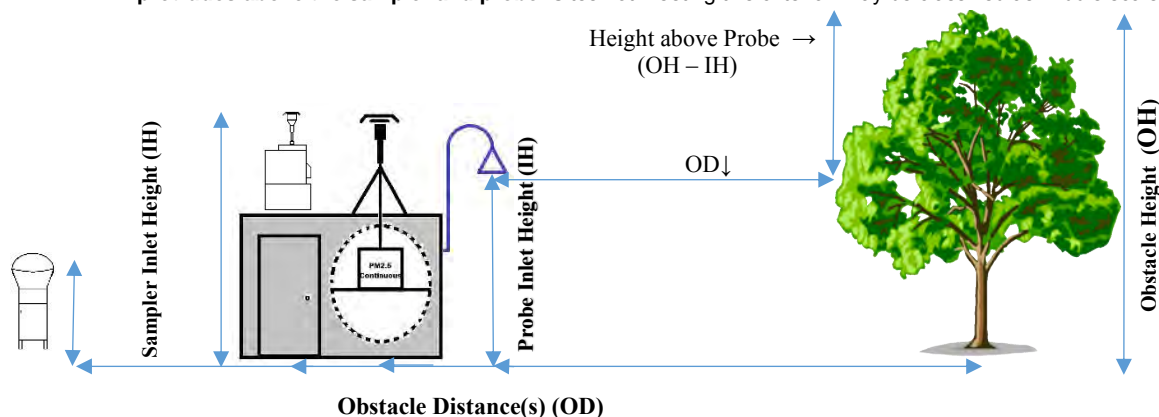
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5} 2025	2.6	Ground	2.0		Middle	Middle
PM _{2.5} BAM	2.1	Ground	2.0		Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

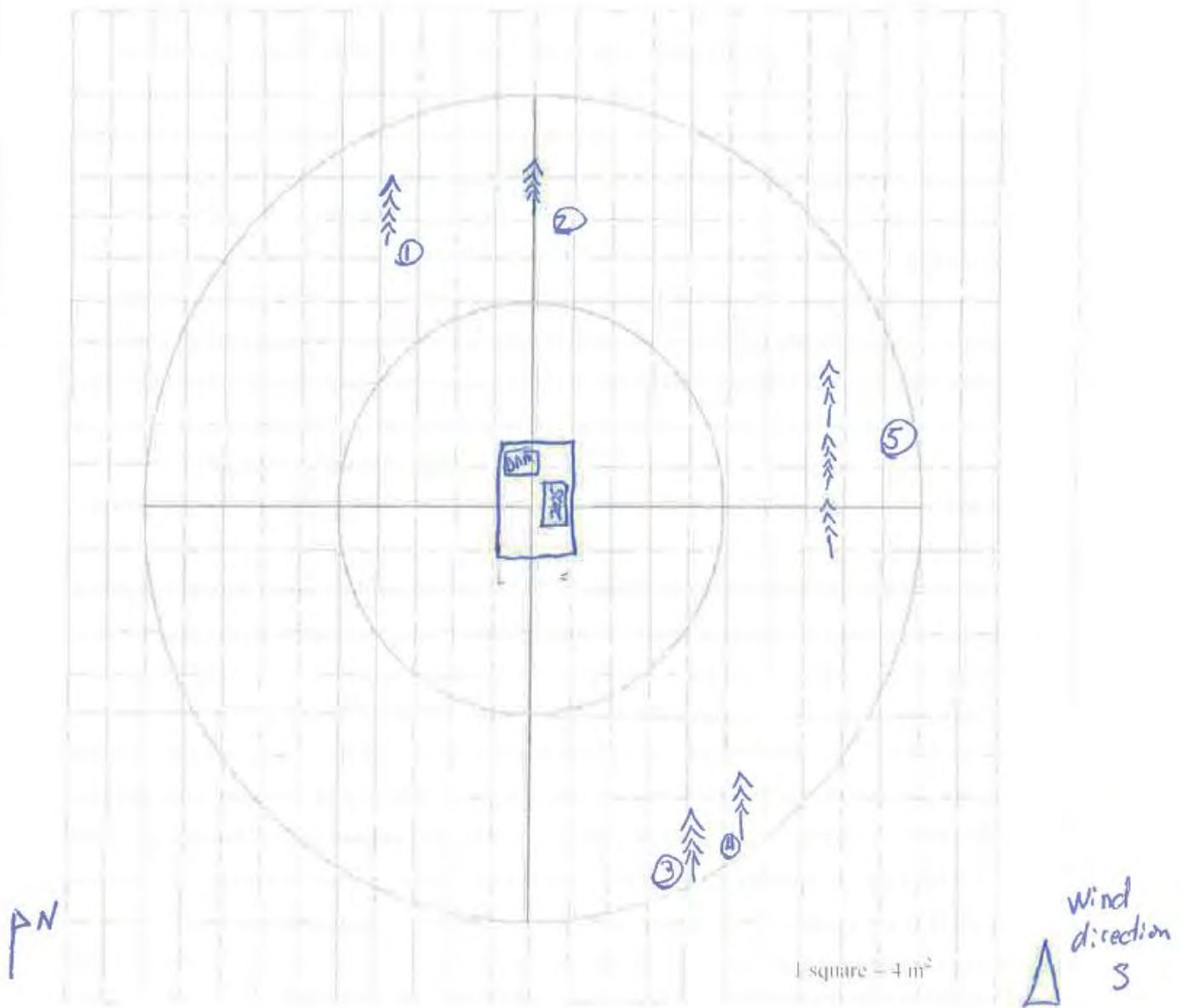
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Distance to closest road (US 31) – 99.4 meters

	Height	$[2*OH - IH(2.6 \text{ or } 2.1)]$	Distance
1 Cedar (N)	5.6 m	7.0	12.2 m
2 Cedar (N)	5.2 m	6.2	12.2 m
3 Cedar (SE)	5.2 m	5.2	13.4 m
4 Cedar (SE)	6.4 m	7.6	12.4 m
5 Cedars (E)	4.2 -5 m	3.2 – 4.8	11 – 12 m

Trees 1 and 2 are measured from the BAM

Cedars trees north and east of site may become a problem in the future

Aerial Photo with Wind Rose

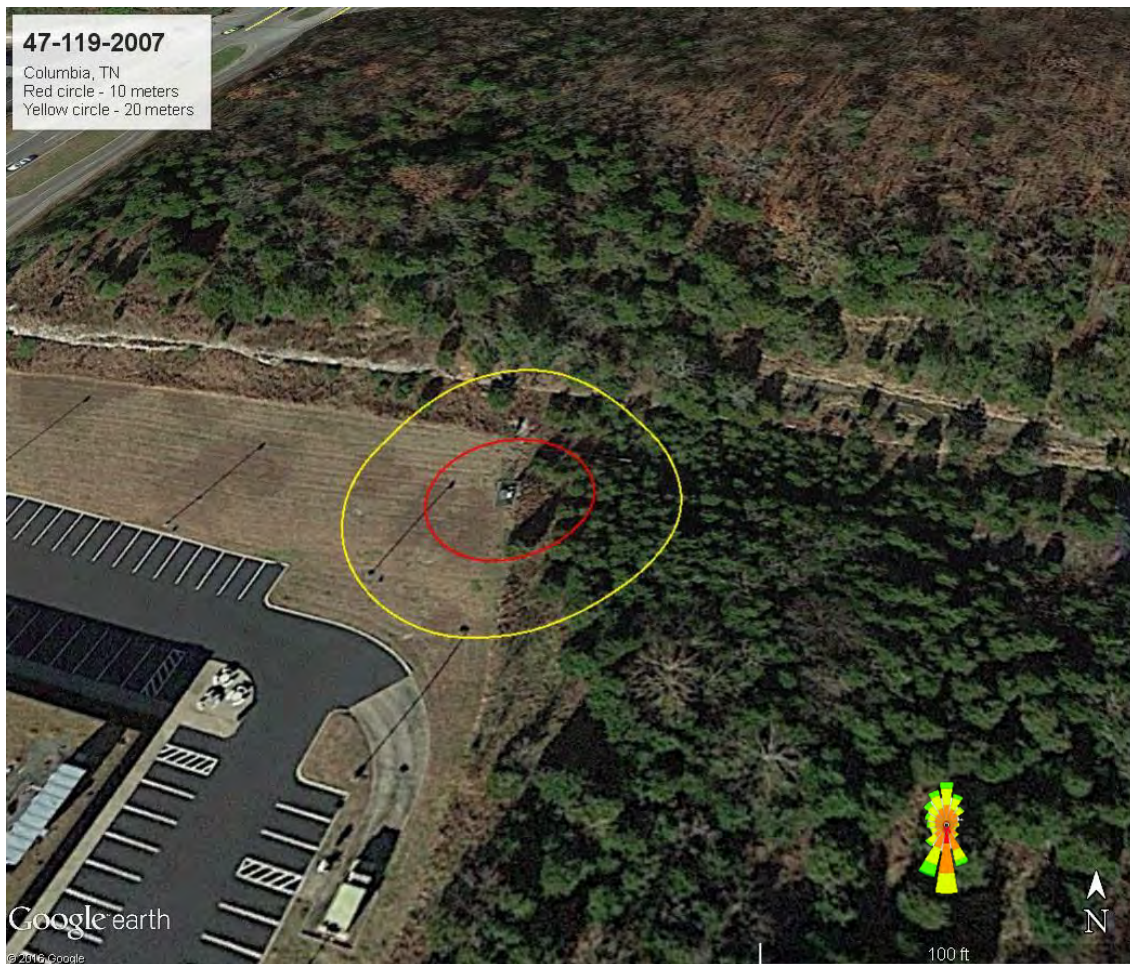


PHOTO LOG: Local Site Name: Columbia **Initials:** EMH **Date:** 2/15/17

Camera ☒ **APC** / ☐ **Personal** – **Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: Site view from west direction

Filename: 02 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: Site view from SW direction

Filename: 03 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 2/15/17 **Time:** 1:00 pm **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

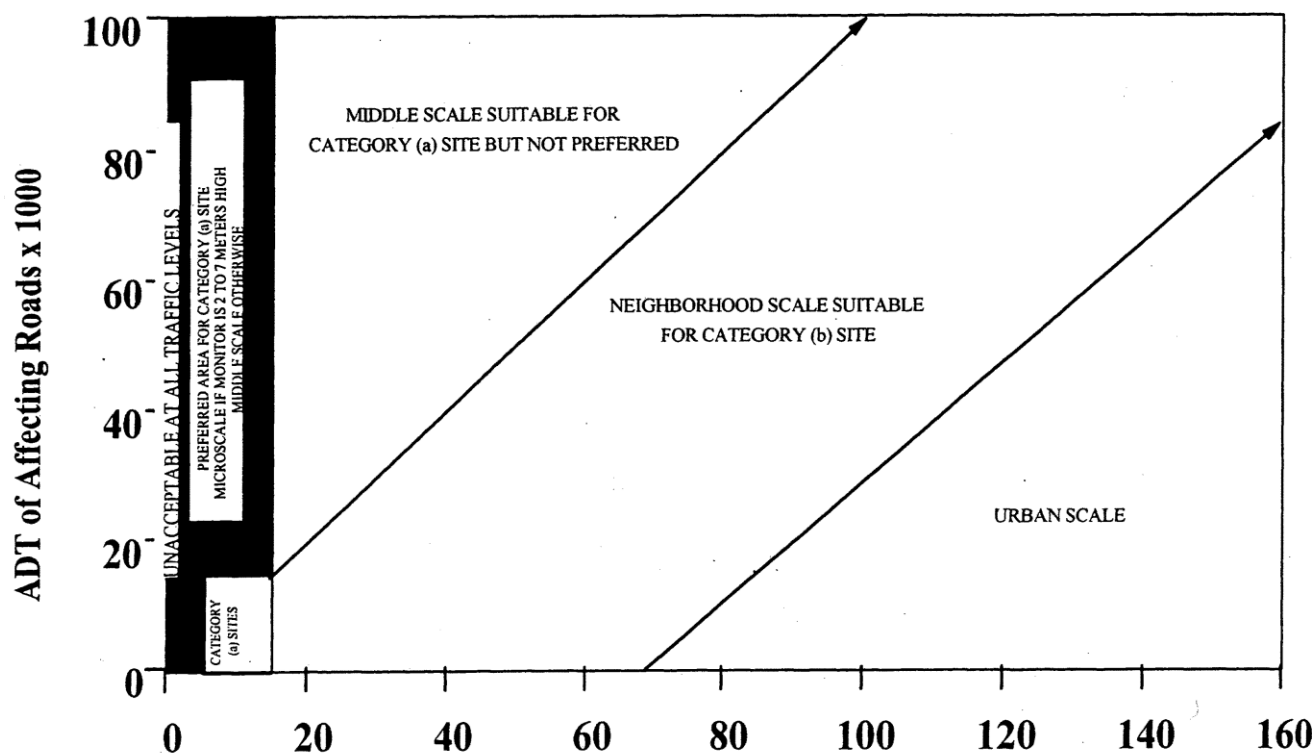


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the BAM 1022. A US Robotics dial-up modem is used to send the ancillary data from the 2025 to the central office staff.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure: Y**
2. **Trailer: N**
3. **None: N**
4. **Other: N**

What are the shelter(s) made of?

1. _____
2. _____
3. _____
4. 2025 platform (wood) and BAM platform (plastic)

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? **N**

Write additional comments on the shelters below:

NA

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

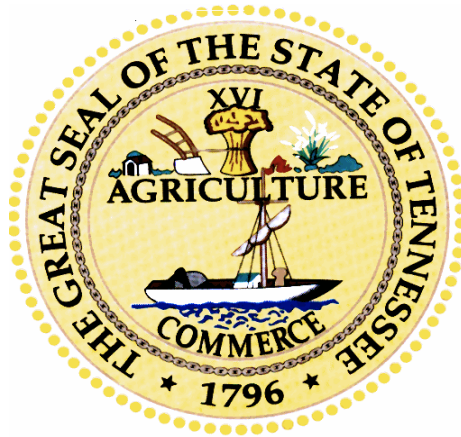
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

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**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 3/2/17

Location: Cookeville, TN

AQS Number: 47-141-0005

Site Name: Cookeville

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Cookeville Initials: EMH Date: 3/2/17

Additional Comments:

Sunny 52 ° F

Electric meter: Cookeville Electric Meter # 20274

Distance to closest roads: Denton Ave (East of site) is 50.5 meters and E 20th Street (North of site) is 111.4 meters
(Measured using Google Earth Pro)

Distance between 2025 monitor and utility pole is 0.6 meters

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Cookeville Initials: EMH Date: 3/2/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 2:01 pm Departure Time: 3:15 pm Primary Operator: Joey Cannon

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [Y] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1-2 per [week]

[NA] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: _____

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5}	R& P	2025	21651
PM _{2.5} BAM	Met One	BAM 1022	T21580

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
NA					

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Cookeville Initials: EMH Date: 3/2/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations [NA] Precision Checks [NA] Audits
(Not Required) (Required) (Required)

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / [☒Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Cookeville Initials: EMH Date: 3/2/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs ☐Interior/Exterior] / Ladder ☐attached/removable / ☐ Not Present [NA] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: _____ meters Roofing Material: _____

Issues: _____

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS changed once every 5 runs : VSCC monthly

COLLOCATED SAMPLERS: ☒ Not Present

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐ Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐ Rank Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☐ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

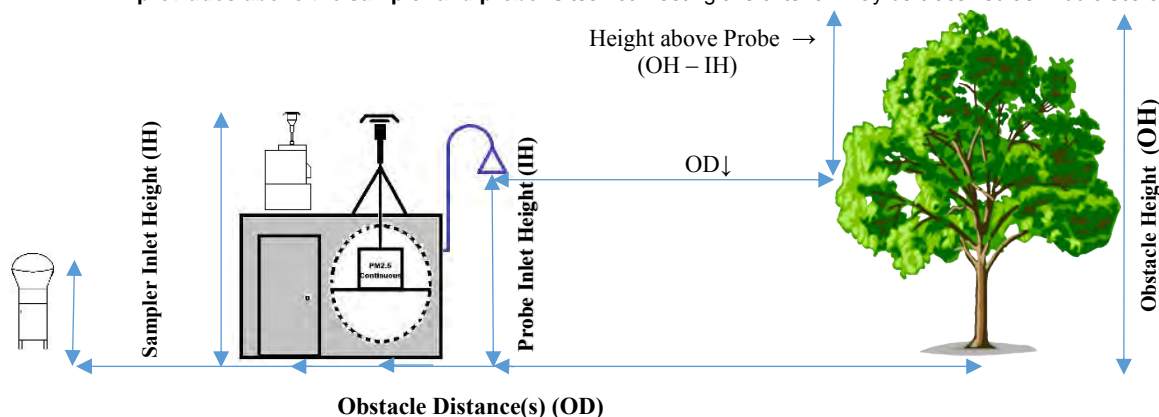
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5} 2025	2.5	Ground	2.4		Neighborhood	Neighborhood
PM _{2.5} BAM	2.6	Ground	2.4		Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD MUST be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)
Tree 9	22.0	2.5	39.0	30.4
Tree 10	22.0	2.5	39.0	25.4
Tree 11	18.2	2.5	31.4	24.4
Tree 12	22.0	2.5	39.0	31.8

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ No Trees Present
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines

Minor Sources:

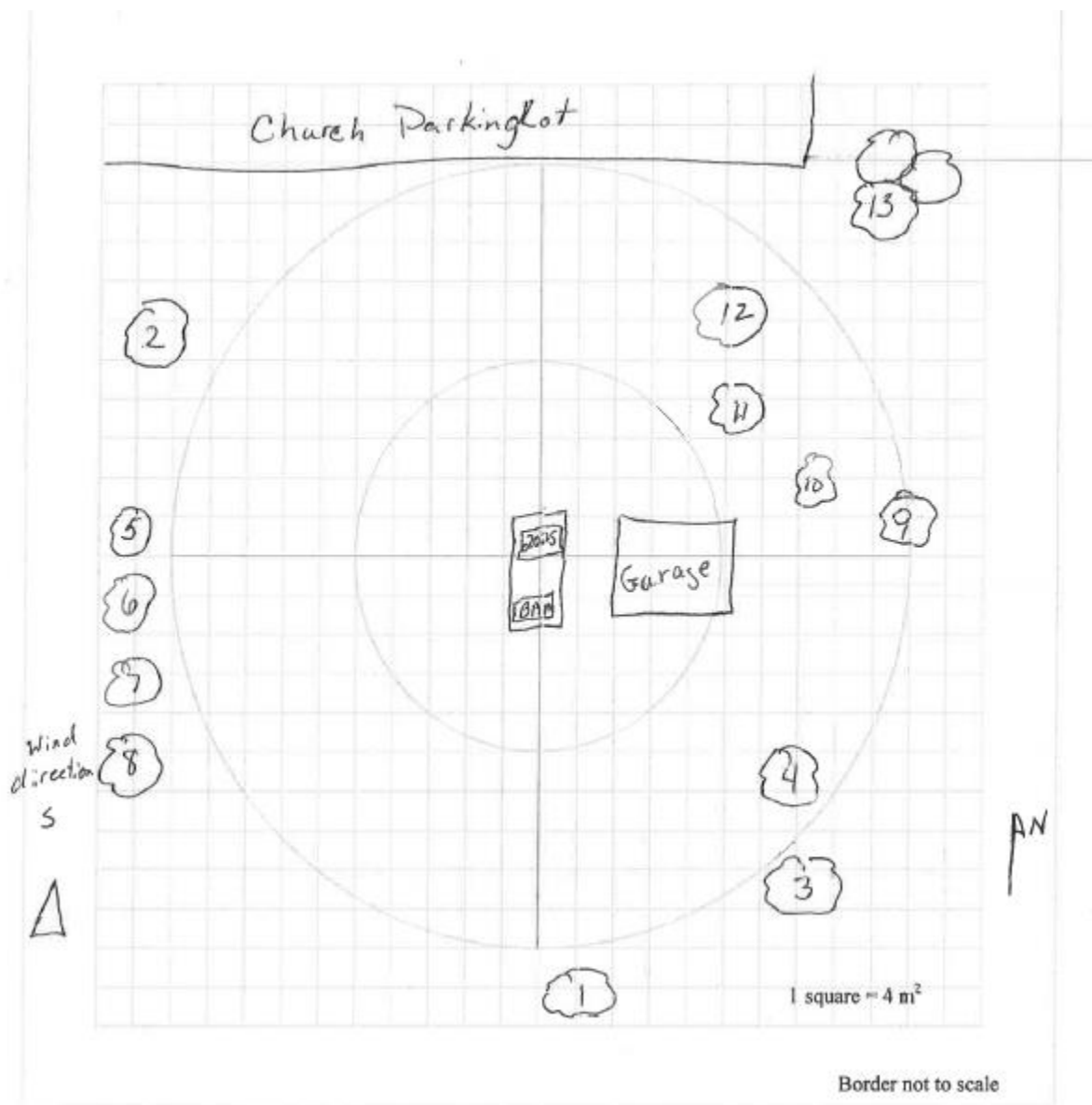
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Cookeville Initials: EMH Date: 3/2/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: 322 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

	Height	$[2*OH - IH(2.6 \text{ or } 2.5)]$	Distance
* Tree 2	17.2	29.4	45.2
Tree 3	17.2	29.2	42.4
Tree 4	8.4	11.6	24.8
*Tree 5	13.6	22.2	41.4
Tree 6	16.6	28.0	41.8
Tree 7	11.8	18.4	39.0
Tree 8	18.2	31.2	59.6
*Trees 13	24.2	43.4	54.4

*The inlet height of the 2025 monitor is used, others the BAM height

Aerial Photo with Wind Rose

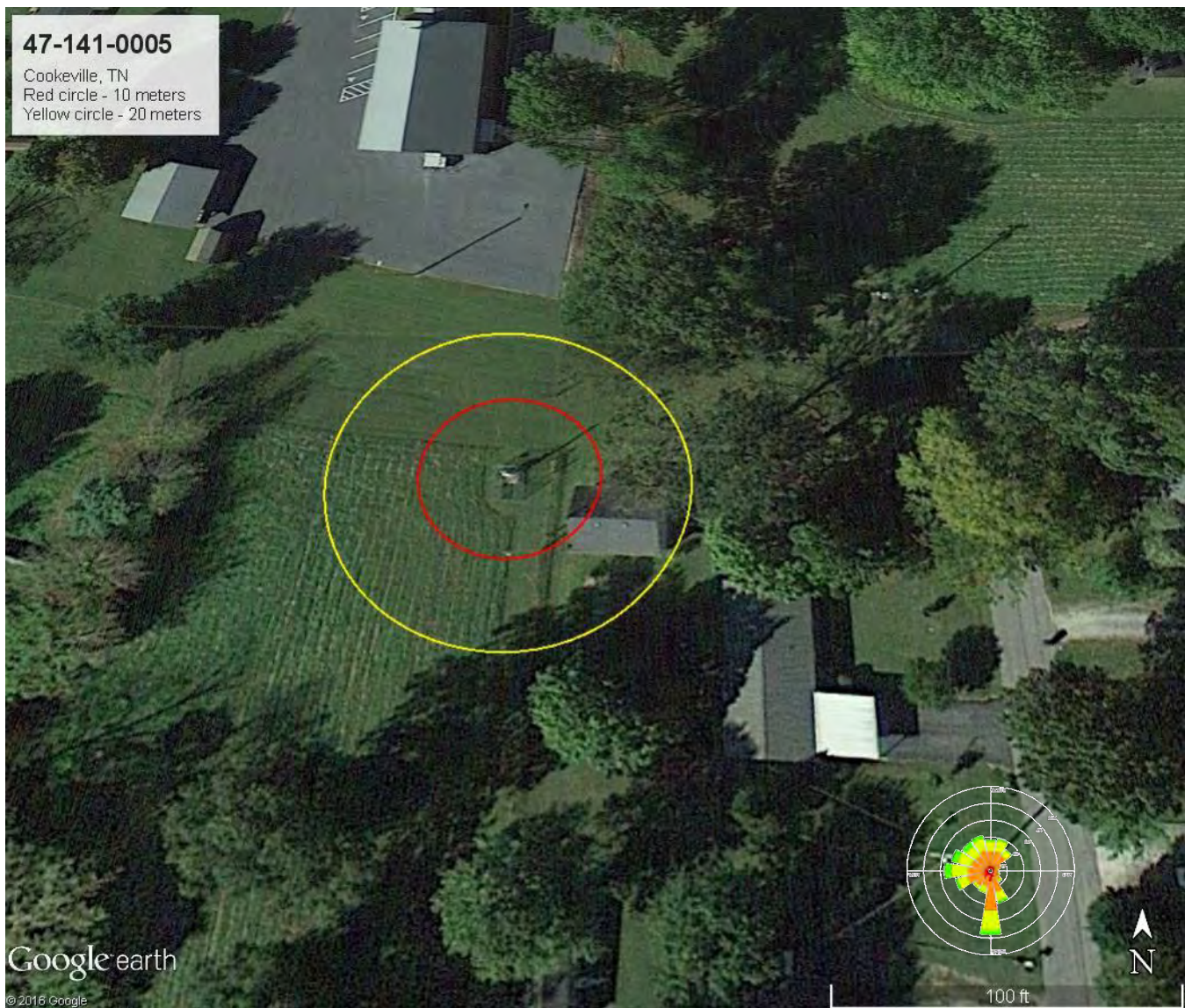


PHOTO LOG: Local Site Name: Cookeville **Initials:** EMH **Date:** 3/2/17

Camera ☒ **APC** / ☐ **Personal – Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: Site view from north direction

Filename: 02 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: Site view from west direction

Filename: 03 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 2/15/17 **Time:** 3:05 pm **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 3/2/17 **Time:** 3:05 pm **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

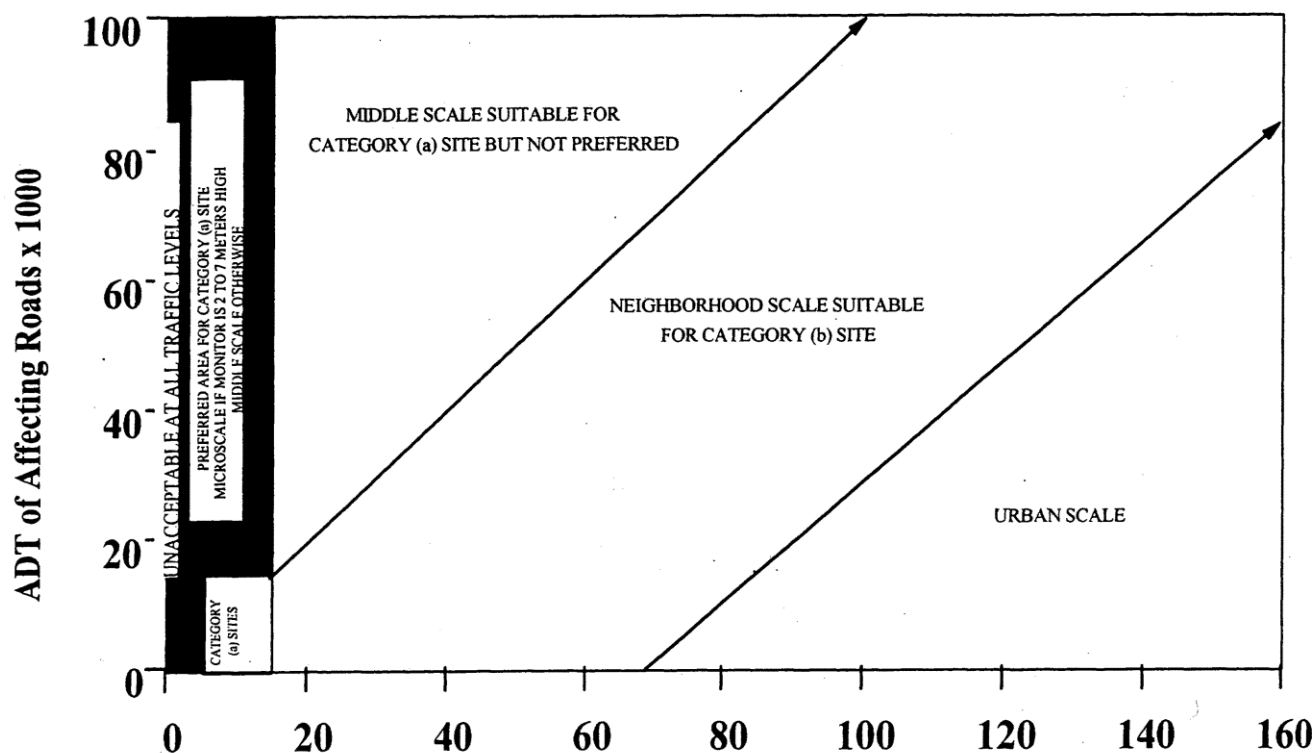


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the BAM 1022. A US Robotics dial-up modem is used to send the ancillary data from the 2025 to the central office staff.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

\SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure: Y**
2. **Trailer: N**
3. **None: N**
4. **Other: Y**

What are the shelter(s) made of?

1. _____
2. _____
3. _____
4. 2025 platform (wood) and Bam platform (plastic)

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y / N

Write additional comments on the shelters below:

NA _____

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

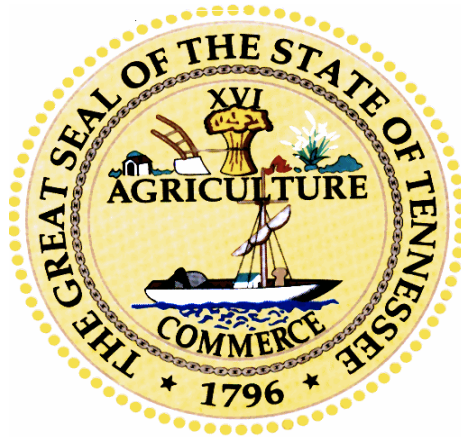
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/16/17

Location: Dyersburg, TN

AQS Number: 47-045-0004

Site Name: Dyersburg

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Dyersburg Initials: EMH Date: 2/16/17
Additional Comments:

Sunny 55° F

Electric meter: Dyersburg Electric Meter # 21103302

Board of 2025 platform rotten; needs replacing (1" thick x 6" wide x 48 " long)

Outlets, breaker box and plus are in good condition

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Dyersburg Initials: EMH Date: 2/16/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 2:25 pm Departure Time: 3:15 pm Primary Operator: Brad Garrett/ Michael Cox

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [Y] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1-2 per [week]

[NA] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: _____

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5} 2025	R & P	2025	21652
PM _{2.5} BAM	Met One	BAM 1022	T21576

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
NA					

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Dyersburg Initials: EMH Date: 2/16/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations [NA] Precision Checks [NA] Audits
(Not Required) (Required) (Required)

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): NA

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / [☒Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: _____

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Dyersburg Initials: EMH Date: 2/16/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs ☐Interior/Exterior] / Ladder ☐attached/removable] / ☐ Not Present] [NA] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: _____ meters Roofing Material: _____

Issues: _____

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS changed once every 5 runs : VSCC monthly

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐ Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐ Rank Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☐ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

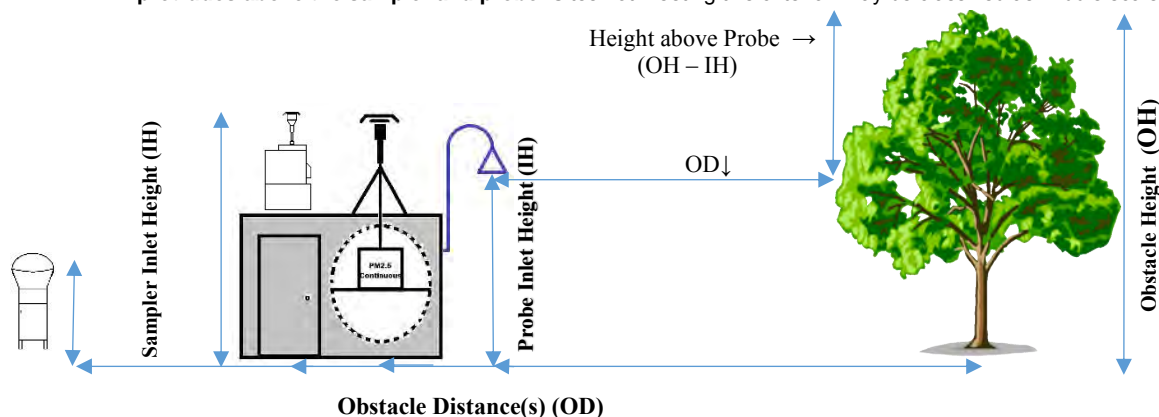
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5} 2025	2.4	Ground	3.1		Neighborhood	Neighborhood
PM _{2.5} BAM	2.1	Ground	3.1		Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 * (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 * (OH - IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**

(39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

_____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

Minor Sources:

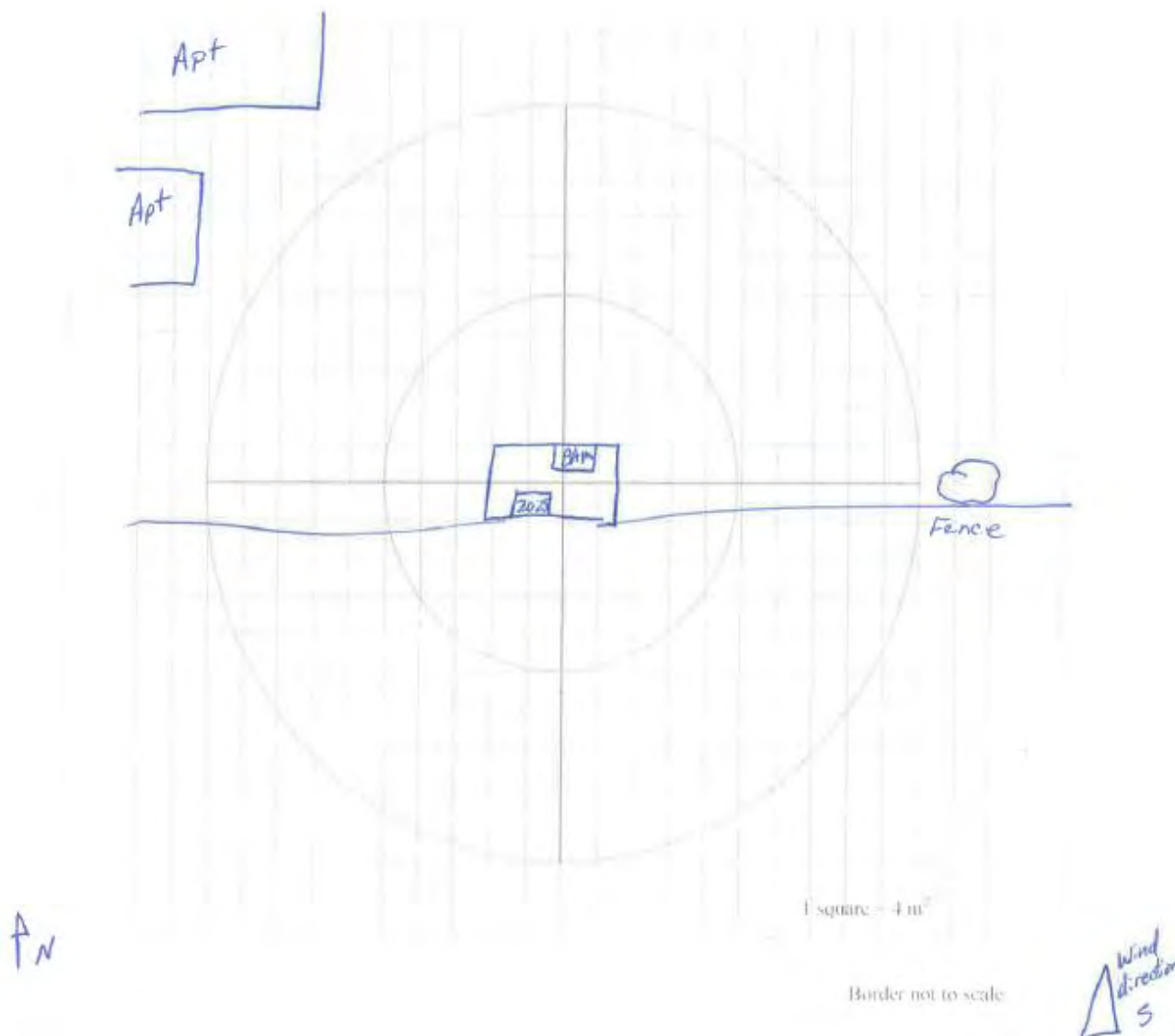
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Dyersburg Initials: EMH Date: 2/16/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Distance to closest road (Greenway Street) – 133.8 meters

	Height	$[2*OH - IH(2.1)]$	Distance
Tree (E of site)	10.6 m	17.0	23.4 m

Aerial Photo with Wind Rose

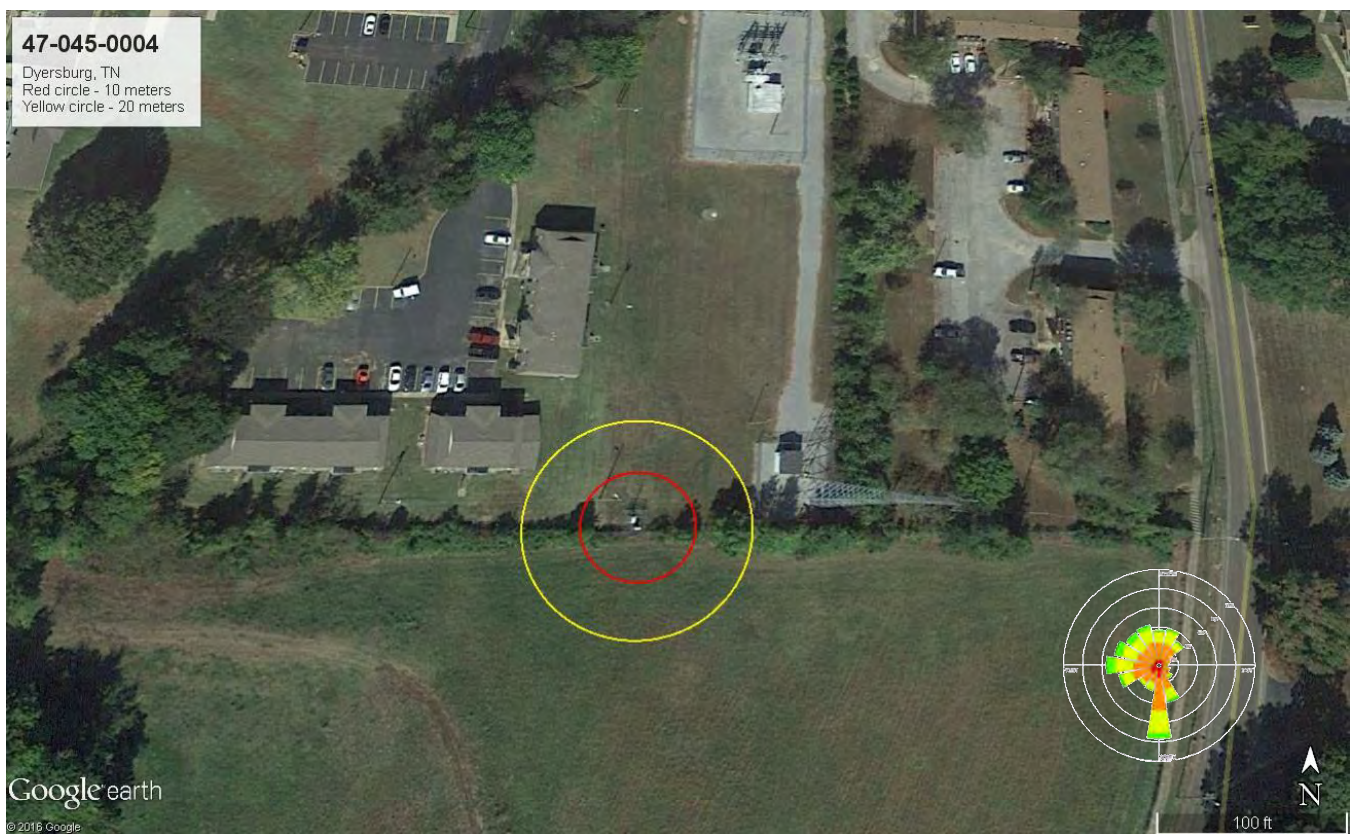


PHOTO LOG: Local Site Name: Dyersburg **Initials:** EMH **Date:** 2/16/17

Camera ☒ **APC** / ☐ **Personal** – **Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: Site view from east direction

Filename: 02 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: Site view from SW direction

Filename: 03 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: View North of site (N directional)

Filename: 04 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: South side of site

Filename: 05 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: View South of site (S directional)

Filename: 06 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: West side of site

Filename: 07 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: View West of site (W directional)

Filename: 08 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: East side of site

Filename: 09 **Date:** 2/16/17 **Time:** 2:55 pm **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



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006



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008





40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

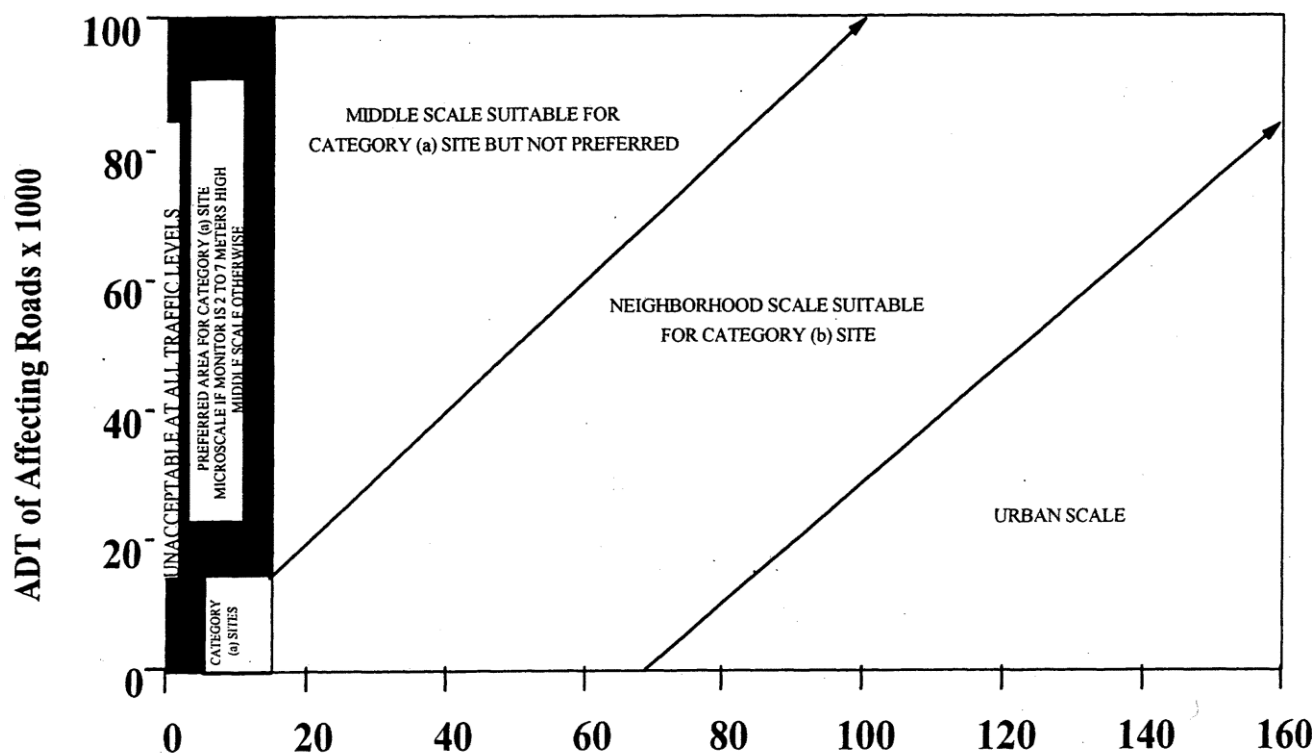


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the BAM 1022 and to the other instruments at the site via a network switch.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure: Y**
2. **Trailer: N**
3. **None: N**
4. **Other: Y**

What are the shelter(s) made of?

1. TEOM enclosure - steel
2. _____
3. _____
4. Monitor platforms – wood and BAM platform - plastic

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y / N

Write additional comments on the shelters below:

NA

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

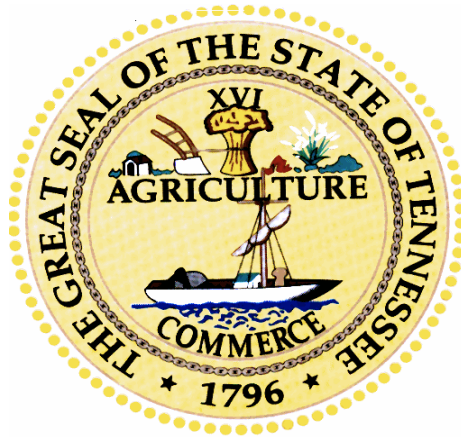
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/23/17

Location: Kingsport, TN

AQS Number: 47-163-6001

Site Name: Eastman Robinson

Pollutants: SO₂

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Eastman Robinson **Initials:** EMH **Date:** 2/23/17

Additional Comments:

Partly sunny 57 ° F

Electric Appalachian Electric Power Meter # 428 774 544

Distance to closest road (Wilburn Dr.) – 37.5 meters

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Robinson Initials: EMH Date: 2/23/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 2:00 pm Departure Time: 3:15 pm Primary Operator: Ron Wilhoite

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [NA] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐ Inside / ☐ Outside] Date: _____ [Y/N] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: 24.5 °C (from data logger) Operator Site Visits: 1 - 2 per [week]

[N] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [Y] Clean / Neat [N] Fire Extinguisher

[N] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: _____

MONITOR(s):

Location: Exterior Samplers [☒ Roof / ☐ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
SO ₂	Teledyne	T100	2261

CALIBRATOR(s): ☐ Not Present

[Y/N] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T700	2596		

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Eastman Robinson Initials: EMH Date: 2/23/17

All Gas Standards Pass thru all Filters during: [Y] Calibrations (Not Required) [Y] Precision Checks (Required) [Y] Audits (Required)

Issues: _____

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
QC			7-7-2020	29.69 +/- 0.25	FBO3900

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): Teledyne T700 SN 557

Cartridge System: ☐Silica Gel ☐Pink / ☐Blue / ☒Charcoal / ☐Purafil / ☐Hopcalite / Other: Dri-rite

[N] Needs Service Last Service Date: _____ Condition: _____

Issues: _____

Probe Line(s): ☒ Replaced / ☐ Cleaned – Frequency: yearly Last Service Date: 6/9/16

[Y] Clean [Y] Heated [N] Insulated [Y] Moisture [N] Retractable [N] Old / Unused Lines [N] Lo Flo

Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? _____

Issues: _____

MSEF (Page 3/5): Local Site Name: Eastman Robinson Initials: EMH Date: 2/23/17

SHELTER – Exterior ☐ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Aluminum]

[N] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / ☒ Not Present] [N] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: 2.4 meters Roofing Material: Aluminum

Issues: _____

OUTDOOR SAMPLERS ☒ Not Present

[Y/N] Locked [Y/N] Electrically Grounded [Y/N] Stabilized [Y/N] Clean Inside [Y/N] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): _____

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at least **1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [☒Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☒ Rain Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☒ Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☒ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

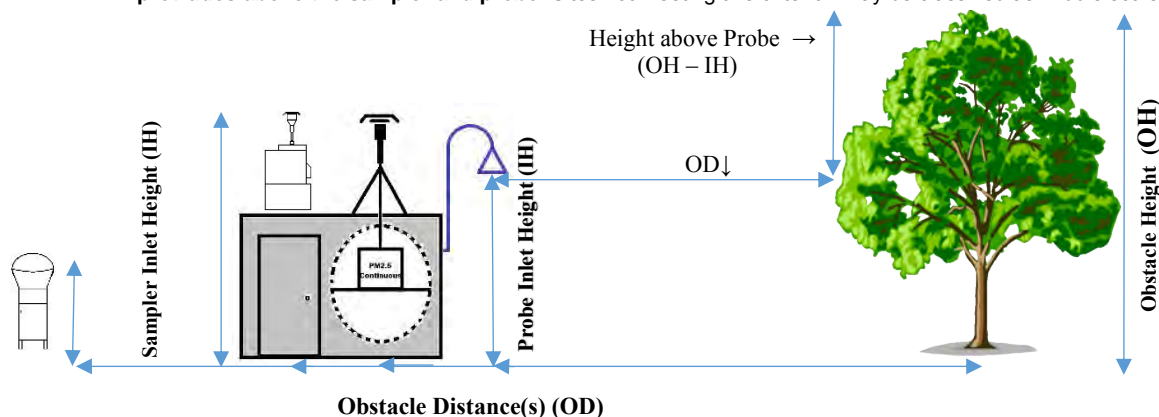
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
SO ₂	3.4	Side of shelter			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ No Trees Present
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

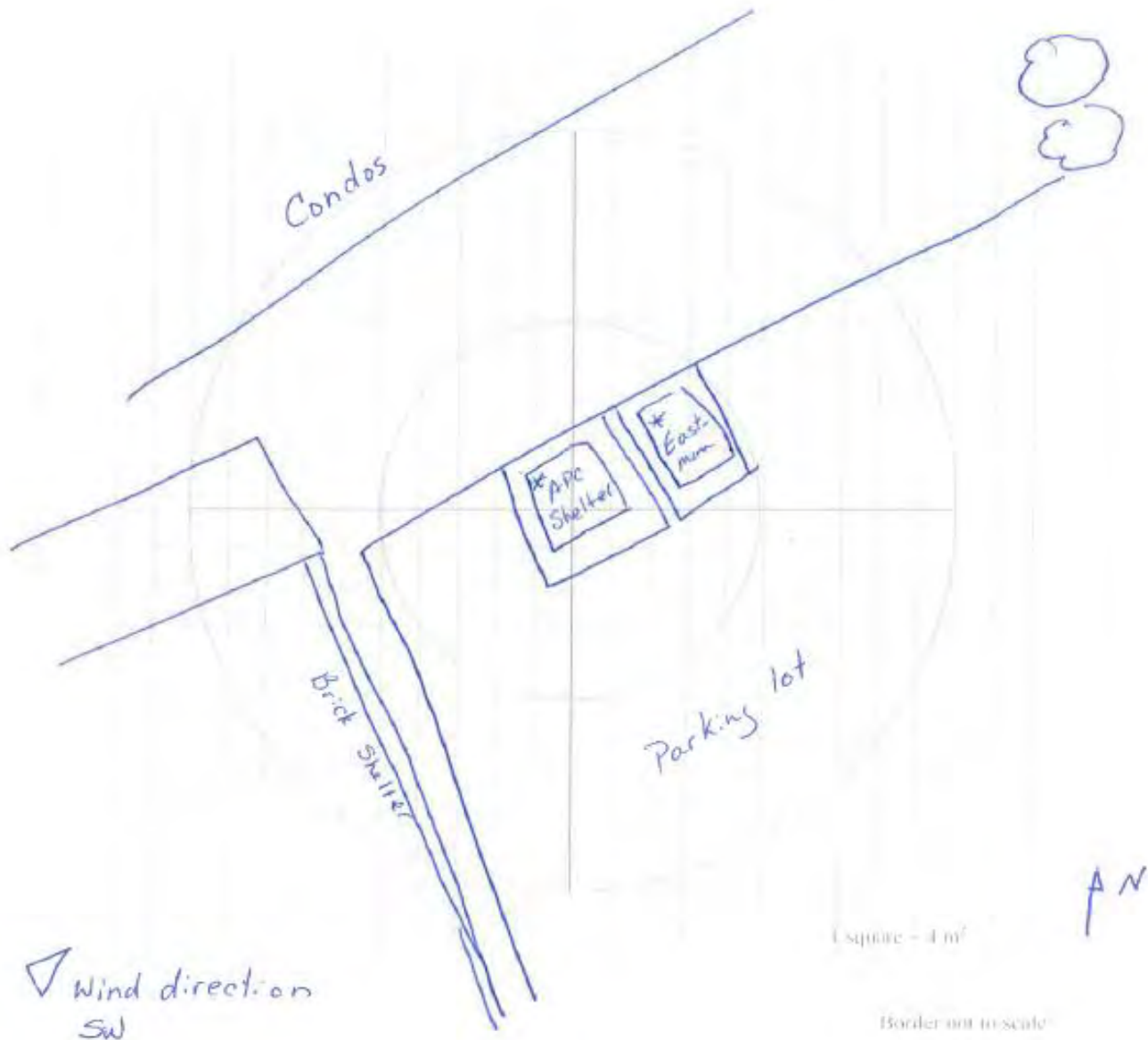
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: Several chimneys are located SW of site and have not been active in over 20 plus years

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Distance between DAPC SO₂ probe and nearest Eastman inlet is 5.5 meters

Aerial Photo with Wind Rose

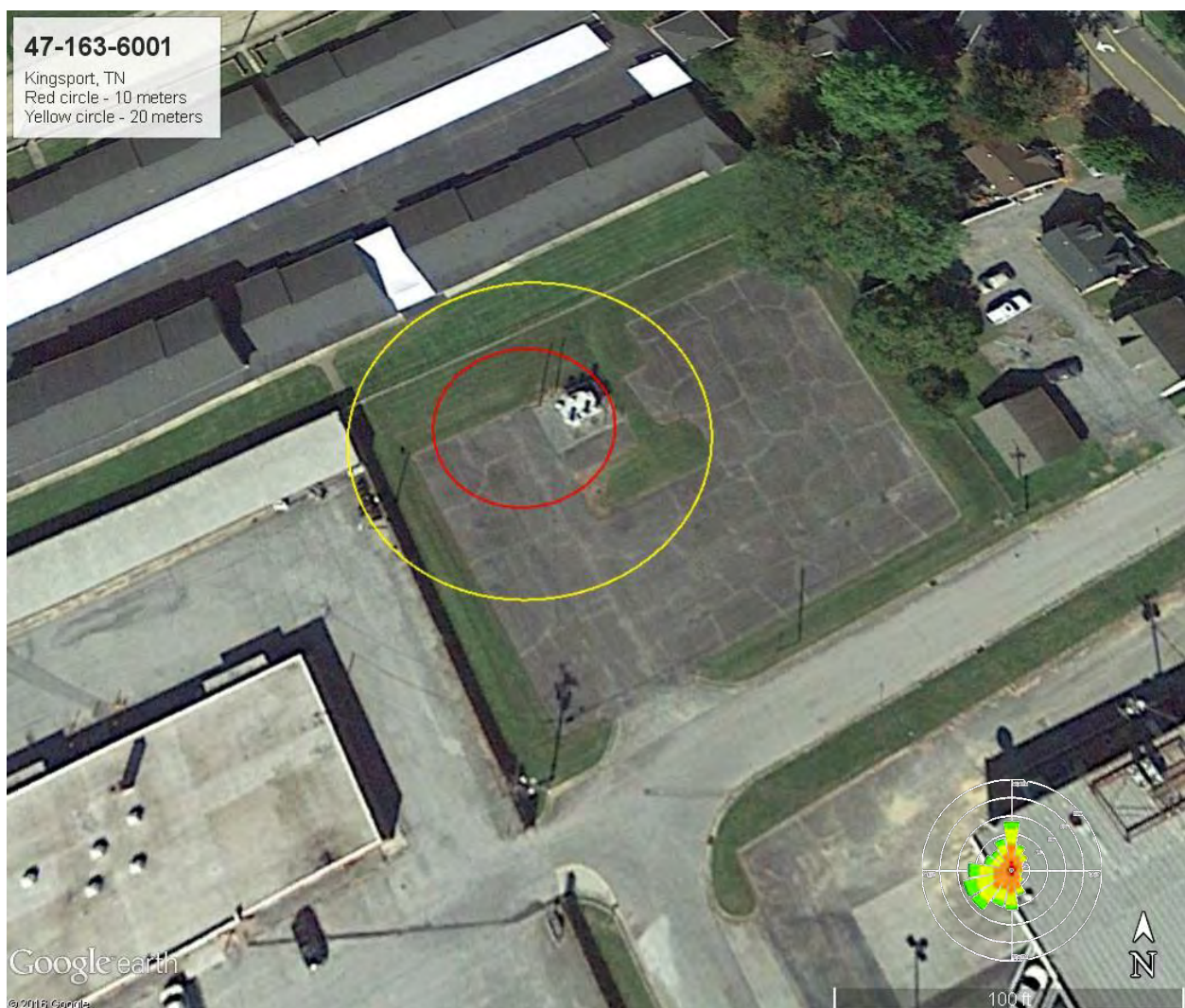


PHOTO LOG: Local Site Name: Eastman Robinson **Initials:** EMH **Date:** 2/23/17

Camera ☒ **APC** / ☐ **Personal** – **Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: Site view from south direction

Filename: 02 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: Site view from SE direction

Filename: 03 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 2/23/17 **Time:** 2:31 pm **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1 2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

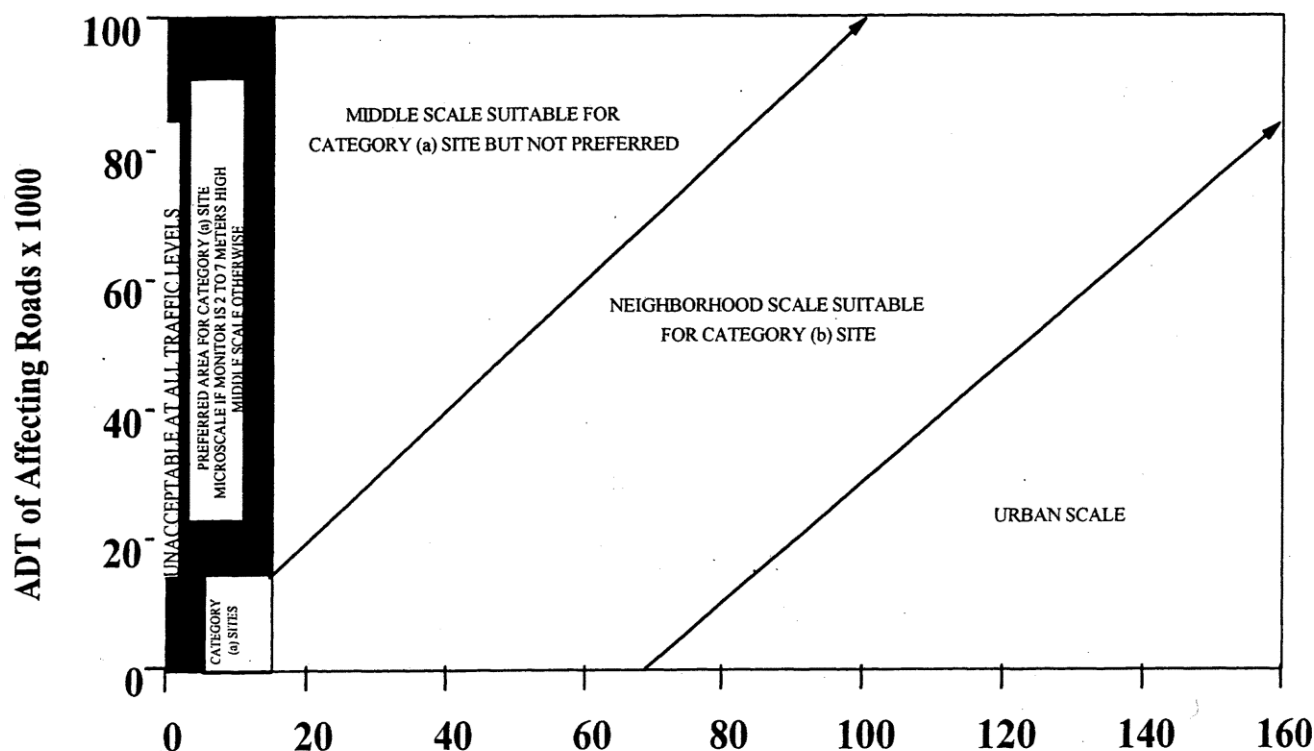


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 and ESC 8872 data logger to collect data. Local internet company (Charter) provides internet communications to the data loggers at the site via a network switch.

RECORDS – at site

Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. Aluminum _____
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y / N

Write additional comments on the shelters below:

Shelter is new _____

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

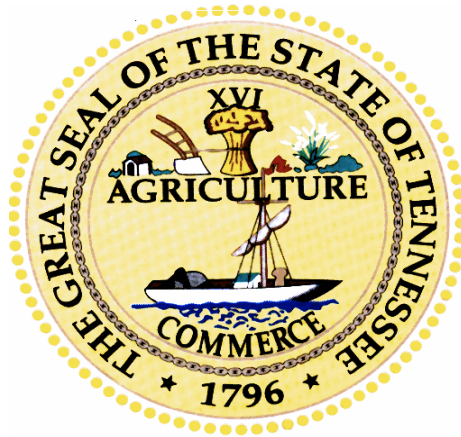
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/23/17

Location: Kingsport, TN

AQS Number: 47-163-6002

Site Name: Eastman Skyland

Pollutants: SO₂

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Eastman Skyland **Initials:** EMH **Date:** 2/23/17

Additional Comments:

Partly Cloudy 47 ° F

Electric Appalachian Electric Power Meter # 533 687 673

Distance to closest road (Bagwell St) – 22.1 meters (measured using Google Earth Pro)

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Skyland Initials: EMH Date: 2/23/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 10:45 am Departure Time: 11:50 am Primary Operator: Ron Wilhoit

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [Y] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐ Inside / ☐ Outside] Date: _____ [N] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: 25.0 °C (from data logger) Operator Site Visits: 1 - 2 per [week | month | _____]

[N] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [Y] Clean / Neat [N] Fire Extinguisher

[Y] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: _____

MONITOR(s):

Location: Exterior Samplers [☒ Roof / ☐ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
SO ₂	Teledyne	100E	3460

CALIBRATOR(s): ☐ Not Present

[Y] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T700	488		

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Eastman Skyland Initials: EMH Date: 2/23/17

All Gas Standards Pass thru all Filters during: [Y] Calibrations (Not Required) [Y] Precision Checks (Required) [Y] Audits (Required)

Issues: _____

CYLINDER GAS STANDARDS: ☐ Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
QC			2-21-2020	30.2 +/- 0.3	FBO3900

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): Teledyne T701 SN 556

Cartridge System: ☐Silica Gel ☐Pink / ☐Blue / ☒ Charcoal / ☐Purafil / ☐Hopcalite / Other: Dri-rite

[N] Needs Service Last Service Date: _____ Condition: _____

Issues: _____

Probe Line(s): ☒ Replaced / ☐ Cleaned – Frequency: yearly Last Service Date: 8/19/16

[Y] Clean [Y] Heated [N] Insulated [Y] Moisture [N] Retractable [N] Old / Unused Lines [N] Lo Flo

Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? _____

Issues: _____

MSEF (Page 3/5): Local Site Name: Eastman Skyland Initials: EMH Date: 2/23/17

SHELTER – Exterior ☐ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Concrete Block]

[N] Needs Maintenance (specify) [N] Tied Down [Y] Electrically Grounded [Y] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / ☐ Not Present] [N] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: _____ meters Roofing Material: _____

Issues: _____

OUTDOOR SAMPLERS ☒ Not Present

[Y/N] Locked [Y/N] Electrically Grounded [Y/N] Stabilized [Y/N] Clean Inside [Y/N] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): _____

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [☒ Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)]

Funnel(s): [☒ Rain Shield / ☐ Part of Probe] Funnel Material: [☐ Teflon® / ☒ Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☒ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

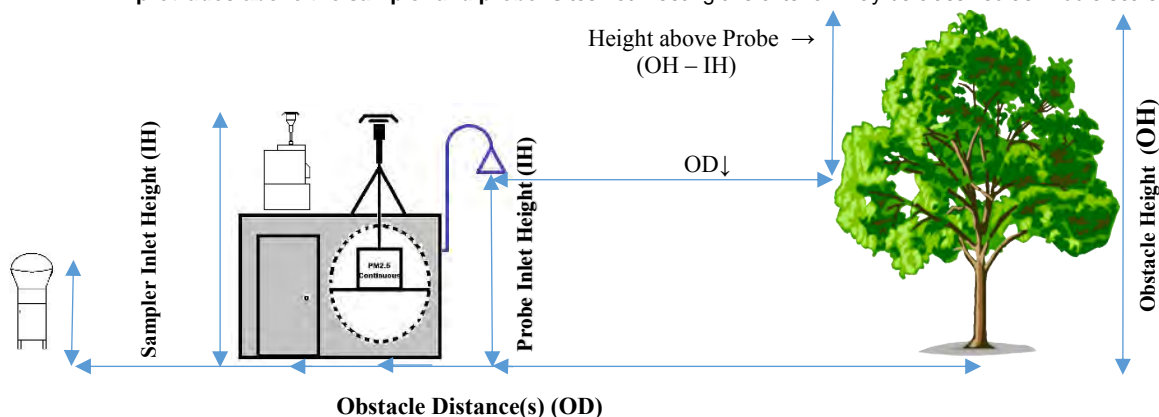
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
SO ₂	12.2	Ground			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 * (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 * (OH - IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

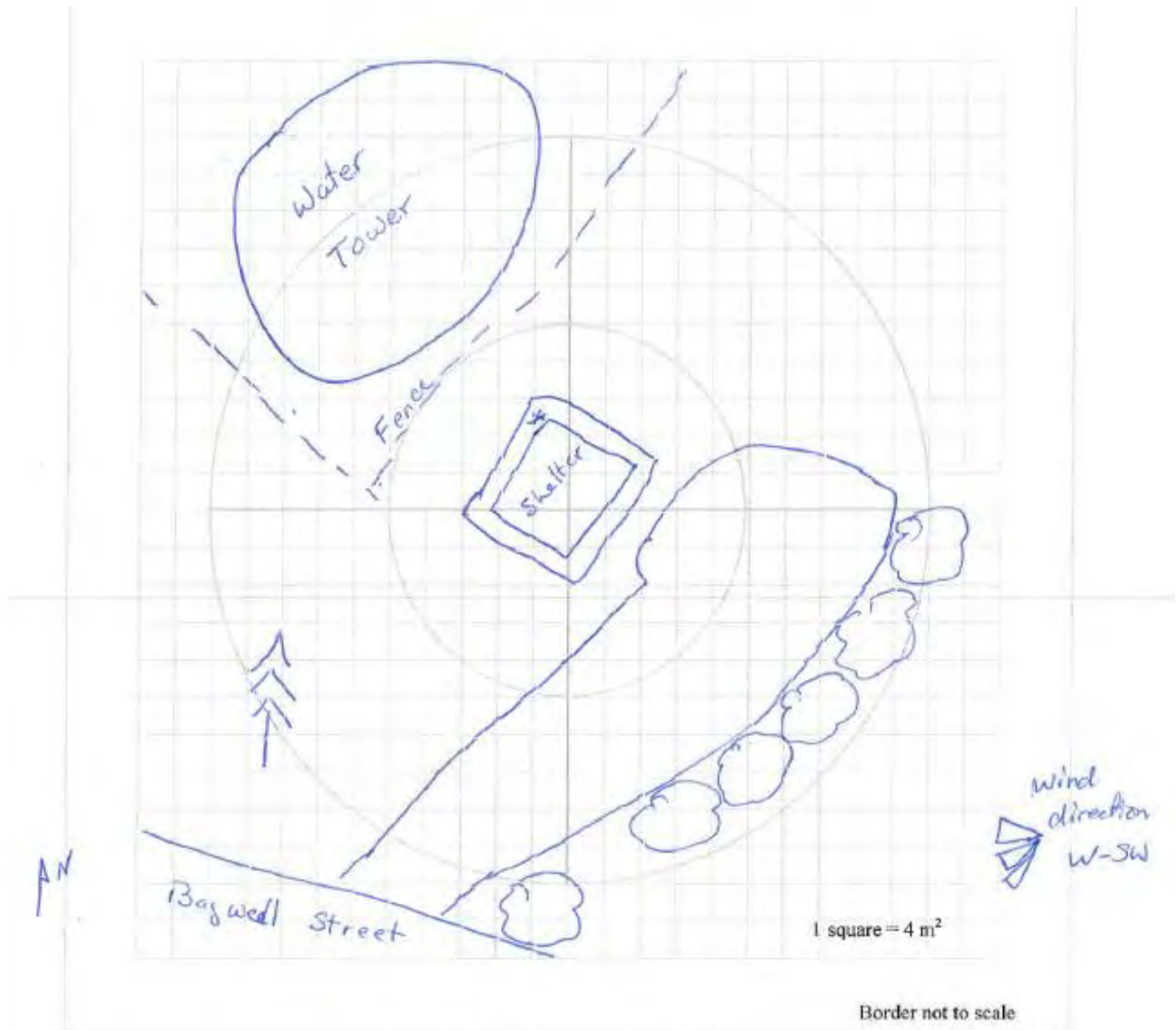
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

	Height	$[2* OH - IH (12.2)]$	Distance
Water Tower	18.0	11.6	12.4
Tree (W)	9.8	-----	24.4
Tree (S)	11.4	-----	23.6
Trees (E)	18.0	11.6	20.4

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Eastman Skyland **Initials:** EMH **Date:** 2/23/17

Camera ☒ **APC** / ☐ **Personal – Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: Site view from south direction

Filename: 02 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: Site view from east direction

Filename: 03 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 2/23/17 **Time:** 11:20 am **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

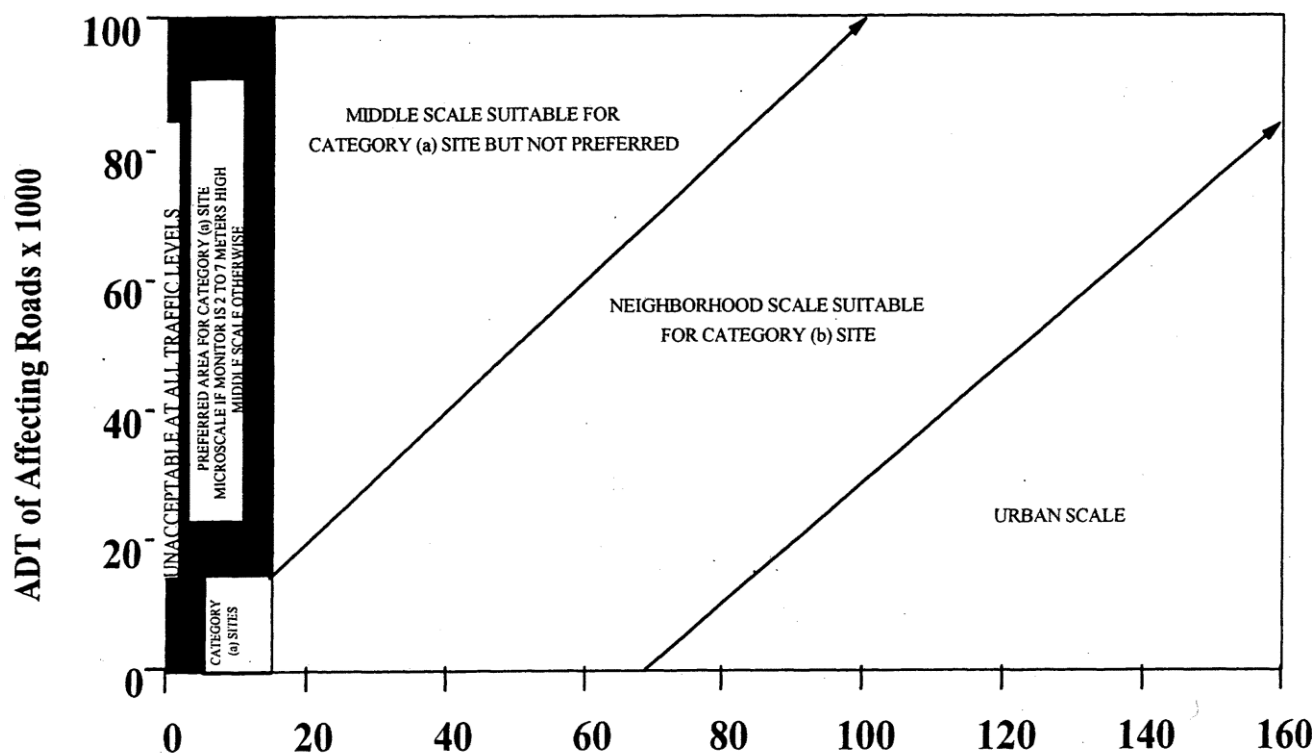


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 and ESC 8872 data logger to collect data. Local internet company (Century Link) provides internet communications to the data loggers via a network switch.

RECORDS – at site

Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** Y
2. **Trailer:** N
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. _____
3. _____
4. Concrete block _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y / N

Write additional comments on the shelters below:

None _____

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

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Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

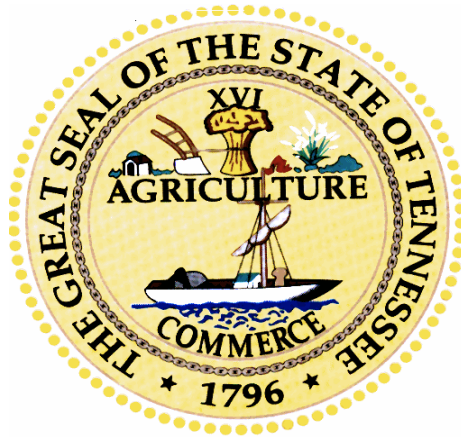
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Location: Bristol, TN

Date: 2/23/17

AQS Number: 47-163-3004

Site Name: Exide

Pollutants: Pb

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Exide Initials: EMH Date: 2/23/17

Additional Comments:

Partly Cloudy 47° F

Electricity provided by the Exide platform on the other side of fence

Lead monitors are 5.8 meters (measured by measuring wheel) to the closest road (Edison Circle, which circles the plant, minimum traffic on this road)

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Exide Initials: EMH Date: 2/23/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present [N] Completed

Arrival Time: 9:15 am Departure Time: 10:00 am Primary Operator: Candace Justice

Observer(s): _____

SITE

[N]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: Site is located by road outside plant property

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1 or 2 per [week]

[NA] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: None

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
Pb (Poc 1)	Tisch	TE-303	1110
Pb (Poc 2)	Unknown	Unknown	Unknown

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
NA					

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Exide Initials: EMH Date: 2/23/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations (Not Required) [NA] Precision Checks (Required) [NA] Audits (Required)

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[NA] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): NA

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / [☐Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: _____

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Exide Initials: EMH Date: 2/23/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs ☐Interior/Exterior] / Ladder ☐attached/removable] / ☐ Not Present [NA] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: _____ meters Roofing Material: _____

Issues: _____

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): None

COLLOCATED SAMPLERS: ☐ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
Pb	Hi	2.3
Pb	Hi	2.3

*Collocated monitors must be within 4 meters of each other and at least 2 meters apart for flow rates greater than 200 liters/min or at least 1 meter apart for samplers having flow rates less than 200 liters/min to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐ Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐ Rank Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☐ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

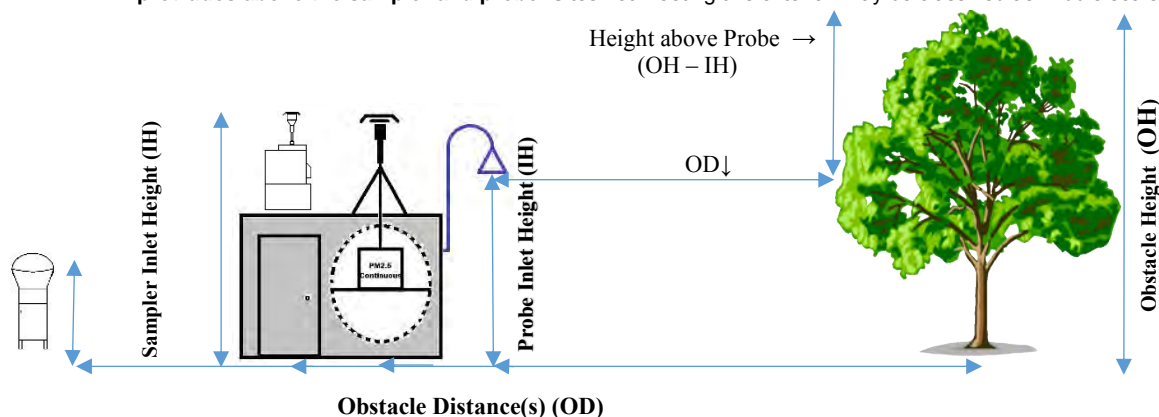
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
Pb	2.1	Ground	2.3		Urban	Urban
Pb	2.0	Ground	2.3		Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**

(39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

_____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

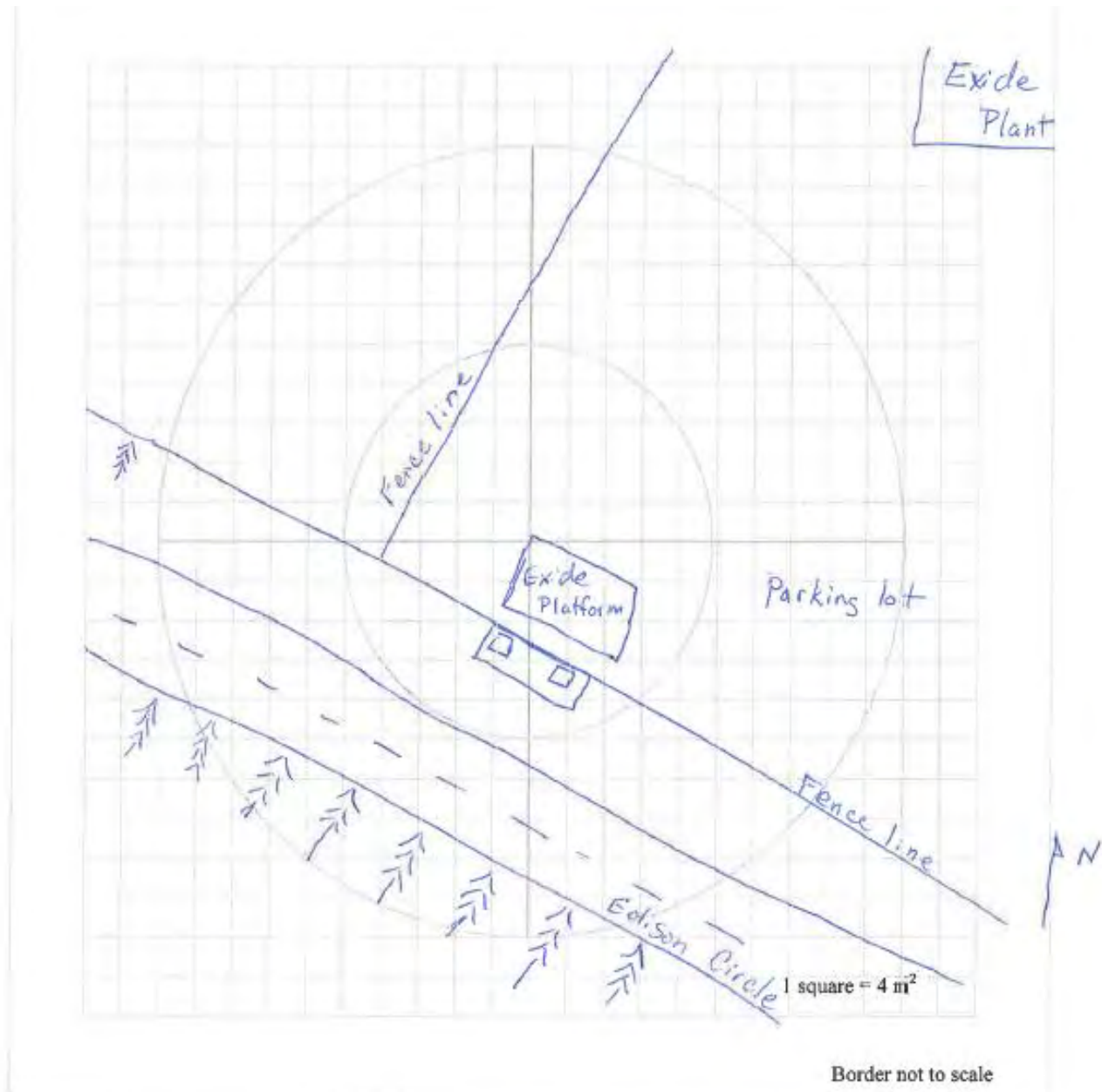
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: No minor source issues

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: 270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Exide plant is 155 meters NE of the site

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Exide **Initials:** EMH **Date:** 2/23/17

Camera ☒ **APC** / ☐ **Personal – Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/23/17 **Time:** 9:40 am **Photographer:** EMH

Description: Site view from SW direction

Filename: 02 **Date:** 2/23/17 **Time:** 9:40 am **Photographer:** EMH

Description: Site view from west direction

Filename: 03 **Date:** 2/23/17 **Time:** 9:40 am **Photographer:** EMH

Description: View North of site (N directional)

Filename: 04 **Date:** 2/23/17 **Time:** 9:40 am **Photographer:** EMH

Description: View South of site (S directional)

Filename: 05 **Date:** 2/23/17 **Time:** 9:40 am **Photographer:** EMH

Description: View West of site (W directional)

Filename: 06 **Date:** 2/23/17 **Time:** 9:40 am **Photographer:** EMH

Description: View East of site (S directional)

001



002



003



004



005



006



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1 2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

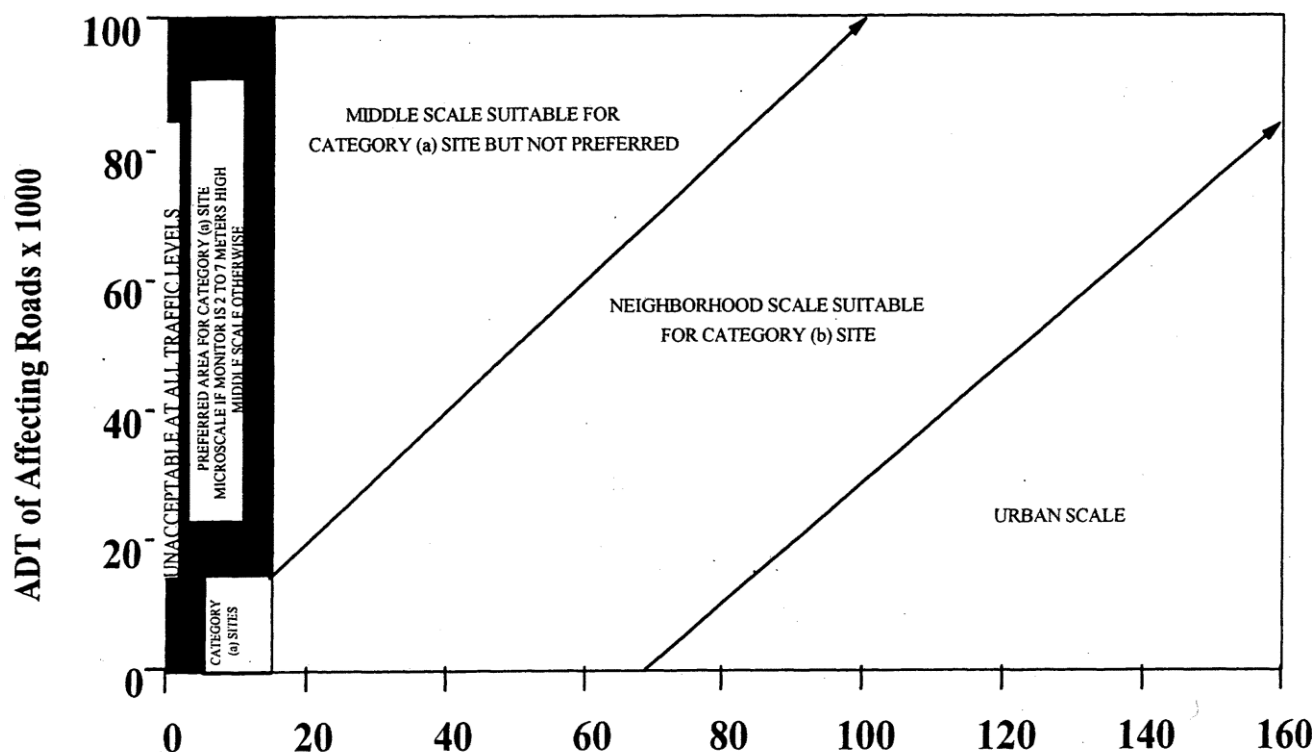


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

None

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure: Y**
2. **Trailer: N**
3. **None: N**
4. **Other: N**

What are the shelter(s) made of?

1. _____
2. _____
3. _____
4. Platform - wood

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? **N**

Write additional comments on the shelters below:

Platform is in good condition. Breaker box, outlets, and plugs are in good condition.

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

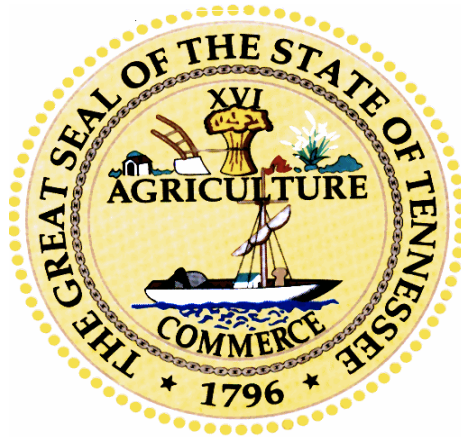
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 3/2/17

Location: Fairview, TN

AQS Number: 47-187-0106

Site Name: Fairview

Pollutants: O3

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Fairview Initials: EMH Date: 3/2/17

Additional Comments:

Shelter moved from previous location to new location because previous location was not meeting EPA siting criteria. Electricity needs to be installed and fence relocated

Waiting for inspection from MTEC to complete installation of electricity

Equipment will be installed and probe line changed out once electricity is on.

Distance from inlet to closest road- 15.8 meters

Electricity was turned on 3/28/17 and site was set up for 2017 O3 season on 3/29/17

Data loggers ESC 8832 SN A4158K and Agilaire 8872 SN 494

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Fairview Initials: EMH Date: 3/2/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 10:40 am Departure Time: 11:20 am Primary Operator: Ken Cooper

Observer(s): _____

SITE

[N]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [N] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1 per [week]

[N] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [N] Clean / Neat [N] Fire Extinguisher

[Y] Insect / Wildlife Issues [N] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: See notes

MONITOR(s):

Location: Exterior Samplers [☒ Roof / ☐ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
Ozone	Thermo	49C	77489-386

CALIBRATOR(s): ☒ Not Present

[Y/N] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	330		

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Fairview Initials: EMH Date: 3/2/17

All Gas Standards Pass thru all Filters during: [Y] Calibrations (Not Required) [Y] Precision Checks (Required) [Y] Audits (Required)

Issues: _____

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): Thomas pump, charcoal, and Drie-Rite will be installed before the site becomes operational.

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / [☐Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: _____

Probe Line(s): [x Replaced / ☐Cleaned] – Frequency: annually Last Service Date: 3/29/17

[Y] Clean [Y] Heated [N] Insulated [N] Moisture [N] Retractable [N] Old / Unused Lines [N] Lo Flo

Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? _____

Issues: _____

MSEF (Page 3/5): Local Site Name: Fairview Initials: EMH Date: 3/2/17

SHELTER – Exterior

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Aluminum]

[Y] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / **X Not Present**] [N] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: 3.1 meters Roofing Material: Aluminum

Issues: _____

OUTDOOR SAMPLERS x Not Present

[NA] Locked [NA] Electrically Grounded [NA] Stabilized [NA] Clean Inside [NA] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): _____

COLLOCATED SAMPLERS: (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at least **1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External

Inlet Type: [☒Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☒Rain Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☒Stainless Steel / Other: _____]

Probe Line(s): [☒Teflon® / Other: _____] Probe Fitting(s): [☒Teflon® / Other: _____ / ☐Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

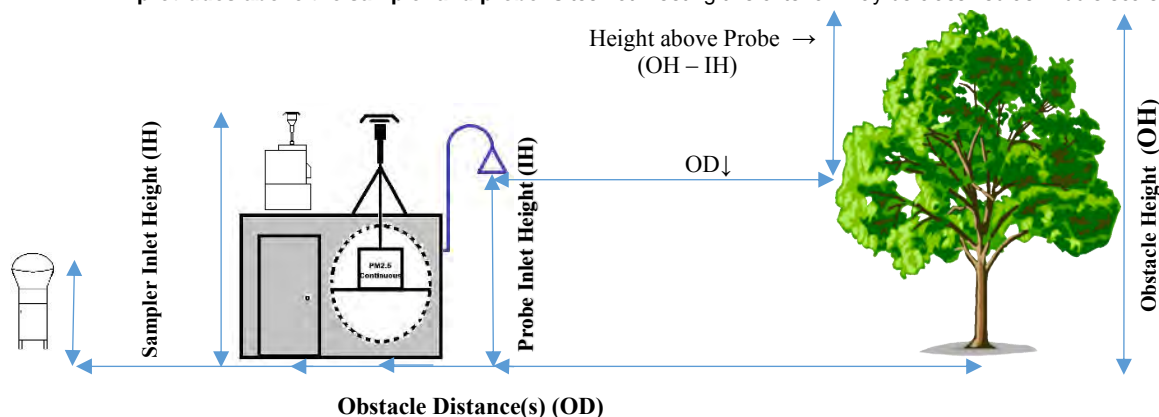
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
O3	> 4.0	Side of shelter			Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

Minor Sources:

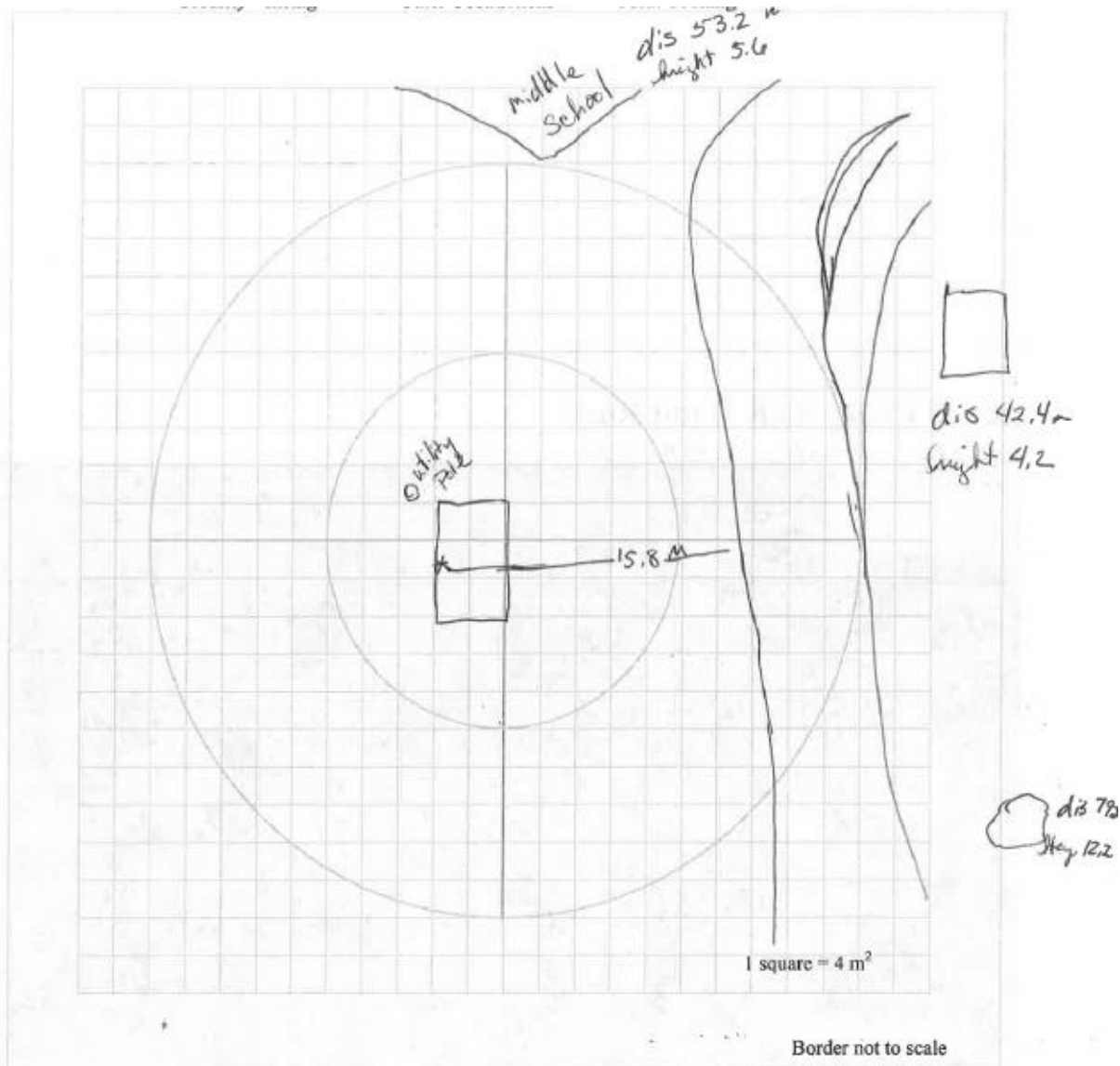
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Fairview Initials: EMH Date: 3/2/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Site drawing is the new site location.

Relocated site (Lat: 35.949729, Long: -87.138132)

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Fairview **Initials:** EMH **Date:** 3/2/17

Camera ☒ **APC** / ☐ **Personal – Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: Site view from NE direction

Filename: 02 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: Site view from east direction

Filename: 03 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 3/2/17 **Time:** 11:10 am **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

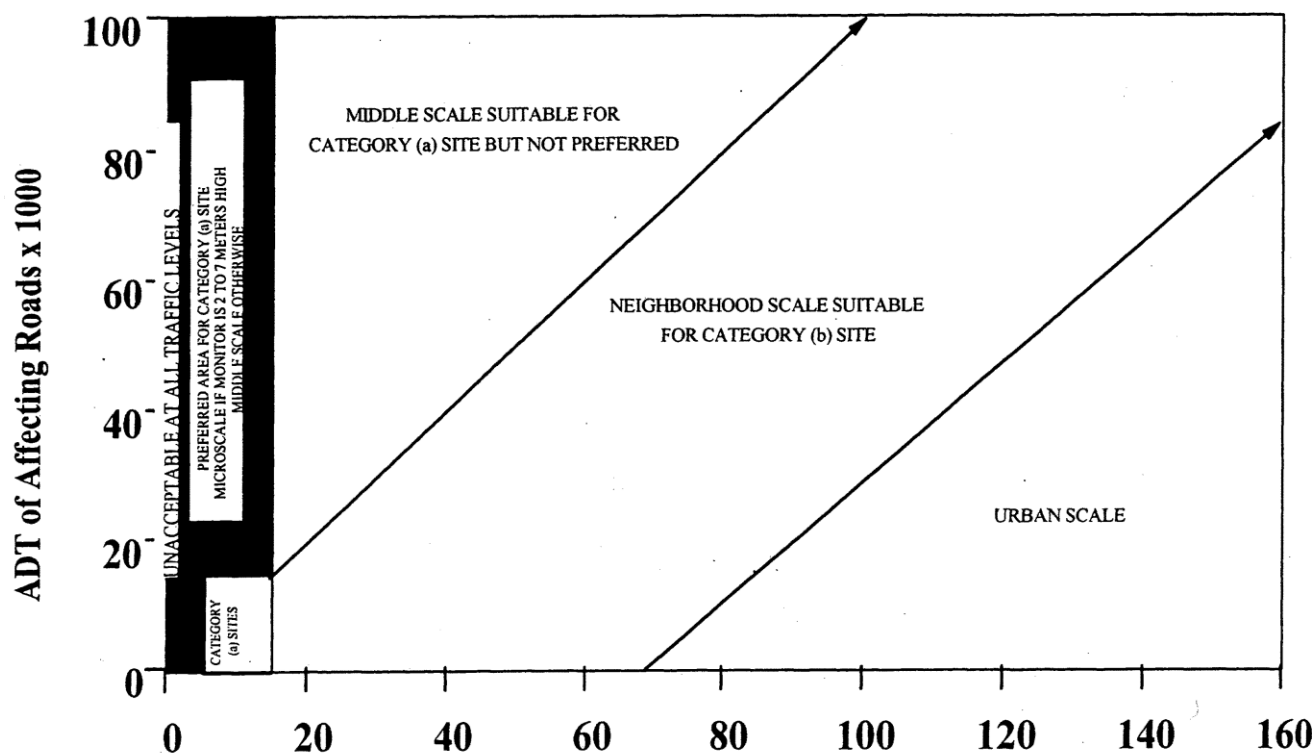


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 data logger and an Agilaire 8872 PC/Data logger. The 8832 data logger serves as the primary logger and is directly connected via analog input to the analyzer at the site. The data will be polled from the 8832 to the central server via a 4G cellular modem (Sierra Wireless RV50). The 8872 serves as a secondary, backup logger, and is used by the site operator to retrieve the electronic strip chart in local standard time. The 8872 will poll data from the 8832 locally over the COM port or over the local tcp/ip network if the COM route is not working (via a network switch). This site was previously supplied internet connectivity via a cabled connection (Comcast Business).

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. Aluminum _____
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

Write additional comments on the shelters below:

Shelter is in fair to good condition; some insulation is exposed underneath shelter, seams around roof need caulking _____

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

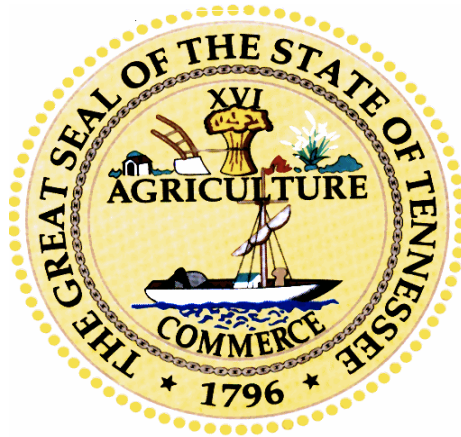
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: February 17, 2017

Location: Oak Ridge, TN

AQS Number: 47-001-0101

Site Name: Freel's Bend

Pollutants: O3, SO2

Project Leader: EMH

Print Name / Signature / Initials / Duties

1: Evelyn M. Haskin EMH Site evaluator

2: Justin E. Long JEL Site evaluator

3: Thomas E. Dalton TED Site evaluator

Air Monitoring Site Evaluation Summary

Local Site Name: Freel's Bend Initials: TED Date: February 17, 2017

Additional Comments:

Sunny, no clouds, 52 F. Electric service meter #115-623-3.5 with City of Oak Ridge. Site behind locked gate with DOE holding permission for entry. Distance to nearest traffic lane and measured by Google earth pro is 153 meters. Steps in need of being reseated or replaced.

MONITORING SITE EVALUATION FORM (MSEF) (Page 1/5):**Local Site Name:** Freel's Bend **Initials:** TED **Date:** February 17, 2017

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 9:00 am **Departure Time:** 11:45 am **Primary Operator:** Erin Sturgill**Observer(s):** Tom Dalton (TED) Jarrett Rudd (JLR)**SITE****[N]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [Y] Bare Soil Area****[N] Vandalism – [] Inside / [] Outside Date:** _____ **[NA] Police Report Filed****Issues:** None**SHELTER - Interior****Arrival Temperature:** 21.5 °C (from data logger) **Operator Site Visits:** 1 per [week]**[Y] Leaking Roof [Damaged: [] Ceiling / [] Floor / [] Walls [Y] Clean / Neat [N] Fire Extinguisher****[Y] Insect / Wildlife Issues [N] Thermometer (min/max) [N] Gasoline (inside shelter)****Issues:** Mice might be in the walls causing problems**MONITOR(s):****Location:** Exterior Samplers [**x** Roof / [] Ground / [] Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	100E	3628
O3	Teledyne	T400	2285

CALIBRATOR(s): [] Not Present**[Y] Are QA/QC Check Gases Vented Outside Shelter?**

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	703E	327	1-19-17	
QC	Teledyne	T700	489	12-30-16	6-30-17

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Freel's Bend Initials: TED Date: February 17, 2017

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits
(Not Required) (Required) (Required)

Issues: Per Erin Strugill 2-24-17

CYLINDER GAS STANDARDS: ☐ Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
QC	SO2	@ 2000 psig	1-16-18	30.6+0.3	FF17345

Issues: NA

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): Dasbi 5011

Cartridge System: ☐Silica Gel ☐Pink ☐Blue / X Charcoal / ☐Purafil / ☐Hopcalite / Other: Dri-rite

[N] Needs Service Last Service Date: 2-16-17 Condition: _____

Issues: _____

Probe Line(s): [X Replaced / ☐Cleaned] – Frequency: once a year Last Service Date: 2/16/ 2017

[Y] Clean [Y] Heated [N] Insulated [N] Moisture [N] Retractable [N] Old / Unused Lines

[NA] Lo Flo Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? 1 per analyzer

Issues: _____

SHELTER – Exterior ☐ Not Present

Type: ☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Sheet metal siding-mobile home type

[Y] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N] Roof Railing

Roof Access: [Stairs |Interior/Exterior| / Ladder |attached/removable| / X Not Present] [NA] Loose Decking (Trip Hazard)

Issues: Roof needs coating and area needs mice traps or other. Steps needs maintenance.

Height of Roof: 3 meters Roofing Material: Sheet metal

Issues: Roof needs coating

MSEF (Page 3/5): Local Site Name: Freel's Bend Initials: TED Date: February 17, 2017

OUTDOOR SAMPLERS

☒ Not Present

[NA] Locked [NA] Electrically Grounded [NA] Stabilized [NA] Clean Inside [NA] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): _____

COLLOCATED SAMPLERS: ☒ Not Present

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
N/A		

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [☒ Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)]

Funnel(s): [☒ Rain Shield / ☐ Part of Probe] Funnel Material: [☐ Teflon® / ☐ Glass / ☒ Stainless Steel / Other: _____]

Probe Line(s): [☒ Teflon® / Other: _____] Probe Fitting(s): [☐ Teflon® / ☒ Other: Stainless Steel / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

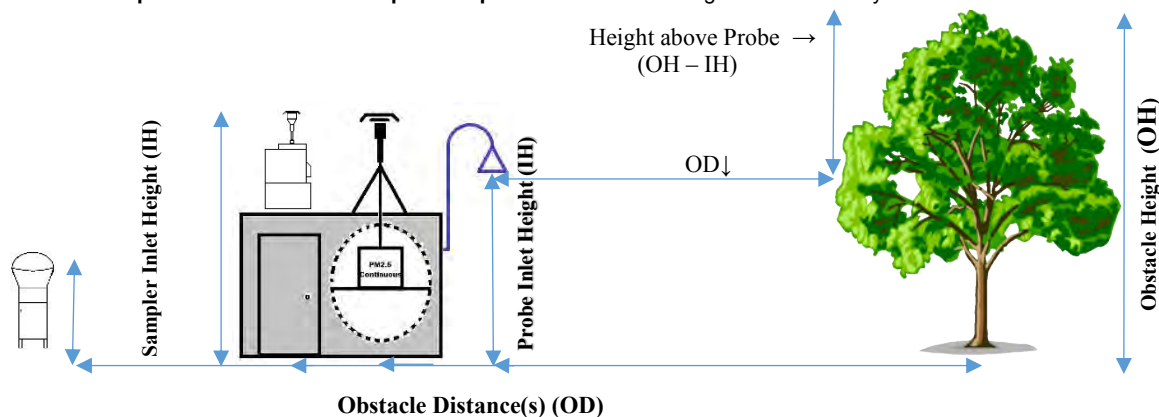
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
SO ₂	4.0	Side of shelter	>1	N/A	Urban	Urban
O ₃	4.0	Side of shelter	>1	N/A	Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2*(OH-IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)
N/A				

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**

(39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

_____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: None

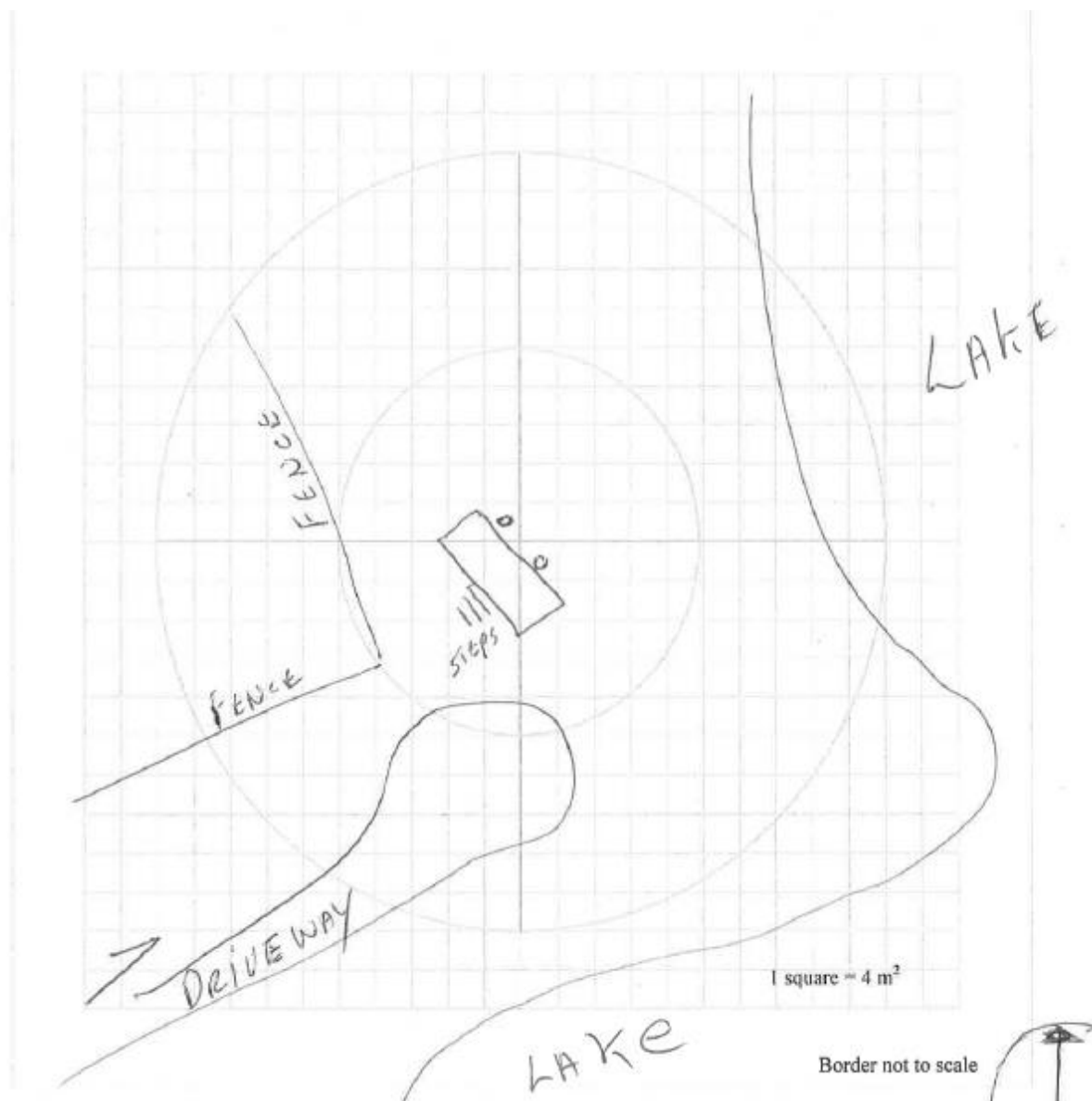
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

All trees and scrubs that posed a problem have been cut down.

No obstructions.

Closest tree to inlet math: $[6.6 \text{ meter tall} - 4.0 \text{ inlet height} = 2.6 \text{ meter}] * 2 = 5.2 \text{ meter}$ distance of tree is 15.1 meter and 15.1 meter is greater than 5.2 so this tree is not an obstacle.

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Freel's Bend Initials: TED Date: February 17, 2017

Camera [☐ APC / X Personal – Owner: _____] Make/Model: _____

Filename: __001__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __001 - North toward shelter__

Filename: __002__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __002 - North away from shelter (north directional)__

Filename: __003__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __003 - East toward shelter__

Filename: __004__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __004 - East away from shelter (east directional)__

Filename: __005__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __005 - South toward shelter__

Filename: __006__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __006 – South away from shelter (south directional)__

Filename: __007__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __007 - West toward shelter__

Filename: __008__ Date: __2-17-17__ Time: __11:00 am__ Photographer: __TED__

Description: __West away from monitor (west directional)__

Filename: _____ Date: _____ Time: _____ Photographer: _____

Description: _____

001 - North toward shelter



002 - North away from shelter (north directional)



003 - East toward shelter



004 - East away from shelter (east directional)



005 - South away from shelter (south directional)



006 - South toward shelter



007 - West toward shelter



008 - West away from monitor (west directional)



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

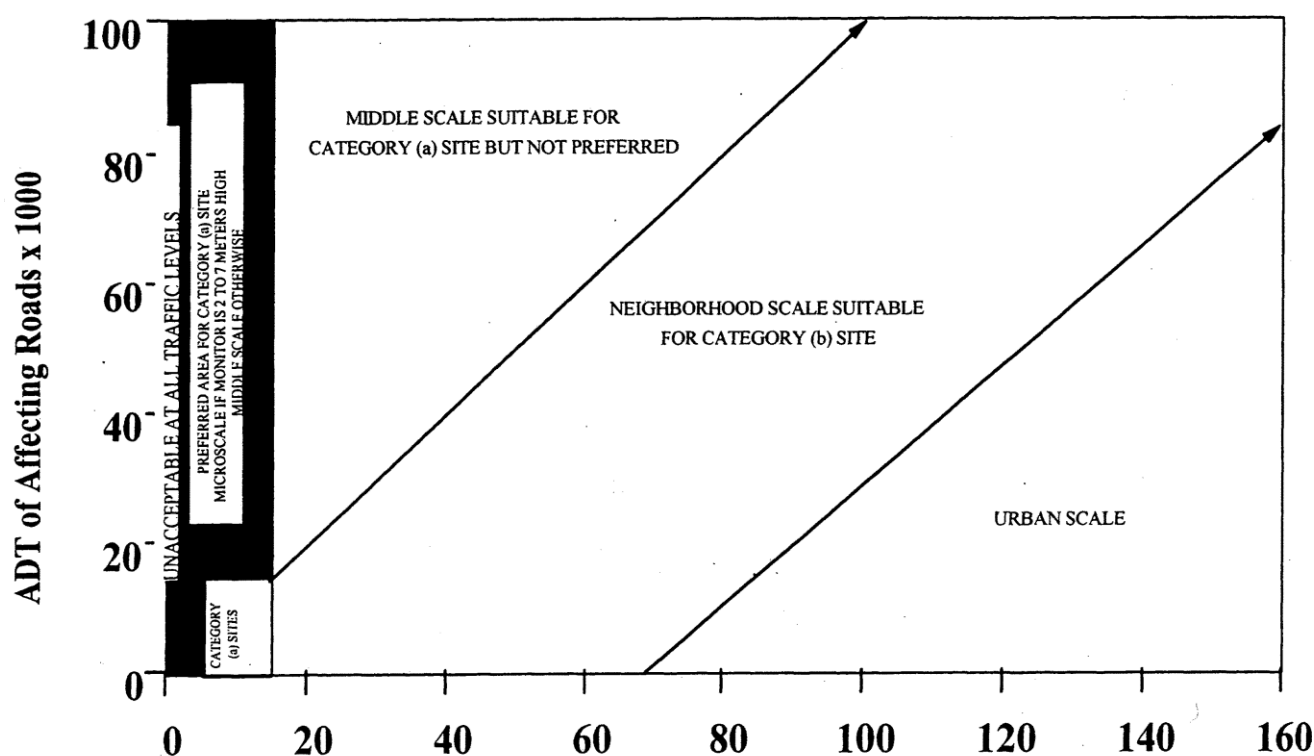


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 data logger and an Agilaire 8872 PC/Data logger. The 8832 data logger serves as the primary logger and is directly connected via analog input to the analyzers at the site. The data is polled from the 8832 logger to the central server via a 4G cellular modem (Sierra Wireless RV50). The 8872 serves as a secondary, backup logger, and is used by the site operator to retrieve the electronic strip chart in local standard time. The 8872 polls data from the 8832 locally over the COM port or over the local tcp/ip network if the COM route is not working (via a network switch).

RECORDS – at site

Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. Aluminum sheet metal
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

With roof top samplers or inlets – is a roof railing present? N (May not be required in accordance with local ordinances)

Roof Access: Stairs or Ladder? N

Stairs can be inside or outside – Ladders are usually permanently attached or removable? N

Write additional comments on the shelters below:

Cleaning outside and paint roof, repair steps

Mice inside walls, roof rusted and needs repainting, insulation exposed, steps need reseating or replacing

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

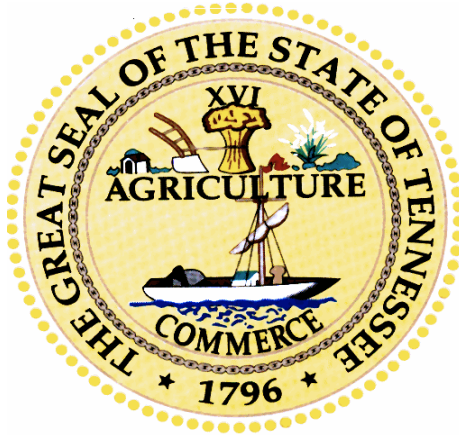
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: March 9, 2017
AQS Number: 47-145-0004

Location: Harriman, TN

Site Name: Harriman
Project Leader: EMH

Pollutants: PM_{2.5}

Print Name / Signature / Initials / Duties

1: Thomas E. Dalton _____ TED _____ Site Evaluator

2: Justin E. Long _____ JEL _____ Site Evaluator

3: Evelyn Haskin _____ EMH _____ Site Evaluator

Air Monitoring Site Evaluation Summary

Local Site Name: Harriman **Initials:** TED **Date:** March 9, 2017

Additional Comments:

Closest road is Emory Dr. - 78 meters Northeast of site

MONITORING SITE EVALUATION FORM (MSEF) (Page 1/5)**Local Site Name:** Harriman **Initials:** TED **Date:** March 9, 2017

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 11:00 am **Departure Time:** 12:00 pm **Primary Operator:** Tom Dalton**Observer(s):** Tom Dalton**SITE****[Y]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [N] Bare Soil Area****[N] Vandalism – [□Inside / □Outside] Date: N/A [N] Police Report Filed****Issues:** None**SHELTER - Interior****Arrival Temperature:** N/A °C (from data logger) **Operator Site Visits:** 1-2 per [week]**[NA] Leaking Roof [Damaged: □Ceiling / □Floor / □Walls] [Y] Clean / Neat [N] Fire Extinguisher****[Y] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline (inside shelter)****Issues:** Wasps**MONITOR(s):** **Location:** Exterior Samplers [☐Roof / ☒Ground / ☐Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM 2.5	Met One	BAM 1022	T21583
PM 2.5	R & P	2025	20980
PM 2.5 TEOM	R & P	1400a	25085

CALIBRATOR(s): ☒ Not Present **[NA] Are QA/QC Check Gases Vented Outside Shelter?**

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
N/A					

Is any analyzer sampling shelter air through its calibration line? [N/A] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Harriman Initials: TED Date: March 9, 2017

All Gas Standards Pass thru all Filters during: [N/A] Calibrations [N/A] Precision Checks [N/A] Audits

Issues: None

CYLINDER GAS STANDARDS: **X** Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
N/A					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / ☒ Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] **Any Open Ports?** -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Harriman Initials: TED Date: March 9, 2017

SHELTER – Exterior **X Not Present**

Type: [☐ Freezer / ☐ Wood Building / ☐ Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [N/A] Roof Railing

Roof Access: [Stairs |Interior/Exterior| / Ladder |attached/removable| / **X Not Present**] [N] Loose Decking (Trip Hazard)

Issues: None

Height of Roof: N/A meters Roofing Material: N/A

Issues: N/A

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: Every 4-5 runs PM₁₀ Head Clean Schedule: monthly

Issue(s): N/A

COLLOCATED SAMPLERS: **x Not Present** (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External **X Not Present**

Inlet Type: [☐ Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)]

Funnel(s): [☐ Rain Shield / ☐ Part of Probe] Funnel Material: [☐ Teflon[®] / ☐ Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☐ Teflon[®] / Other: _____] Probe Fitting(s): [☐ Teflon[®] / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

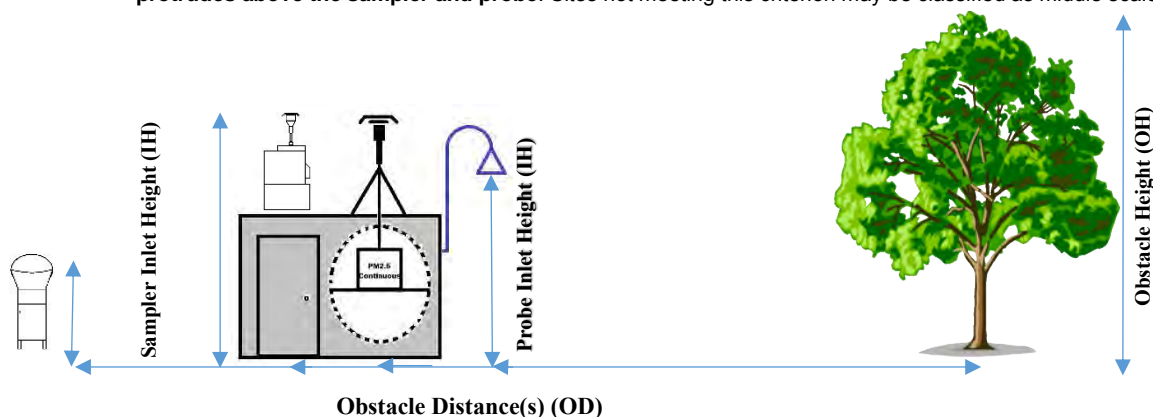
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM	2.5	Ground			Urban	Unknown
PM	2.5	Ground			Urban	Unknown
PM	2.5	Ground			Urban	Unknown

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2*(OH-IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)
N/A				

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: None

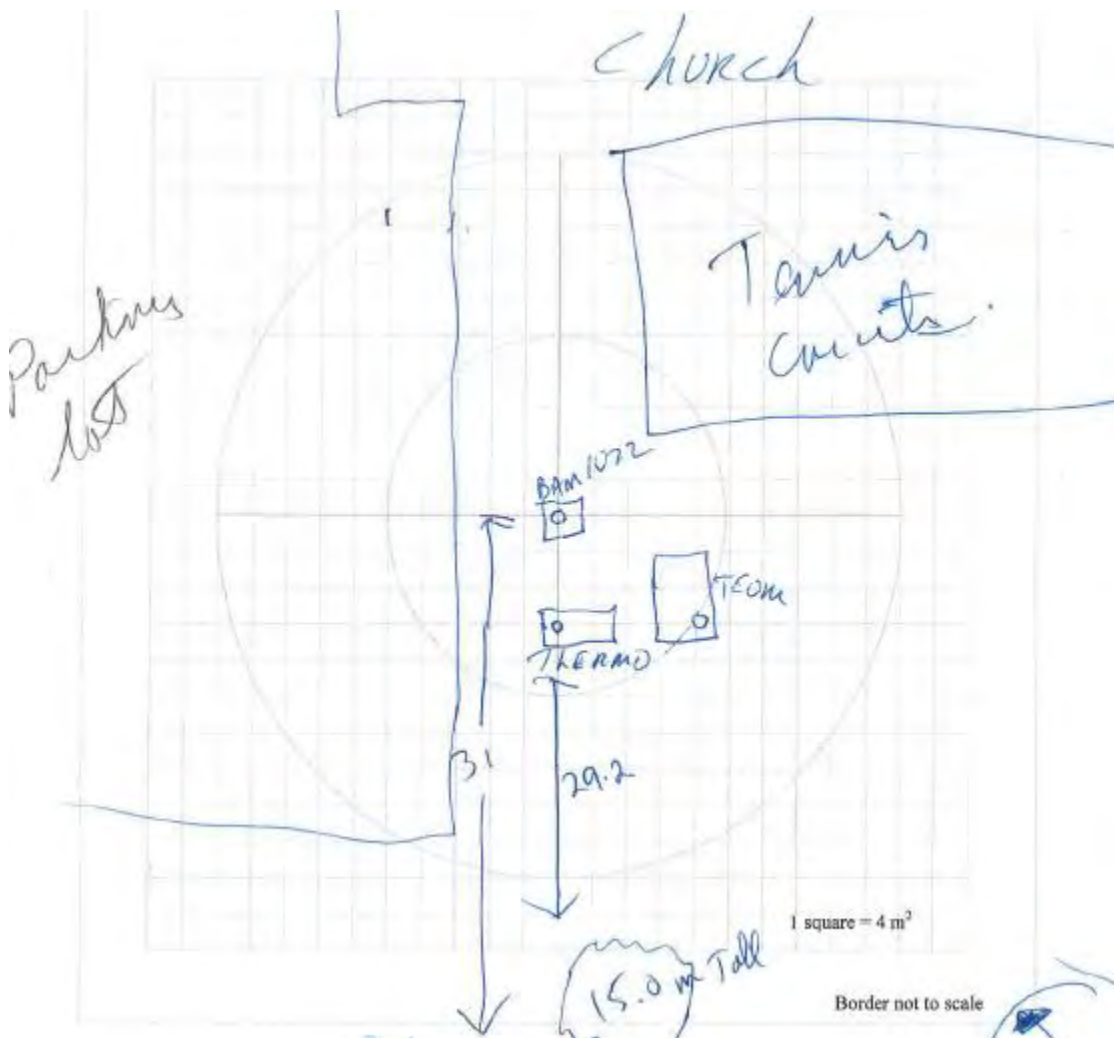
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: 360 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Aerial Photo with Wind Rose



PHOTO LOG: **Local Site Name:** Harriman **Initials:** TED **Date:** March 9, 2017

Camera [☐ APC / ☐ Personal – **Owner:** _____] **Make/Model:** _____

Filename: 001 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: North from monitor (North directional)

Filename: 002 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: North toward monitor

Filename: 003 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: South from monitor (South directional)

Filename: 004 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: South toward monitor

Filename: 005 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: East from monitor (East directional)

Filename: 006 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: East toward monitor

Filename: 007 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: West from monitor (West directional)

Filename: 008 **Date:** 3-9-17 **Time:** 11:00 am **Photographer:** TED

Description: West toward monitor

001 – North from monitor (North directional)



002 – North toward monitor



003 – South from monitor (South directional)



004 – South toward monitor



005 – East from monitor (East directional)



006 – East toward monitor



007 – West from monitor (West directional)



008 – West toward monitor



CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

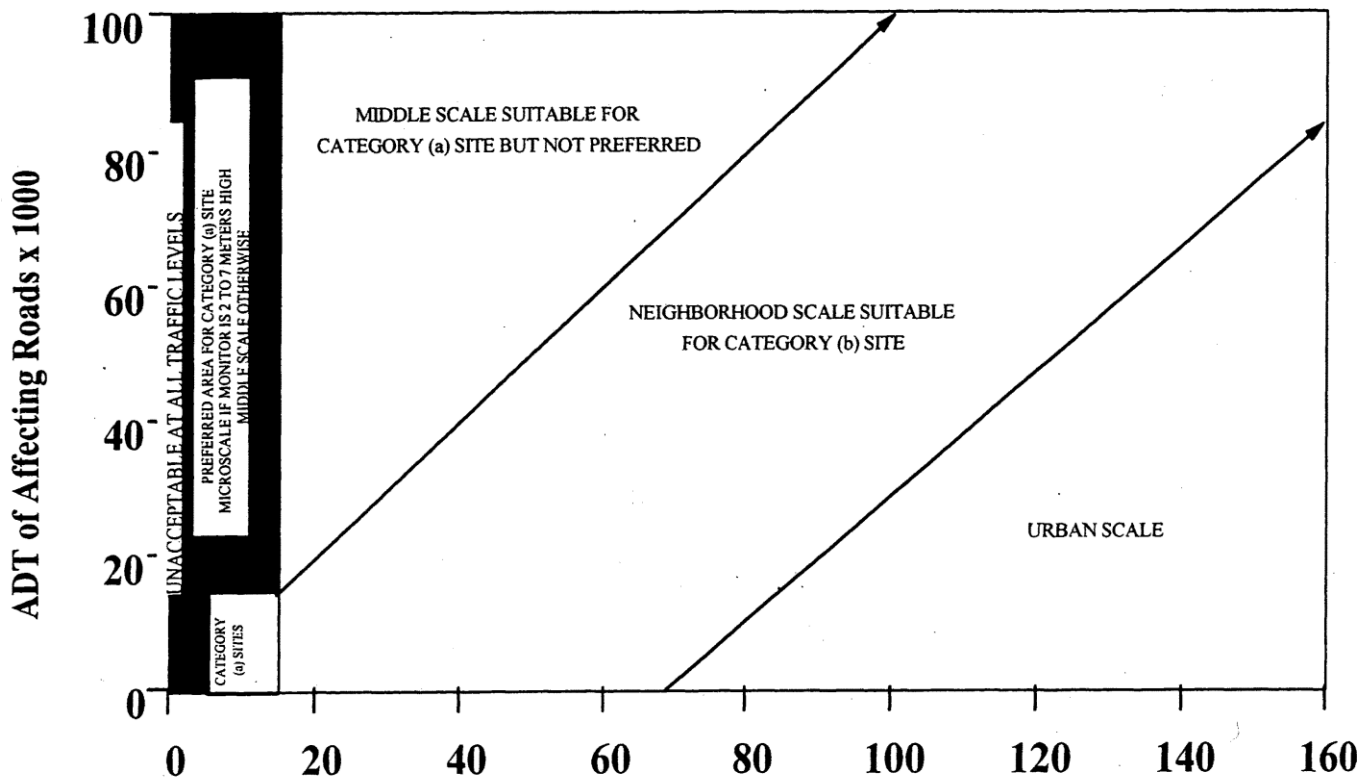


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of 1/4" OD tubing at given flow rate - using a 20 second residence time. The ID's shown are for thick (1/8"), intermediate (5/32") and thin (3/16") wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the BAM 1022 and to the 8832 data logger
via a network switch.

A US Robotics dial-up modem is used to send the ancillary data from the 2025 to the central office staff.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. _____
3. _____
4. Platforms (wood) _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? N

With roof top samplers or inlets – is a roof railing present? N/A (May not be required in accordance with local ordinances)

Roof Access: Stairs or Ladder? N/A

Stairs can be inside or outside – Ladders are usually permanently attached or removable? N/A

Write additional comments on the shelters below:

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and may be specified in agency QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites eating shelter? Ants eating operator? Wasps/Bees attacking auditor? / Larger wildlife making shelter its home

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

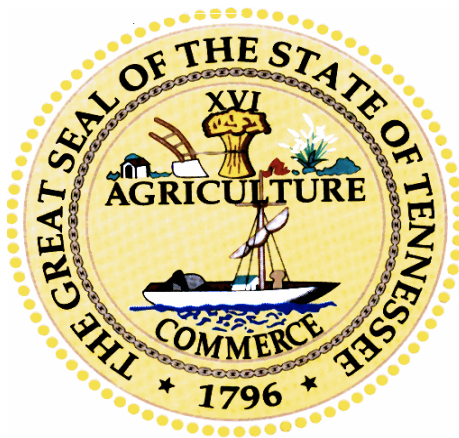
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/3/17

Location: Hendersonville, TN

AQS Number: 47-165-0007

Site Name: Hendersonville

Pollutants: O3/PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Hendersonville Initials: EMH Date: 2/3/17

Additional Comments:

Sunny 39 ° F

Site located inside Corp of Engineers fence

Ozone season starts March 1. Calibrator was taken back to field office for beginning of the year calibration.

Probe line will be replaced in Feb. prior to the beginning of ozone season.

Site was set up for 2017 O3 season on 2/14/17

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Hendersonville Initials: EMH Date: 2/3/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present [Y/N] Completed

Arrival Time: 2:00pm Departure Time: 3:20 pm Primary Operator: Alysaa Ferraro

Observer(s): _____

SITE

[Y]-Security Fence [Y]-Razor/Barb Wire [Y] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [Y/N] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: 23.24 °C (from data logger) Operator Site Visits: 1-2 per [week]

[Y] Leaking Roof [Damaged: ☒ Ceiling / ☐ Floor / ☐ Walls] [N] Clean / Neat [N] Fire Extinguisher

[Y] Insect / Wildlife Issues [Y] Thermometer (min/max) [Y] Gasoline (inside shelter)

Issues: Evidence of past leaks , Damage of insulation underneath shelter

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5} TEOM	R & P	1400a	K58537
Ozone	Thermo	49c	73470-373
PM _{2.5} (Poc 1)	Thermo	2025	22516
PM _{2.5} (Poc 2)	Thermo	2025	21906
PM _{2.5} BAM	Met one	BAM 1022	T17005

CALIBRATOR(s): ☒ Not Present

[Y/N] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	332		

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Hendersonville Initials: EMH Date: 2/3/17

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits
(Not Required) (Required) (Required)

Issues: _____

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y/N] Temperature Sensor [Y/N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / x Charcoal / ☐Purafil / ☐Hopcalite / Other: Dri-rite]

[Y/N] Needs Service Last Service Date: _____ Condition: _____

Issues: _____

Probe Line(s): [x Replaced / ☐Cleaned] – Frequency: 1 per year Last Service Date: 2/14/17

[Y/N] Clean [Y/] Heated [N] Insulated [Y/N] Moisture [N] Retractable [N] Old / Unused Lines [N] Lo Flo

Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? _____

Issues: Probe line will be replaced prior to the beginning of 2017 ozone season

MSEF (Page 3/5): Local Site Name: Hendersonville Initials: EMH Date: 2/3/17

SHELTER – Exterior ☐ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Aluminum]

[Y/N] Needs Maintenance (specify) [Y/N] Tied Down [Y/N] Electrically Grounded [Y/N] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / ☐ Not Present] [Y/N] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: 3.2 meters Roofing Material: Aluminum

Issues: Rust spots on roof

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y/] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS changed once every 5 runs : VSCC monthly

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
PM _{2.5}	Lo	1.6
PM _{2.5}	Lo	1.6

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at least **1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [☒Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☒Rain Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☒Stainless Steel / Other: _____]

Probe Line(s): [☒Teflon® / Other: _____] Probe Fitting(s): [☒Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

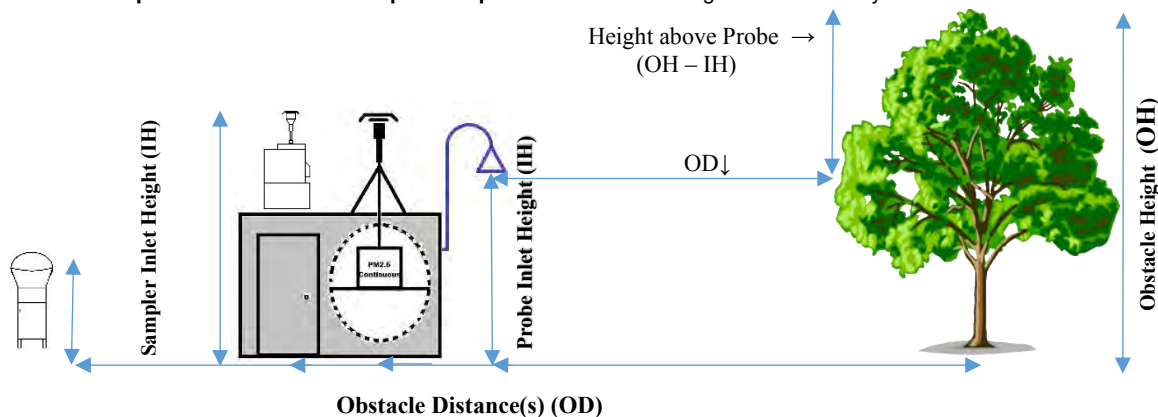
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
O ₃	4.3	Side of shelter		1.8	Urban	Neighborhood
PM _{2.5} TEOM	5.0	Roof		1.8		
PM _{2.5} 2025	2	Ground		1.6	Urban	Neighborhood
PM _{2.5} 2025	2	Ground		1.6	Urban	Neighborhood
PM _{2.5} BAM	2.3	Ground		1.4	Urban	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2*(OH-IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**

(39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

_____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines or obstacles

Minor Sources:

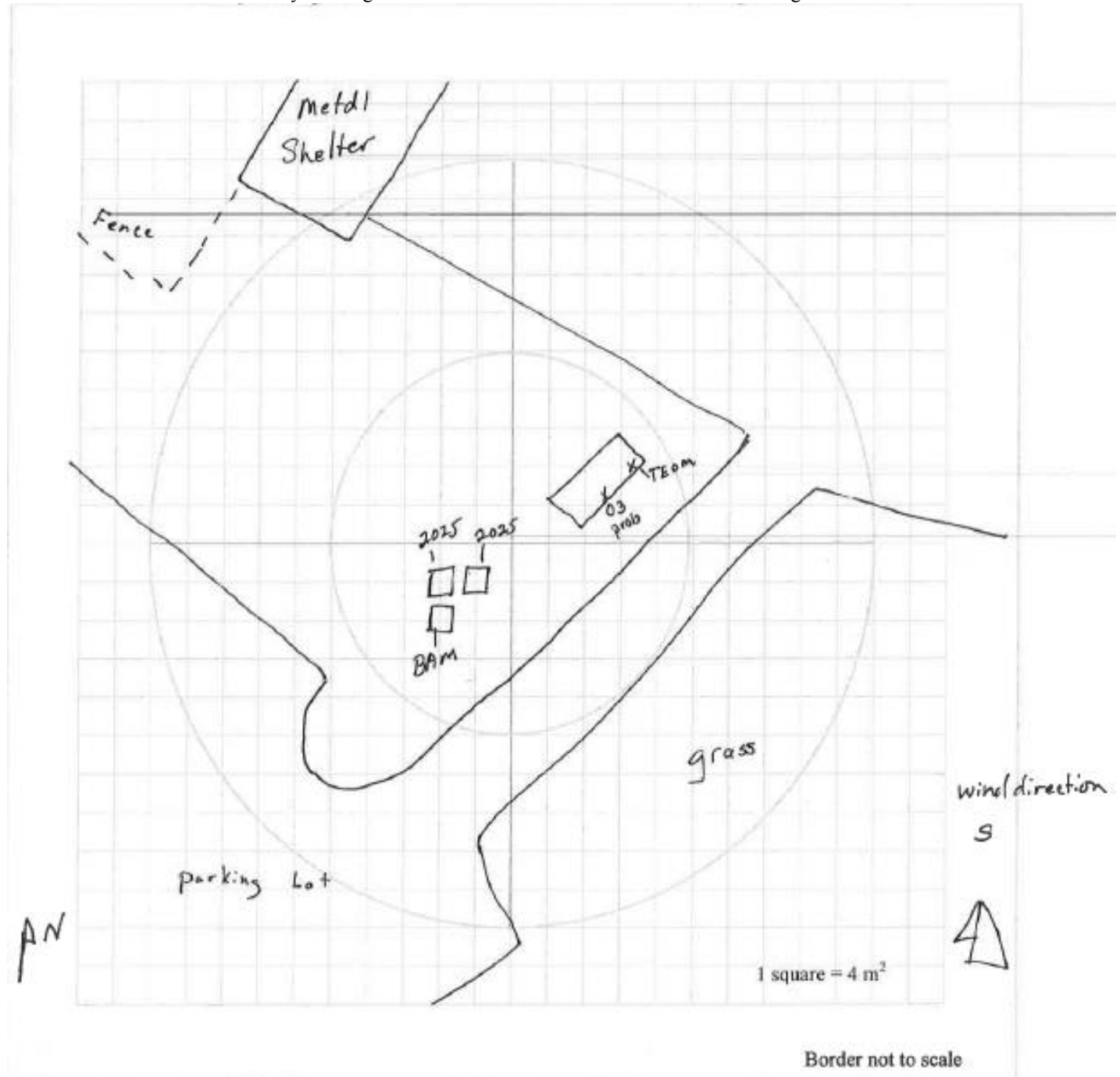
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Hendersonville Initials: EMH Date: 2/3/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Distance to closest road (Overlook Circle) – 67.9 m (Measured using Google Earth Pro)

Aerial Photo with Wind Rose

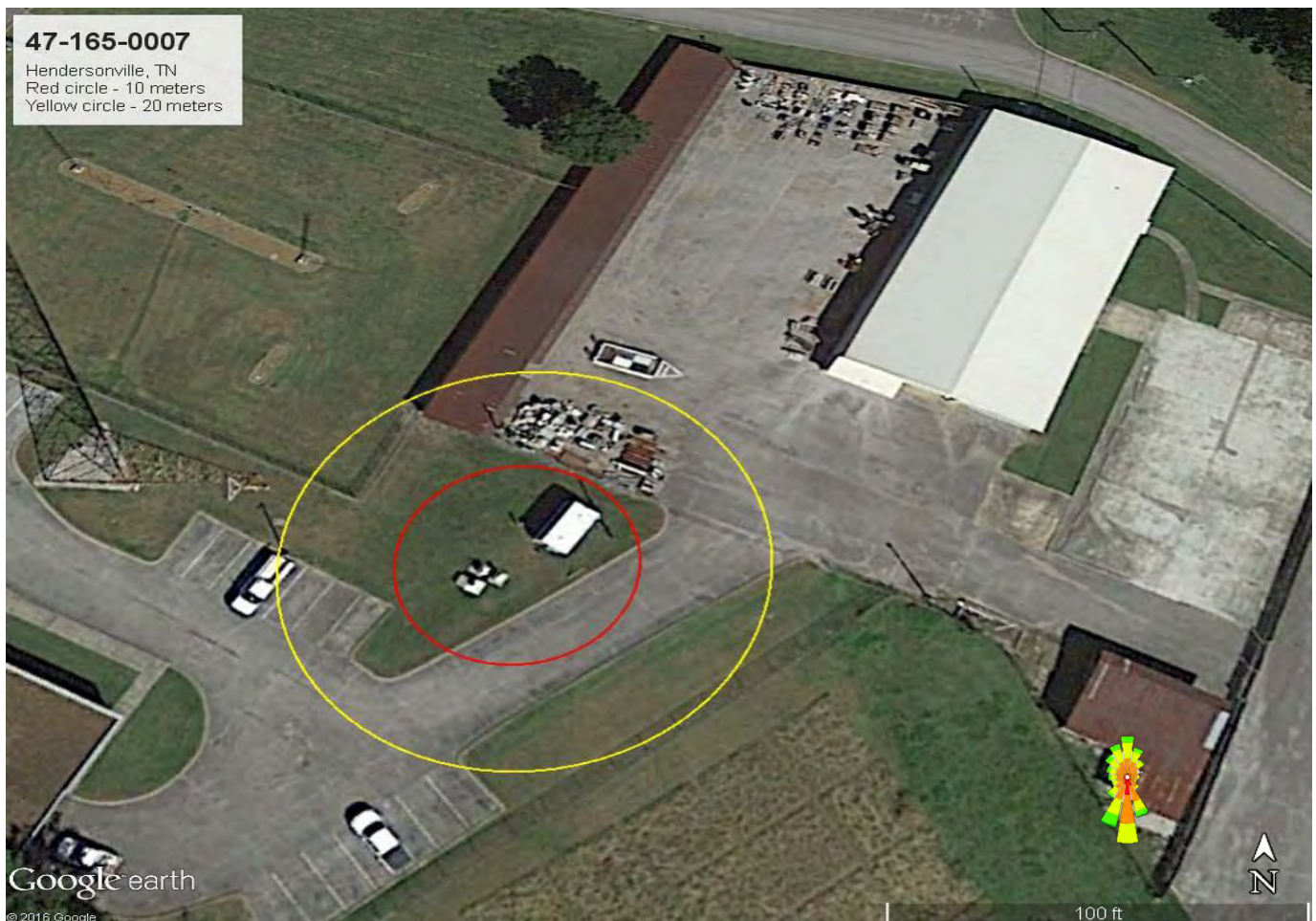


PHOTO LOG: Local Site Name: Hendersonville **Initials:** EMH **Date:** 2/3/17

Camera ☒ **APC** / ☐ **Personal – Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: Site view from west direction

Filename: 02 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: Site view from south direction

Filename: 03 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: View East of site (E directional)

Filename: 11 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: Steps to shelter are warped and split; need repair in near future

Filename: 12 **Date:** 2/3/17 **Time:** 3:00 pm **Photographer:** EMH

Description: Insulation underneath shelter exposed

PHOTO LOG: Local Site Name: Hendersonville Initials: EMH Date: 2/3/17

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Nikon Coolpix

Filename: 13 Date: 2/3/17 Time: 3:00 pm Photographer: EMH

Description: Rust on roof

Hendersonville: Photo Log (2017)

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40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

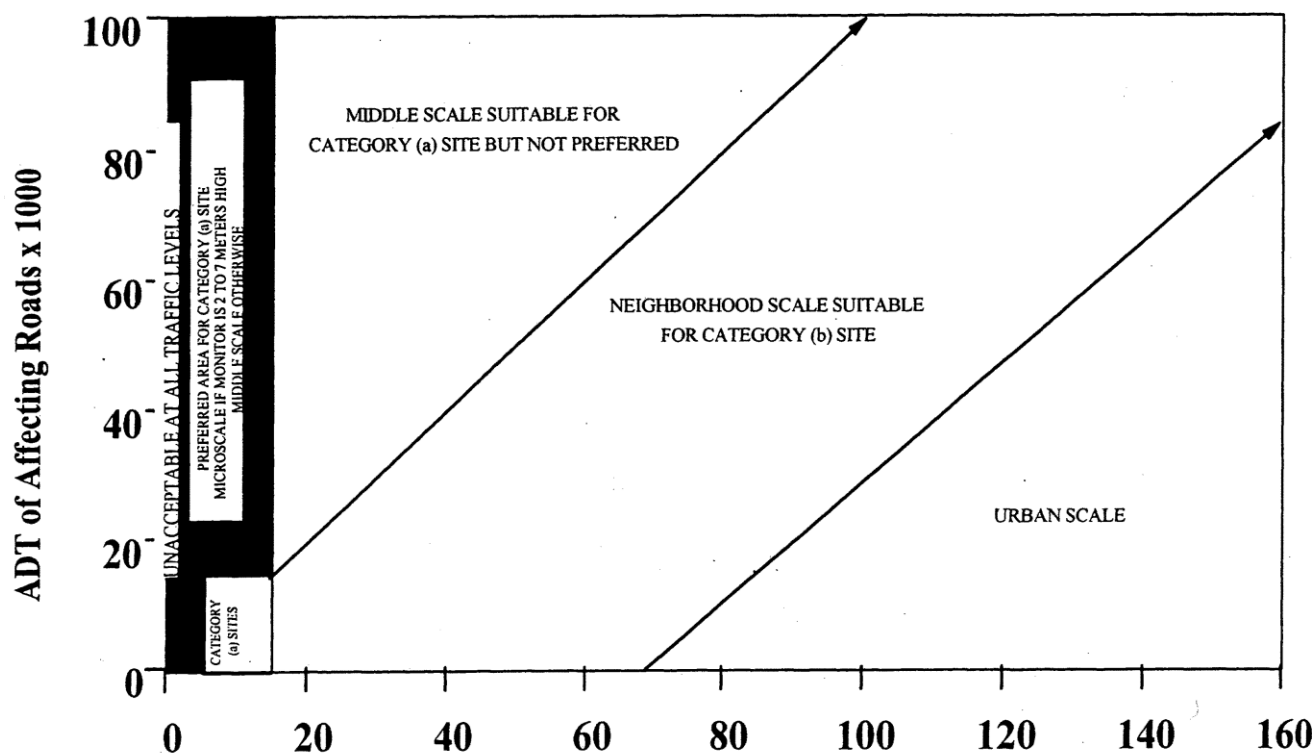


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

SUPPORTING INSTRUMENTATION

Temperature Sensor: the shelter must have a temperature sensor inside connected to the data logger. The sensor is not directly required in the regulation, but is needed to demonstrate the operational conditions of the analyzer meet the FRM/FEM requirements.

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Zero Air System:

For a Commercial System: give the make and model

For a home built Cartridge System: identify the cartridges present, if any need service, date of last service, and condition of system. Identify any issues with either system.

Data Logger: Identify system at site

Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?

Does the operator know what it means?

Is the time-scale of the strip chart accurate with the actual or standard time?

Probe Lines:

Frequency – how often are they cleaned or serviced, ask operator or check the logbook for the last service date.

Was any dirt and contamination observed in the probe lines, including condensation? Y / N

Are the probe lines heated and insulated? Y / N

Are the probe lines retractable – a retractable line is a single line system which can be “retracted” inside the shelter from its sampling position? Y / N

Comment and identify on any issues about the probe lines or attached additional sheets.

Probe lines are heated but not insulated.

RECORDS – at site

Documents available (QAPPs, SOPs)?

SOP

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes The logbooks are for each monitor located at site.

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** Y

What are the shelter(s) made of?

1. _____
2. Aluminum_____
3. _____
4. Platforms - wood_____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

Write additional comments on the shelters below:

Countertop in shelter needs to be cleaned; evidence of ceiling leaking in past, roof is has rust spots and seams around roof need caulking; steps outside shelter will need one or two of the boards replaced in near future, insulation underneath shelter is exposed

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

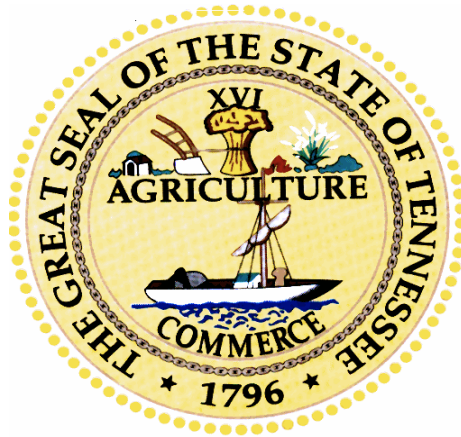
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/16/17

Location: Jackson, TN

AQS Number: 47-113-0006

Site Name: Jackson

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Jackson **Initials:** EMH **Date:** 2/16/17
Additional Comments:

Sunny, 48 °F

Electric : Jackson Energy Authority Meter # 2114113

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Jackson Initials: EMH Date: 2/16/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 11:30 am Departure Time: 12:40 pm Primary Operator: David Norville

Observer(s): _____

SITE

[Y]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [N] Bare Soil Area

[N] Vandalism – [☐ Inside / ☐ Outside] Date: _____ [NA] Police Report Filed

Issues: Site is completely enclosed in by chain link fencing because area is due to vandalism problems

SHELTER – Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1 per [week]

[N] Leaking Roof [Damaged: NA] [Y] Clean / Neat [N] Fire Extinguisher

[N] Insect / Wildlife Issues [N] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: None

MONITOR(s):

Location: Exterior Samplers [☐ Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5} (Poc 1)	Thermo	2025	22165
PM _{2.5} (Poc 2)	R & P	2025	20786
PM _{2.5} TEOM	R & P	1400a	25175

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date

Is any analyzer sampling shelter air through its calibration line? [Y/N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Jackson Initials: EMH Date: 2/16/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations [NA] Precision Checks [NA] Audits
(Not Required) (Required) (Required)

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR:

(PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[NA] Temperature Sensor [NA] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): NA

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / ☐x Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Jackson Initials: EMH Date: 2/16/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: NA]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs ☐Interior/Exterior] / Ladder ☐attached/removable] / ☐ Not Present [NA] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: _____ meters Roofing Material: _____

Issues: _____

OUTDOOR SAMPLERS

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS changed once every 5 runs : VSCC cleaned monthly

COLLOCATED SAMPLERS: ☐ Not Present

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
PM _{2.5}	Lo	1.3 m
PM _{2.5}	Lo	1.3 m

*Collocated monitors must be within 4 meters of each other and at least 2 meters apart for flow rates greater than 200 liters/min or at least 1 meter apart for samplers having flow rates less than 200 liters/min to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): Not Present

Inlet Type: [NA]

Funnel(s): NA Funnel Material: NA

Probe Line(s): NA Probe Fitting(s): NA

Residence Time: NA

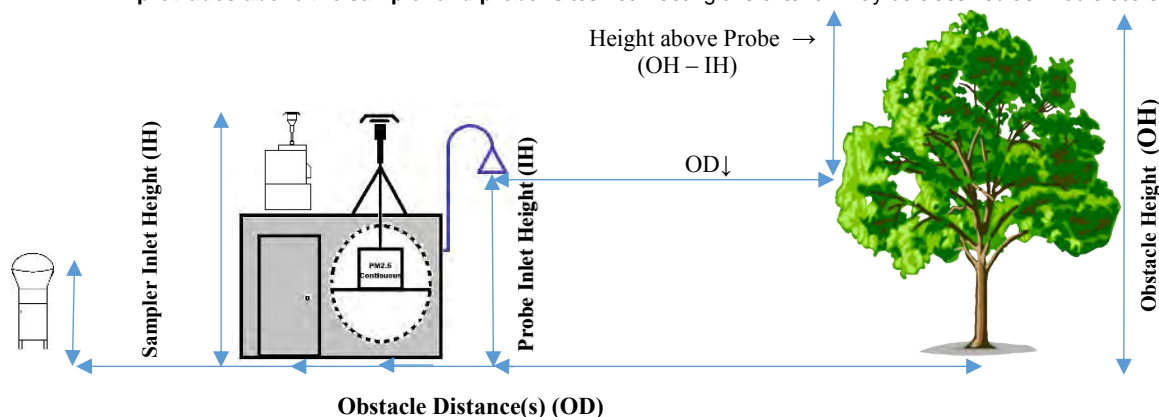
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5}	2.6	Ground	1.3 to 2.6		Neighborhood	Neighborhood
PM _{2.5}	2.5	Ground	1.3 to 2.6		Neighborhood	Neighborhood
PM _{2.5}	2.5	Ground	1.3 to 2.6		Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)
Tree (1)	18.6	2.5	32.2	24.6
Tree (2)	15.6	2.5	26.2	26.0
Tree (7)	17.6	2.6	30.0	29.4
Tree (8)	21.8	2.6	38.4	29.8

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: A siting waiver was received for this site.

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH

Primary Wind Dir

Security Issues

Sloping Areas

Monitoring Shelter

Probe Position(s)

Exterior Samplers

Met Tower

Security Fencing

Nearby Trees/Shrubs

Roadways

Buildings

Walls

Other Obstructions

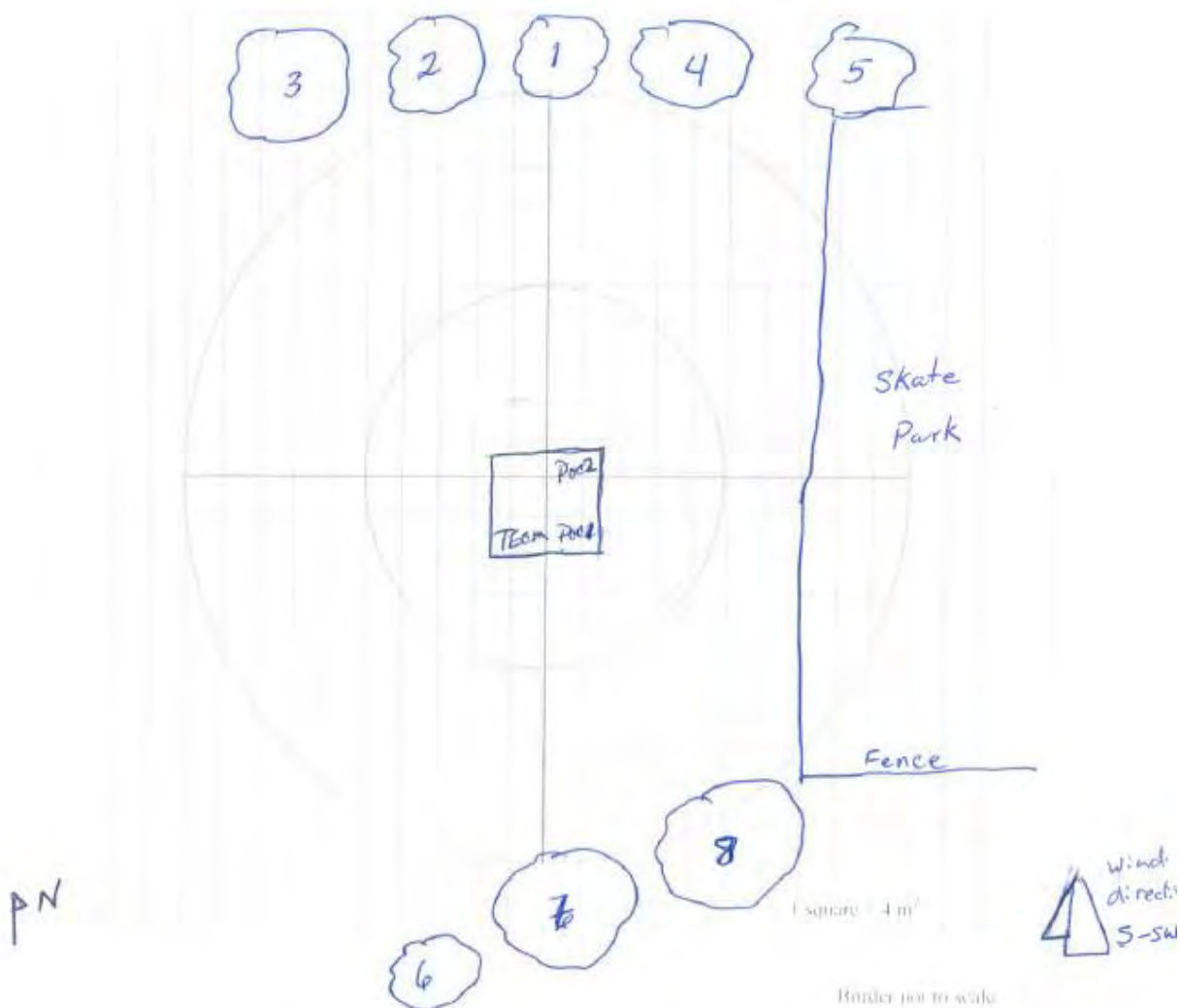
Possible Sources

Paved / Unpaved Areas

Nearby Construction

Flues, Vents, Boilers

Meat Cooking

UNRESTRICTED AIR FLOW: 235 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Distance to closest road (North Parkway) – 225.8 meters

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Jackson **Initials:** EMH **Date:** 2/16/17

Camera ☒ **APC** / ☐ **Personal – Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/16/17 **Time:** 12:25 pm **Photographer:** EMH

Description: View of site (taken from North)

Filename: 02 **Date:** 2/6/17 **Time:** 12:25 pm **Photographer:** EMH

Description: View of site (taken from NW)

Filename: 03 **Date:** 2/6/17 **Time:** 12:25 pm **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 2/6/17 **Time:** 12:25 pm **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 2/6/17 **Time:** 12:25 pm **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 2/16/17 **Time:** 12:25 pm **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 2/16/17 **Time:** 12:25 pm **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 2/16/17 **Time:** 12:25 pm **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 2/16/17 **Time:** 12:25 pm **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 2/16/17 **Time:** 12:25 pm **Photographer:** EMH

Description: View East of site (E directional)

001



002



003



004



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006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

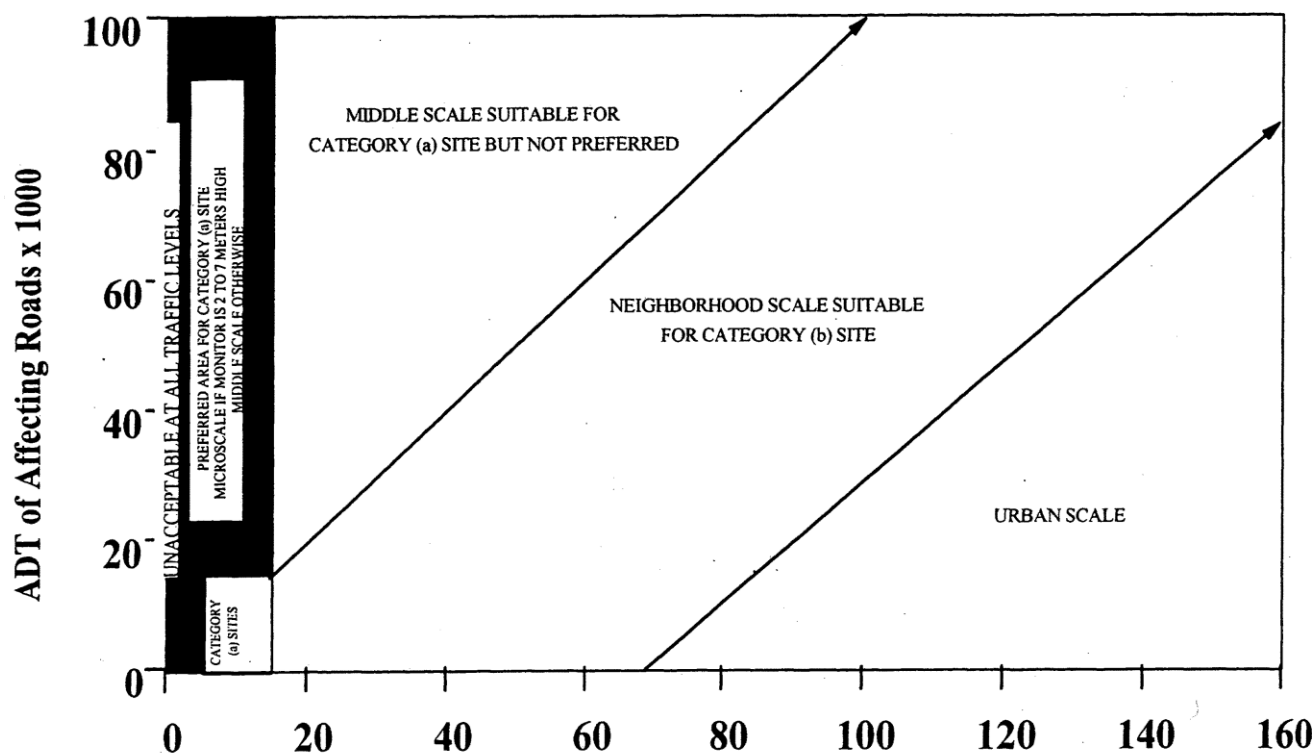


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A ESC 8832 data logger collects data from the TEOM only via an analog connection.

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the 8832 data logger.

Two US Robotics dial-up modems provide communications to each of the 2025s.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** Y
2. **Trailer:** N
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. TEOM enclosure
2. _____
3. _____
4. Monitor platforms - wood

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y / N

Write additional comments on the shelters below:

Platforms are in fair condition. Breaker box, outlets, and plugs are in good condition

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

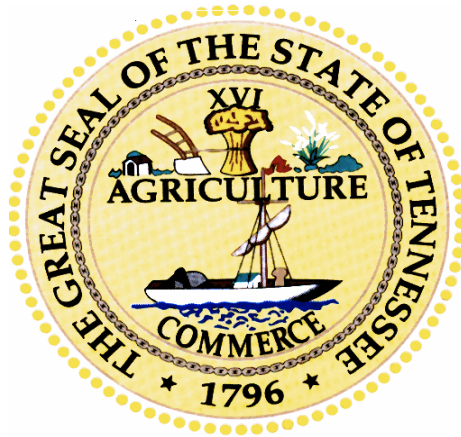
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: February 21, 2017

Location: Kingsport, TN

AQS Number: 47-163-2003

Site Name: Kingsport O3

Pollutants: O3

Project Leader: EMH

Print Name / Signature / Initials / Duties

1: Evelyn M. Haskin _____ EMH, Team 3 lead _____

2: Thomas E. Dalton _____ TED Site evaluator _____

3: Justin E. Long _____ JEL Site evaluator _____

Air Monitoring Site Evaluation Summary

Local Site Name: Kingsport O3 **Initials:** TED **Date:** February 21, 2017

Additional Comments:

Electric meter:#190 087 204

The distance from the inlet to the nearest road is 40.9 meters with the road name being Ketron Dr. -

The property is owned by Sullivan County School Board with the property data being Map 014N 014N J 04900
000014N.

Photos are stored on the State computer Tag #M45936 at C: Local Disk C: Files: 2016-17: monitor audits: Kingsport O3.

Back up ozone analyzer: API 400A SN 546

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Kingsport O3 Initials: TED Date: February 21, 2017

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present [Y] Completed

Arrival Time: 11:20 am Departure Time: 12:40 pm Primary Operator: Preston K. Pierce

Observer(s): Preston Pierce

SITE

[N]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [Y] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: N/A [NA] Police Report Filed

Issues: N/A

SHELTER - Interior

Arrival Temperature: 21.57 °C (from data logger) Operator Site Visits: once per [week | month | four per month]

[N] Leaking Roof [Damaged: none] [Y] Clean / Neat [N] Fire Extinguisher

[N] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline

Issues: Steps are in need of being set back into the original spot.

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☐Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2278

CALIBRATOR(s): T703 ; Are QA/QC Check Gases Vented Outside Shelter? Yes

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	703	328	1-19-17	

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Kingsport O3 Initials: TED Date: February 21, 2017

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits
(Not Required) (Required) (Required)

Issues: None

CYLINDER GAS STANDARDS: X Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
N/A					

Issues: None

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: ☐Silica Gel ☐Pink / ☐Blue / X Charcoal / ☐Purafil / ☐Hopcalite / Other: Dri-rite

[N] Needs Service Last Service Date: 2-15-17 Condition: Good

Issues: None

Probe Line(s): [X Replaced / ☐Cleaned] – Frequency: 1-year Last Service Date: 02-15-17

[Y] Clean [Y] Heated [N] Insulated [N] Moisture [N] Retractable [N] Old / Unused Lines

[N] Lo Flo Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? one

Issues: None

MSEF (Page 3/5): Local Site Name: Kingsport O3 Initials: TED Date: February 21, 2017

SHELTER – Exterior

Type: ☐ Freezer / ☐ Wood Building / ☐ Brick-Block / Other: Metal Sided

[Y] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N] Roof Railing

Roof Access: [Stairs Interior/Exterior] / Ladder [attached/removable] / **X Not Present** [N] Loose Decking (Trip Hazard)

Issues: Mold needs to be removed and entry steps reset.

Height of Roof: 3.2 meters Roofing Material: aluminum

Issues: None

OUTDOOR SAMPLERS **X Not Present**

[NA] Locked [NA] Electrically Grounded [NA] Stabilized [NA] Clean Inside [NA] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: NA PM₁₀ Head Clean Schedule: NA

Issue(s): NA

COLLOCATED SAMPLERS: ☐ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
N/A		

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [**X** Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)]

Funnel(s): [**X** Rain Shield / ☐ Part of Probe] Funnel Material: [☐ Teflon® / ☐ Glass / **X** Stainless Steel / Other: _____]

Probe Line(s): [**X** Teflon® / Other: _____] Probe Fitting(s): [☐ Teflon® / Other: Stainless Steel / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

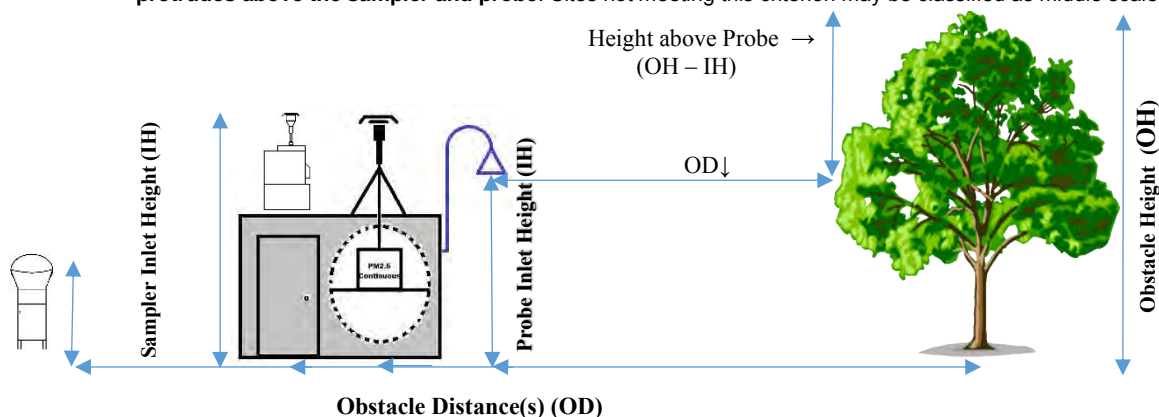
Issue(s): None

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
O3	4.2	Side of shelter	N/A	>1 (1.2)	Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

N/A				

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): N/A inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: None

Minor Sources:

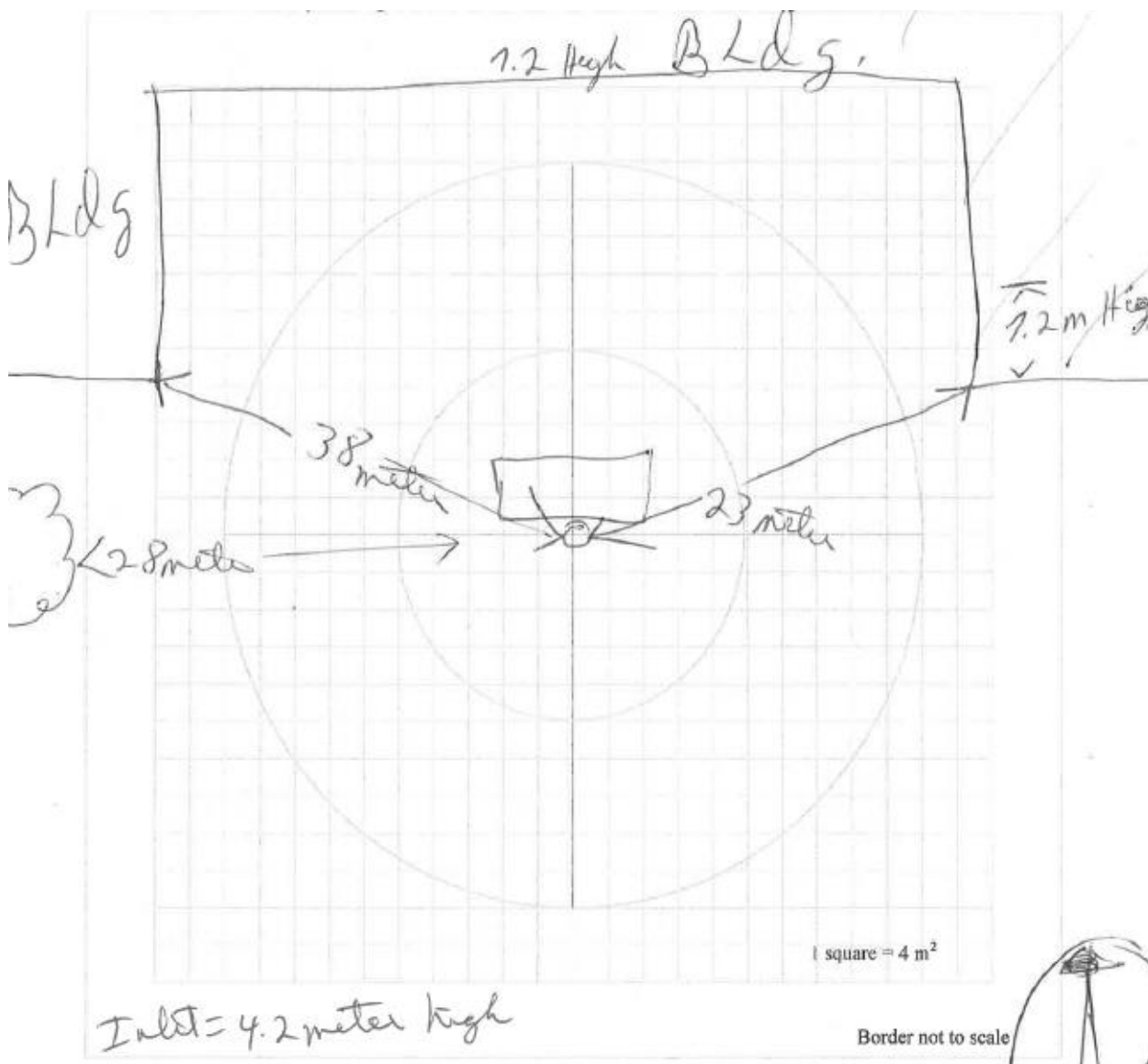
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues:

None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: > 270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Closest tree math- 28 meter distance with 11.6 meter height tree, inlet=4.2 meter high. [$11.6 - 4.2 = 7.4$ meters]. ($7.4 * 2 = 14.8$) 28 meters distance is greater than 14.8 meters. Tree is not an obstacle.

Aerial Photo with Wind Rose



PHOTO LOG: Kingsport O3 **Initials:** TED **Date:** February 21, 2017

Camera [X Personal – Owner: TED**]** **Make/Model:** N/A

Filename: 001 **Date:** 2-21-17 **Time:** 12:00pm **Photographer:** TED

Description: South away from monitor (south directional)

Filename: 002 **Date:** 02-21-17 **Time:** 12:00 pm **Photographer:** TED

Description: South toward monitor

Filename: 003 **Date:** 02-21-17 **Time:** 12:00 pm **Photographer:** TED

Description: East toward monitor

Filename: 004 **Date:** 02-21-17 **Time:** 12:00 pm **Photographer:** TED

Description: East away from monitor (east directional)

Filename: 005 **Date:** 02-21-17 **Time:** 12:00 pm **Photographer:** TED

Description: North toward monitor

Filename: 006 **Date:** 02-21-17 **Time:** 12:00 pm **Photographer:** TED

Description: North away from monitor (north directional)

Filename: 007 **Date:** 02-21-17 **Time:** 12:00 pm **Photographer:** TED

Description: West toward monitor

Filename: 008 **Date:** 02-21-17 **Time:** 12:00 pm **Photographer:** TED

Description: West away from monitor (west directional)

001- South away from monitor (south directional)



002-South toward monitor



003-East toward monitor



004-East away from monitor (east directional)



005-North toward monitor



006-North away from monitor (north directional)



007-West toward monitor



008-West away from monitor (west directional)



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

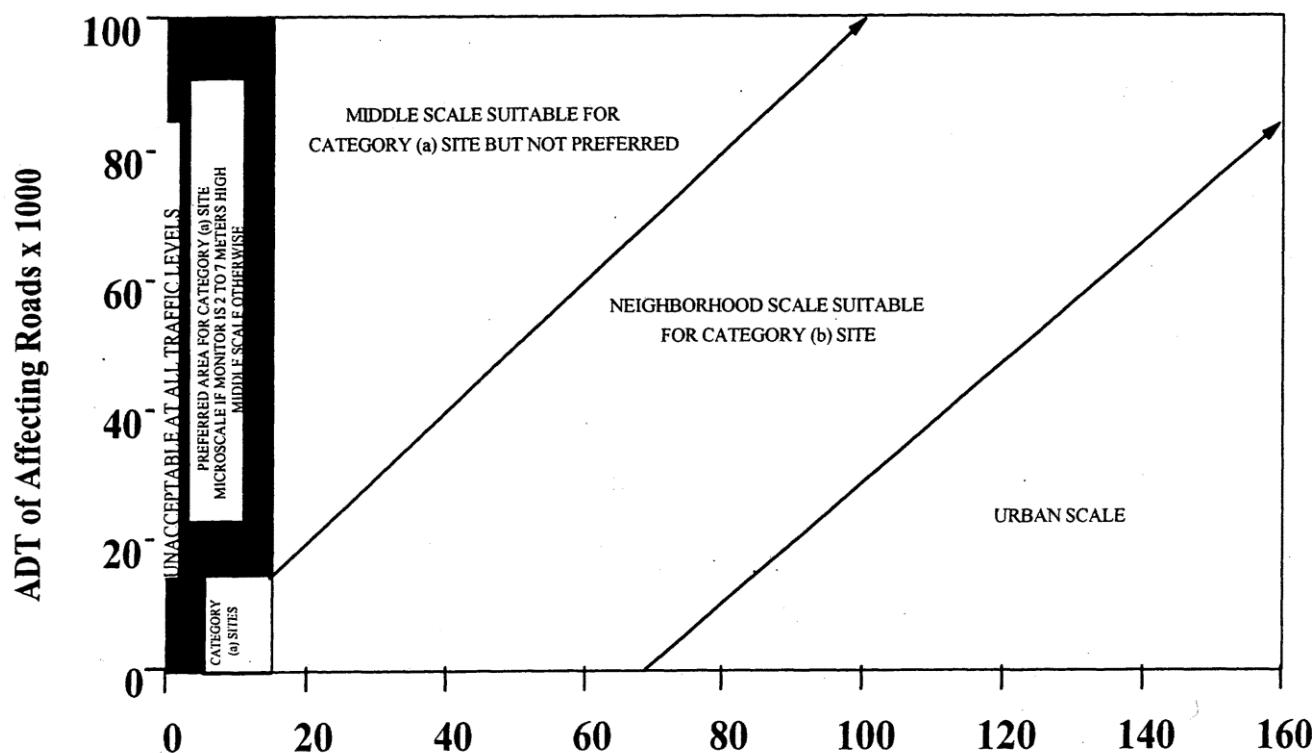


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 data logger and an Agilaire 8872 PC/Data logger. The 8832 data logger serves as the primary logger and is directly connected via analog input to the analyzer at the site. The data is polled from the 8832 logger to the central server via a 4G cellular modem (Sierra Wireless RV50). The 8872 serves as a secondary, backup logger, and is used by the site operator to retrieve the electronic strip chart in local standard time. The 8872 polls data from the 8832 locally over the COM port or over the local tcp/ip network if the COM route is not working (via a network switch).

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. sheet metal_____
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

With roof top samplers or inlets – is a roof railing present? N

Roof Access: Stairs or Ladder? Y Ladder

Stairs can be inside or outside – Ladders are usually permanently attached or removable? Y removable

Write additional comments on the shelters below:

The outside of this shelter needs the mold removed (washed down or pressure washed)_____

Steps need reseated back to the original position_____

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

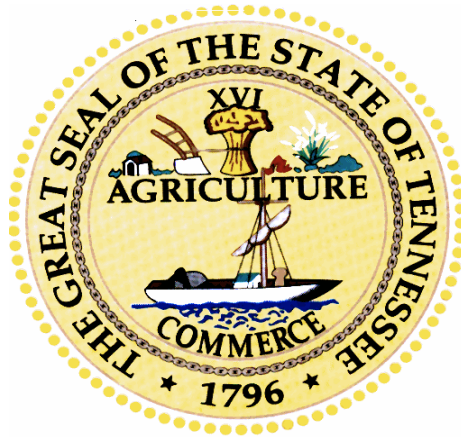
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/6/17

Location: Kingsport, TN

AQS Number: 47-163-1007

Site Name: Kingsport PM

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Thomas E. Dalton TED Site Evaluator

2: Justin E. Long JEL Site Evaluator

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Kingsport PM **Initials:** TED **Date:** 2/6/17

Additional Comments:

City of Kingsport is the property owner. All trees and scrubs identified as problems during the initial site evaluation have been trimmed or cut back to the point that they are no longer an obstacle. Outdoor GFCI's need to be tested/operated regularly to ensure they work properly

[illegible]

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Kingsport PM Initials: TED Date: 2/6/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 9:00 am Departure Time: 1:00 pm Primary Operator: Candace Justice

Observer(s): _____

SITE

[Y]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [N] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: _____

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1 per [week]

[NA] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: None

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒ Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5}	R & P	2025	22127
PM _{2.5} BAM	Met One	BAM 1022	T17015
PM _{2.5} TEOM	R & P	1400a	25209

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date

Is any analyzer sampling shelter air through its calibration line? [NA] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Kingport PM Initials: TED Date: 2/6/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations [NA] Precision Checks [NA] Audits
(Not Required) (Required) (Required)

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): NA

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / ☐x Charcoal / ☐Purafil / ☐Hopcalite / Other: NA

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Kingport PM Initials: TED Date: 2/6/17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs |Interior/Exterior| / Ladder |attached/removable| / ☐ Not Present] [NA] Loose Decking (Trip Hazard)

Issues: _____

Height of Roof: _____ meters Roofing Material: _____

Issues: _____ Used for storage only _____

OUTDOOR SAMPLERS

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [NA] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS changed once every 5 runs: VSCC cleaned monthly

COLLOCATED SAMPLERS: ☒ Not Present

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at least **1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐ Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐ Rank Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☐ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

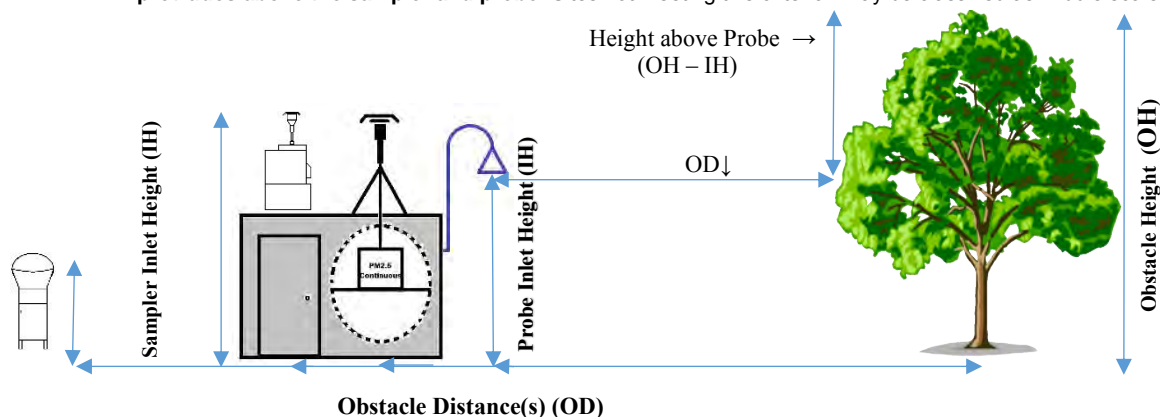
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5}	2.5	Ground	1.8		Urban	Urban
PM _{2.5}	2.5	Ground	1.8		Urban	Urban
PM _{2.5}	2.5	Ground	1.8		Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 * (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 * (OH - IH)]$	Obstacle Distance (OD)
NA				

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: No issues with driplines

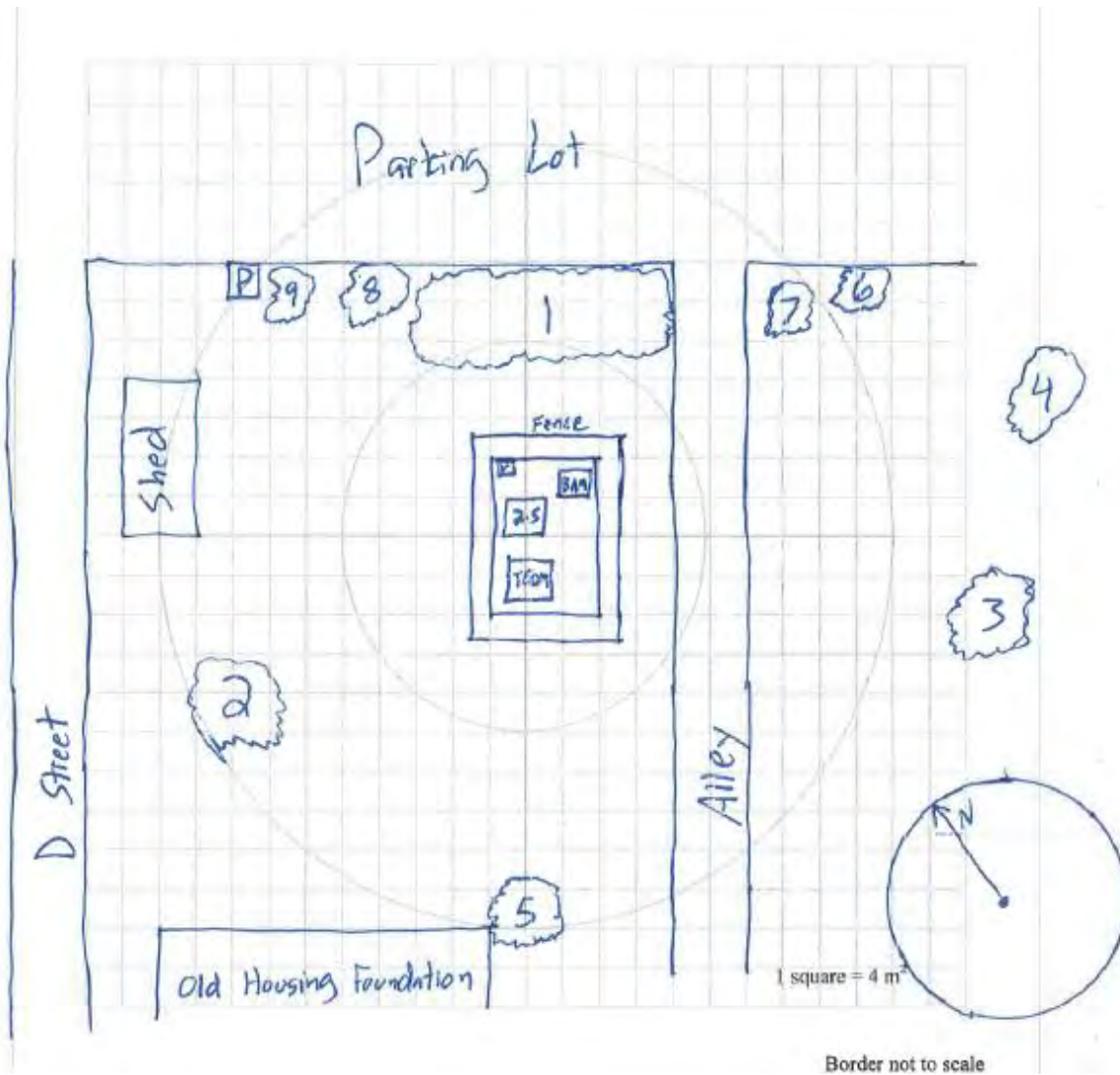
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: > 270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Currently there are 9 trees/bushes appearing on the site drawing on page 7. However, these trees are only shown to present the immediate surroundings of the monitor units. All tree listed either previously met the requirements for not being an obstacle or have been trimmed/cut back to where they no longer could be considered an obstacle.

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Kingsport PM **Initials:** TED **Date:** 2/6/17

Camera [☒ APC / ☐ Personal – Owner: _____] **Make/Model:** _____

Filename: 01 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: East side away from monitor

Filename: 02 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: East side of monitor

Filename: 03 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: North side away from monitor

Filename: 04 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: North side of monitor

Filename: 05 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: South away from monitor

Filename: 06 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: South side of monitor

Filename: 07 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: West side away from monitor

Filename: 08 **Date:** 2/6/17 **Time:** 12:00 pm **Photographer:** TED

Description: West side toward monitor

001-east from monitor



002 east side of monitor



003-North side away from monitor



004-North side of monitor



005-south away from moniator



006-South side toward monitor



007-west away from monitor



008-west side toward monitor



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

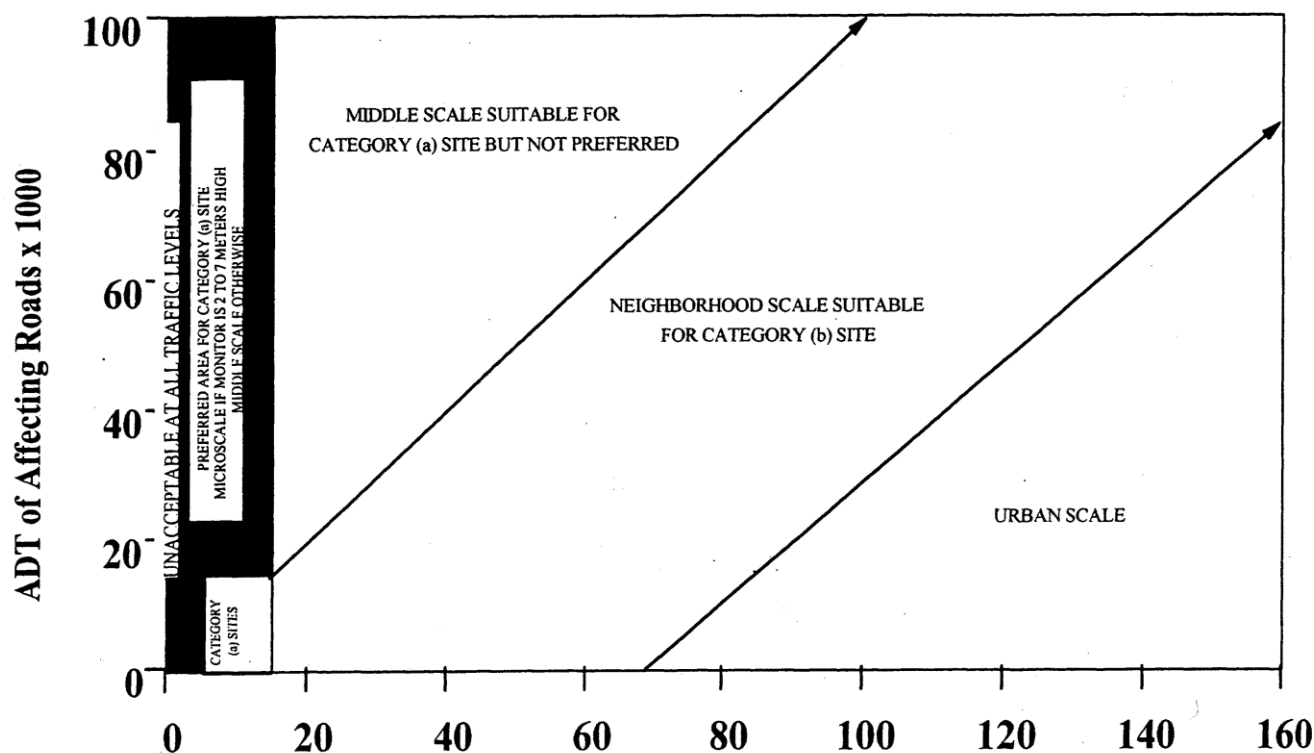


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the BAM 1022 and to the 8832 data logger
via a network switch.

A US Robotics dial-up modem is used to send the ancillary data from the 2025 to the central office staff.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** Y
2. **Trailer:** N
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. TEOM shelter (steel)
2. _____
3. _____
4. Platform (wood)

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y N

Write additional comments on the shelters below:

Platform, Breaker box, outlets, and plugs are in good condition. TEOM pump housing fan need replacing

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

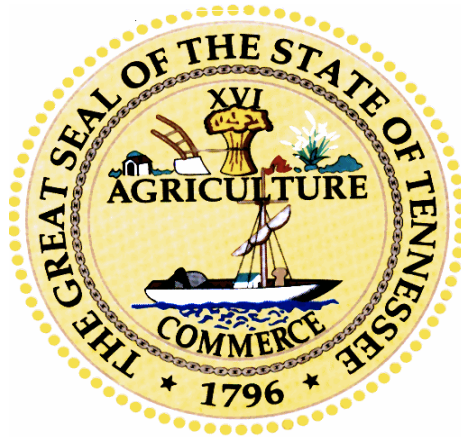
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: 2/17/17

Location: Loretto, TN

AQS Number: 47-099-0002

Site Name: Lawrence

Pollutants: PM_{2.5}

Project Leader:

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin EMH Site Specialist

2: _____

3: _____

Air Monitoring Site Evaluation Summary

Local Site Name: Lawrence Initials: EMH Date: 2/17/17

Additional Comments:

Sunny 59 °F

Electric meter: Lawrenceburg Power System Meter # 18282

Shelter is used for storage only; both BAM 1020 monitors are no longer in operation

TEOM and 2025 platforms have warped and split boards

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Lawrence Initials: EMH Date: 2/17/17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present [Y] Completed

Arrival Time: 10:40 am Departure Time: 11:50 am Primary Operator: Larry Yocom

Observer(s): _____

SITE

[N]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [NA] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] Date: _____ [NA] Police Report Filed

Issues: None

SHELTER - Interior

Arrival Temperature: NA °C (from data logger) Operator Site Visits: 1-2 per [week]

[NA] Leaking Roof [Damaged: ☐ Ceiling / ☐ Floor / ☐ Walls] [NA] Clean / Neat [NA] Fire Extinguisher

[NA] Insect / Wildlife Issues [NA] Thermometer (min/max) [NA] Gasoline (inside shelter)

Issues: Shelter is used only for storage

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☒Ground / ☐Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5}	Thermo	2025	21908
PM _{2.5} TEOM	R & P	1400a	25205

CALIBRATOR(s): ☒ Not Present

[NA] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
NA					

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Lawrence Initials: EMH Date: 2/17/17

All Gas Standards Pass thru all Filters during: [NA] Calibrations (Not Required) [NA] Precision Checks (Required) [NA] Audits (Required)

Issues: NA

CYLINDER GAS STANDARDS: x Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: _____

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply

Zero Air System: Commercial System (Make / Model): NA

Cartridge System: [☐Silica Gel ☐Pink / ☐Blue] / [☒Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[NA] Needs Service Last Service Date: _____ Condition: _____

Issues: NA

Probe Line(s): [☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[NA] Clean [NA] Heated [NA] Insulated [NA] Moisture [NA] Retractable [NA] Old / Unused Lines [NA] Lo

Flo Manifold -> [NA] Any Open Ports? -> How many analyzers using manifold? _____

Issues: NA

MSEF (Page 3/5): Local Site Name: Lawrence Initials: EMH Date: 2/17/17

SHELTER – Exterior ☐ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Old shipping container]

[NA] Needs Maintenance (specify) [NA] Tied Down [NA] Electrically Grounded [NA] Roof Railing

Roof Access: [Stairs ☐Interior/Exterior] / Ladder ☐attached/removable] / ☐ Not Present [NA] Loose Decking (Trip Hazard)

Issues: Used for storage only

Height of Roof: _____ meters Roofing Material: _____

Issues: Used for storage only

OUTDOOR SAMPLERS

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS changed once every 5 runs : VSCC cleaned monthly

COLLOCATED SAMPLERS: ☒ Not Present

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)

*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐ Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐ Rank Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐ Stainless Steel / Other: _____]

Probe Line(s): [☐ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

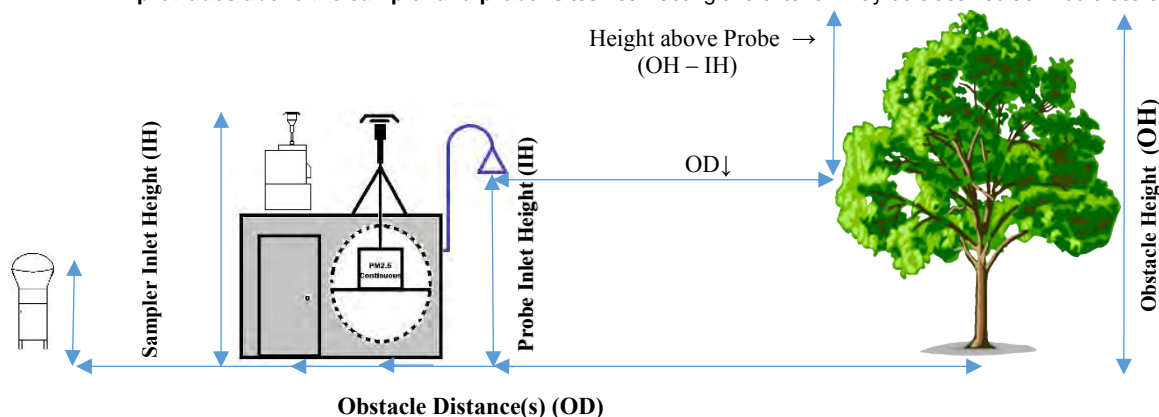
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	*Horizontal Distance (meters) If Applicable	*Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5} 2025	2.5	Ground	2.54		Regional	Regional
PM _{2.5} TEOM	2.5	Ground	2.54		Regional	Regional

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 * (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 * (OH - IH)]$	Obstacle Distance (OD)
Tree (2)	14.8	2.5	24.6	21.4
Tree (5)	15.4	2.5	25.8	18.8
Tree (6)	18.0	2.5	31.0	26.4
Tree (7)	18.0	2.5	31.0	19.4

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: A siting waiver was received for this site

Minor Sources:

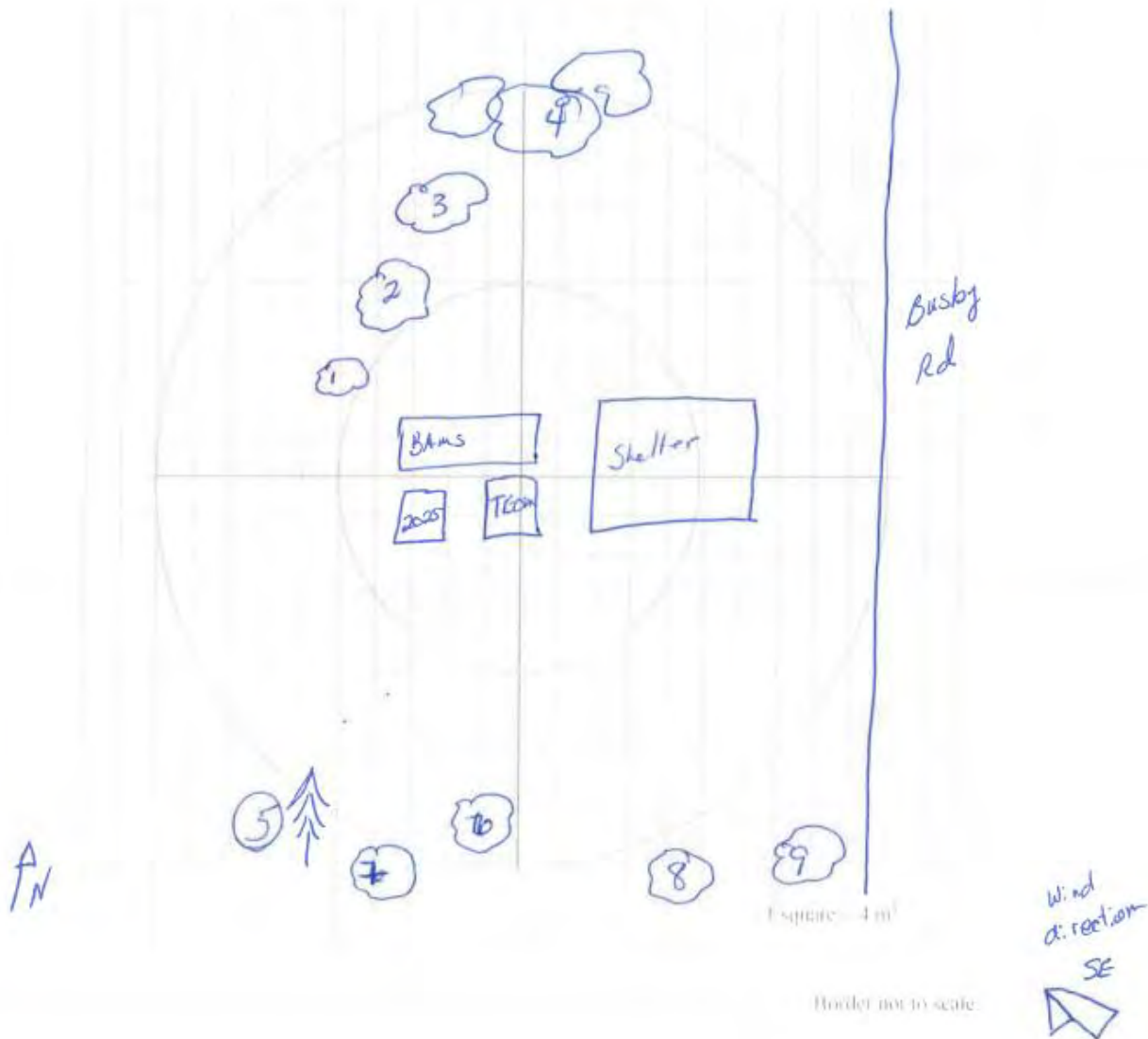
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

MSEF (Page 5/5): Local Site Name: Lawrence Initials: EMH Date: 2/17/17

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: > 270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Distance to closest road (Busby Road) – from TEOM is 17.6 meters and from 2025 monitor is 26.8 meters (used measuring wheel)

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Lawrence **Initials:** EMH **Date:** 2/17/17

Camera ☒ **APC** / ☐ **Personal – Owner:** _____ **Make/Model:** Nikon Coolpix

Filename: 01 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: Site view from north direction

Filename: 02 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: Site view from south direction

Filename: 03 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: North side of site

Filename: 04 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: View North of site (N directional)

Filename: 05 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: South side of site

Filename: 06 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: View South of site (S directional)

Filename: 07 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: West side of site

Filename: 08 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: View West of site (W directional)

Filename: 09 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: East side of site

Filename: 10 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: View East of site (E directional)

Filename: 11 **Date:** 2/17/17 **Time:** 11:40 am **Photographer:** EMH

Description: Board need replacing on 2025 platform

001



002



003



004



005



006



007



008



009



010



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

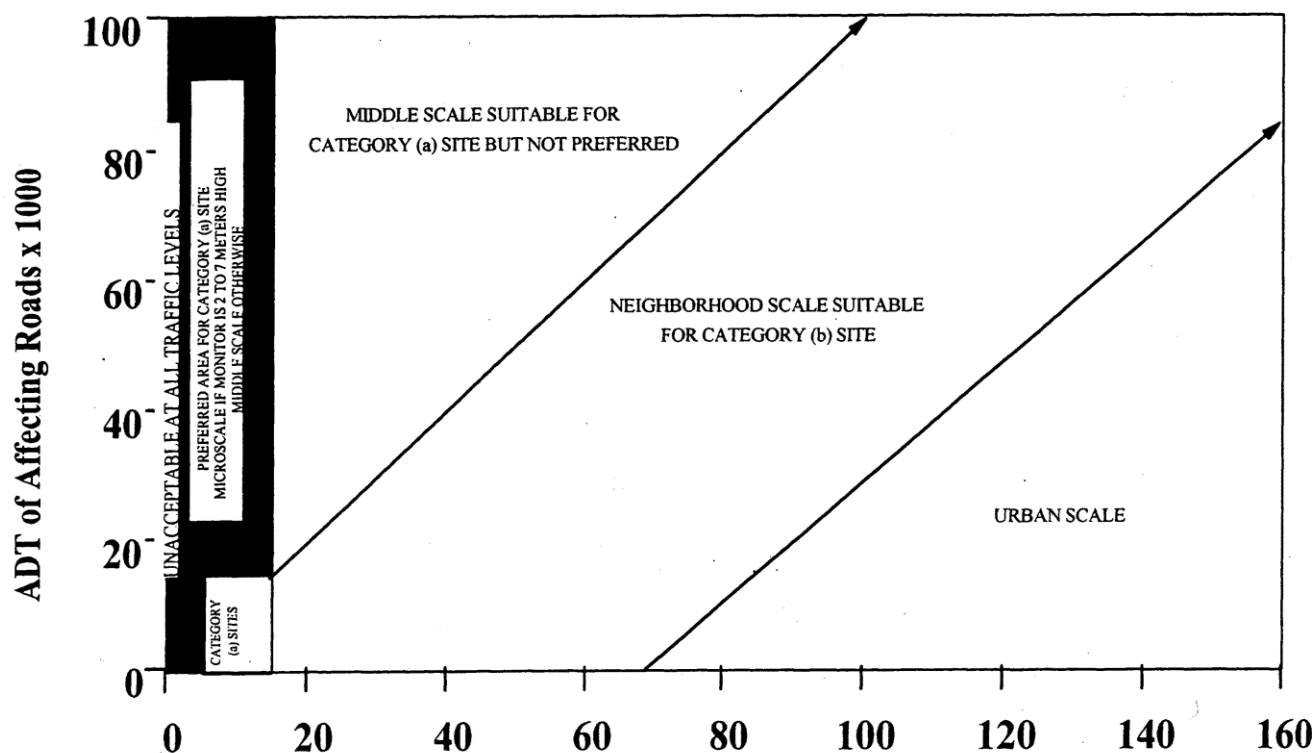


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of 1/4" OD tubing at given flow rate - using a 20 second residence time. The ID's shown are for thick (1/8"), intermediate (5/32") and thin (3/16") wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to an ESC 8832 logger.

A US Robotics dial-up modem is used to send the ancillary data from the 2025 to the central office staff.

RECORDS – at site

Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** Y
2. **Trailer:** N
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. TEOM and BAM enclosures - steel
2. Shelter is old shipping container - steel
3. _____
4. Platforms - wood

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

Write additional comments on the shelters below:

Platforms are in fair condition. Breaker box, outlets, and plugs are in good condition.

Shelter has rodent problem.

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

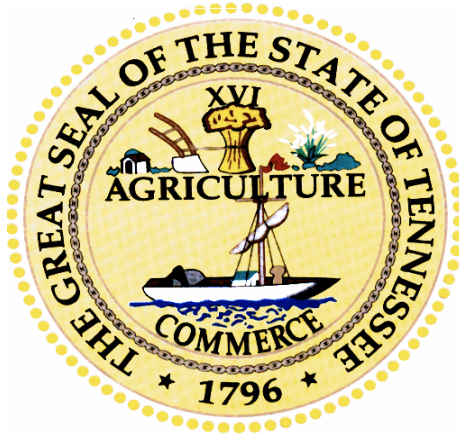
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: February 28, 2017

Location: Loudon, TN

AQS Number: 47-105-0109

Site Name: Loudon Elementary

Pollutants: O3

Project Leader: Team 3

Print Name / Signature / Initials / Duties

1: Evelyn Haskin EMH Site Evaluator

2: Justin E. Long JEL Site Evaluator

3: Thomas E. Dalton TED Site Evaluator

Air Monitoring Site Evaluation Summary

Local Site Name: Loudon Elementary Initials: TED Date: February 28, 2017

Additional Comments:

The ozone monitor has been moved from the Loudon – Pope site (130 Webb Dr., Loudon, TN) to the Loudon Elementary School (2175 Roberts Road, Loudon, TN) at the beginning of the 2017 ozone season.

No obstructions were identified at the new location.

The exterior of the shelter is in need of cleaning.

MONITORING SITE EVALUATION FORM (MSEF) (Page 1/5):

Local Site Name: Loudon Elementary **Initials:** TED **Date:** February 28, 2017

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 10:30 am **Departure Time:** 1:00 pm **Primary Operator:** Amelia Poe

Observer(s): TED/JEL

SITE

[Y]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [Y] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] **Date:** _____ [NA] Police Report Filed

Issues: Area needs to be over-sowed with grass seed

SHELTER - Interior

Arrival Temperature: 21.89 °C (from data logger) **Operator Site Visits:** 1 per [week]

[Y] Leaking Roof [Damaged: X Ceiling / X Floor / ☐Walls] [Y] Clean / Neat [N] Fire Extinguisher

[Y] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: Fire ants will need to be kept at bay to prevent shelter from having dirt removed from under supports.

MONITOR(s):

Location: Exterior Samplers [☐Roof / ☐Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
O3 Analyzer	Teledyne	T400	2282

CALIBRATOR(s): ☐ Not Present

[Y] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	331	1-18-17	

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Loudon Elementary Initials: TED Date: February 28, 2017

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits

Issues: None

CYLINDER GAS STANDARDS: [X] Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
N/A					

Issues: None

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply [N] On-Site Computer

Zero Air System: Commercial System (Make / Model):

Cartridge System: [☐Silica Gel [☐Pink / ☐Blue] / X Charcoal / ☐Purafil / ☐Hopcalite / Other: dri-rite]

[N] Needs Service Last Service Date: 02-2017 Condition: OK

Issues:

Probe Line(s): [X Replaced / ☐Cleaned] – Frequency: One a year Last Service Date: 2/27/17

[Y] Clean [Y] Heated [N] Insulated [N] Moisture [N] Retractable [N] Old / Unused Lines [Y] Lo Flo

Manifold -> [N] **Any Open Ports?** -> How many analyzers using manifold? 1

Issues: None

SHELTER – Exterior

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Metal Sided]

[N] Needs Maintenance (specify) [N] Tied Down [Y] Electrically Grounded [N/A] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / X Not Present] [N] Loose Decking (Trip Hazard)

Issues: None

Height of Roof: 3 meters Roofing Material: aluminum

Issues: None

MSEF (Page 3/5): Local Site Name: Loudon Elementary Initials: TED Date: February 28, 2017

SHELTER – Exterior

Type: ☐ Freezer / ☐ Wood Building / ☐ Brick-Block / Other: Metal Sided

[N] Needs Maintenance (specify) [N] Tied Down [Y] Electrically Grounded [N/A] Roof Railing

Roof Access: [Stairs |Interior/Exterior| / Ladder |attached/removable| /X Not Present] [N] Loose Decking (Trip Hazard)

Issues: None

Height of Roof: 3 meters Roofing Material: aluminum

Issues: None

OUTDOOR SAMPLERS

X Not Present

[Y/N] Locked [Y/N] Electrically Grounded [Y/N] Stabilized [Y/N] Clean Inside [Y/N] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: NA PM₁₀ Head Clean Schedule: NA

Issue(s): NA

COLLOCATED SAMPLERS: **x Not Present**

(39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)
N/A		

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: ☒ Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)

Funnel(s): ☒ Rain Shield / ☐ Part of Probe Funnel Material: ☐ Teflon® / ☐ Glass / ☒ Stainless Steel / Other: _____

Probe Line(s): ☒ Teflon® / Other: _____ Probe Fitting(s): ☒ Teflon® / Other: _____ / ☐ Not Present

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

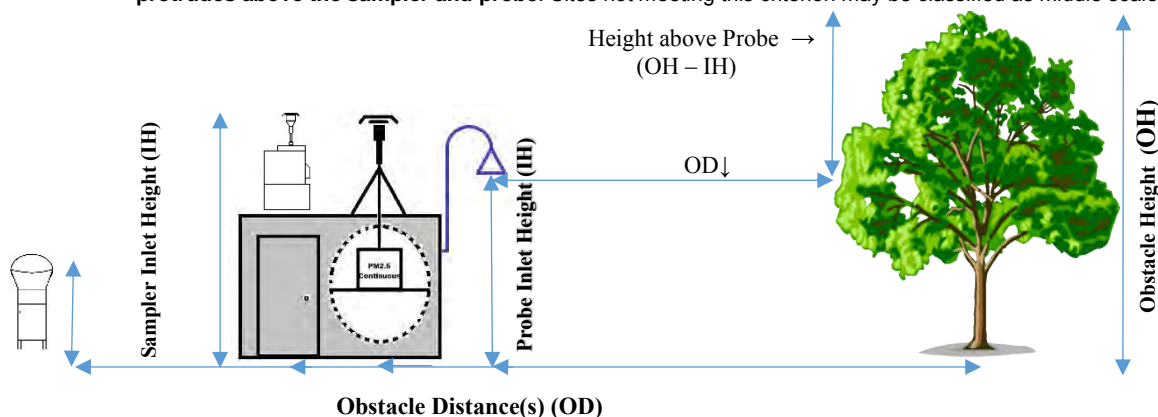
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
O3	4.8	Side of shelter				

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 * (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 * (OH - IH)]$	Obstacle Distance (OD)
N/A				

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: _____

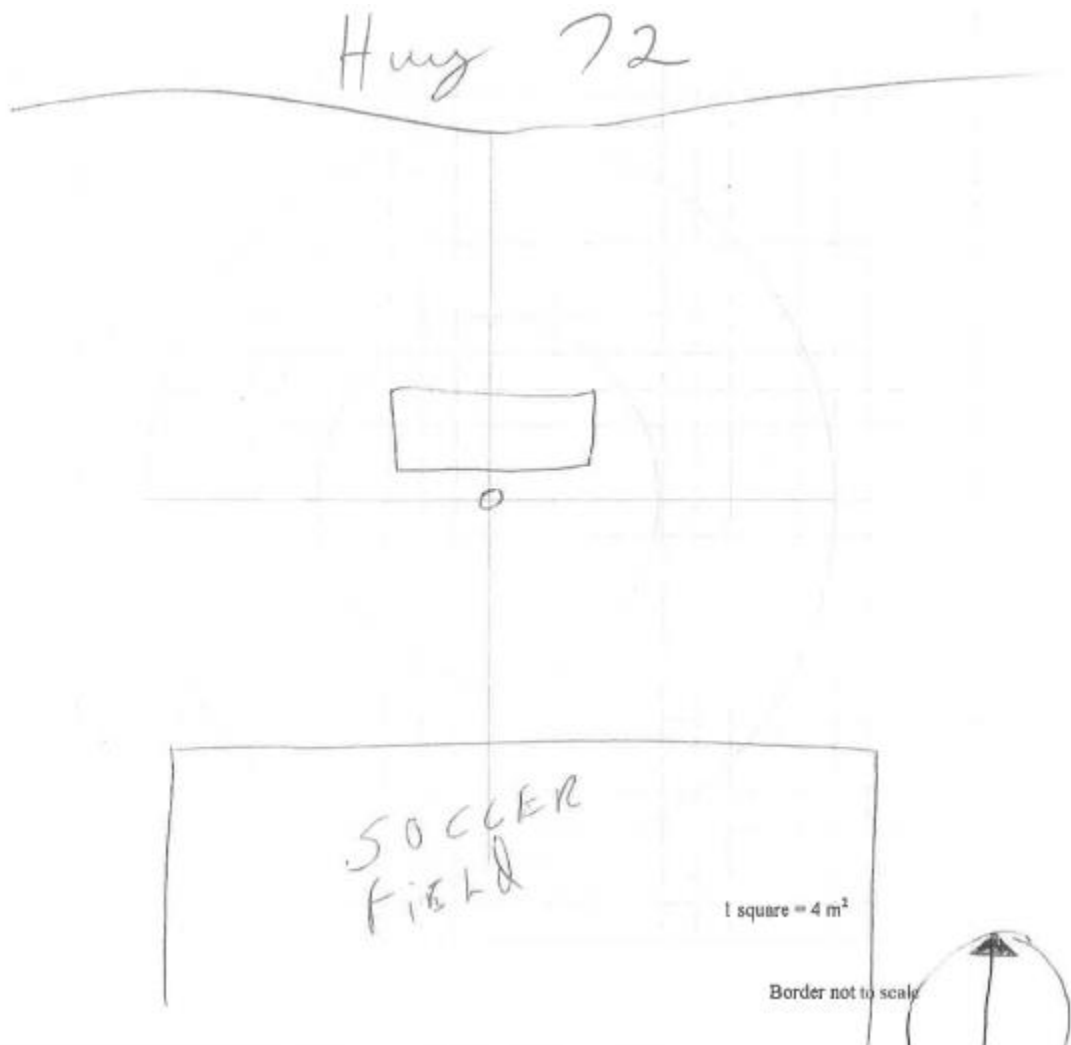
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: 360 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

New location is north of Loudon Elementary School's soccer field (Lat: 35.721004, Long: -84.343031)

As identified by yellow pin in aerial photo below

Distance to closest road: HWY 72 is 120.1 meters (measured by using Google Earth Pro)



PHOTO LOG: Local Site Name: Loudon Elementary Initials: TED Date: February 28, 2017

Camera: X Personal – Owner: _____ Make/Model: N/A

Filename: 001 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: 001-East toward monitor

Filename: 002 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: 002-East away from monitor (east directional)

Filename: 003 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: 003-South toward monitor

Filename: 004 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: South away from monitor (South directional)

Filename: 005 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: West toward monitor

Filename: 006 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: West away from monitor (West directional)

Filename: 007 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: North toward monitor

Filename: 008 Date: 2-28-17 Time: 10:30 am Photographer: TED

Description: North away from monitor (north directional)

001-East toward monitor



002-East away from monitor (East directional)



003-South toward monitor



004-South away from monitor (South directional)



005-West toward monitor



006-West away from monitor (West directional)



007-North toward monitor



008-North away from monitor (North directional)



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

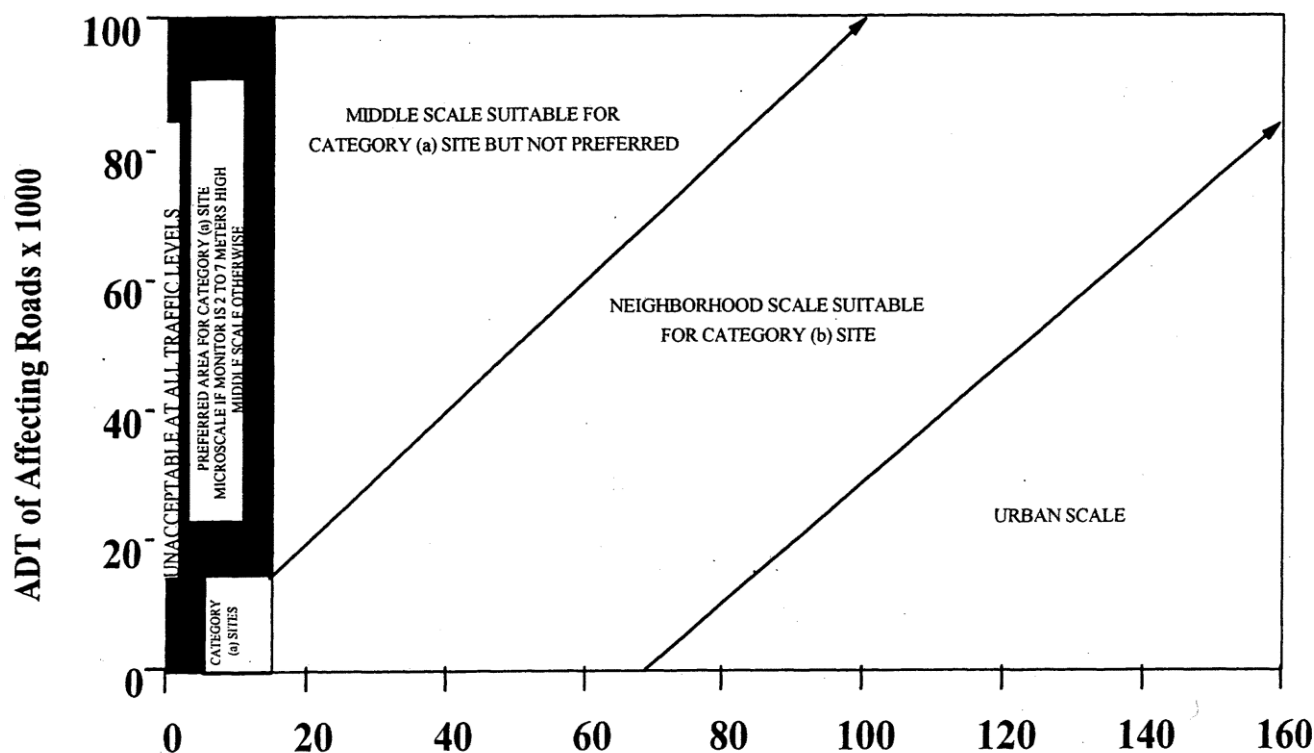


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

The site uses an ESC 8832 data logger and an Agilaire 8872 PC/Data logger. The 8832 data logger serves as the primary logger and is directly connected via analog input to the analyzer at the site. The data is polled from the 8832 logger to the central server via a 4G cellular modem (Sierra Wireless RV50). The 8872 serves as a secondary, backup logger, and is used by the site operator to retrieve the electronic strip chart in local standard time. The 8872 polls data from the 8832 locally over the COM port or over the local tcp/ip network if the COM route is not working (via a network switch).

RECORDS – at site

Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. Aluminum _____
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? Y

Write additional comments on the shelters below:

Ladders are brought to the site as needed.

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

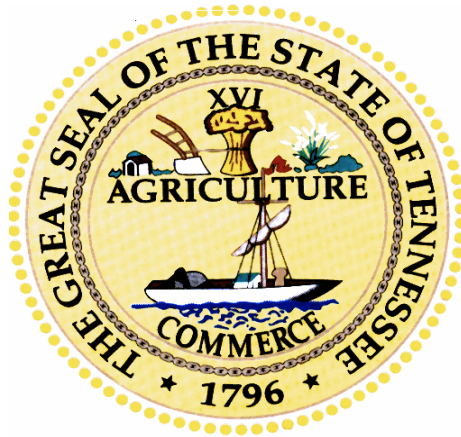
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: February 28, 2017

Location: Loudon, TN

AQS Number: 47-105-0108

Site Name: Loudon Pope

Pollutants: PM_{2.5}

Project Leader: Team 3

Print Name / Signature / Initials / Duties

1: Evelyn Haskin EMH Site Evaluator

2: Justin E. Long JEL Site Evaluator

3: Thomas E. Dalton TED Site Evaluator

Air Monitoring Site Evaluation Summary

Local Site Name: Loudon Pope Initials: TED/JEL Date: February 28, 2017

Additional Comments:

No license agreement for this site.

PM2.5 monitor will be moved to the Loudon Elementary School before or at the end of 2017.

O3 monitor moved to Loudon Elementary School on 2/27/17 prior to the start of the 2017 O3 season. Shelter remains at Pope site. Shelter, met tower pole will need to be removed when PM2.5 monitor is relocated.

Distance to closest road (Webb Dr) is 12.2 meter (measured using Google Earth Pro)

Landowner did not want anything cut down at site.

MONITORING SITE EVALUATION FORM (MSEF) (Page 1/5):**Local Site Name:** Loudon Pope **Initials:** TED/JEL **Date:** February 28, 2017

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 9:00 am **Departure Time:** 10:00 am **Primary Operator:** Tom Dalton**Observer(s):** TED**SITE****[N]-Security Fence** **[N]-Razor/Barb Wire** **[Y]** **Grass/Shrubs Cut** **[N]** **Bare Soil Area****[N]** **Vandalism** – [☐Inside / ☐Outside] **Date:** _____ **[Y/N]** **Police Report Filed****Issues:** None**SHELTER - Interior****Arrival Temperature:** NA °C (from data logger) **Operator Site Visits:** 1 -2 per [week]**[N]** **Leaking Roof** **[Damaged:** ☐ **Ceiling** / ☐ **Floor** / ☐ **Walls**] **[Y]** **Clean / Neat** **[N]** **Fire Extinguisher****[Y]** **Insect / Wildlife Issues** **[Y]** **Thermometer** (min/max) **[N]** **Gasoline** (inside shelter)**Issues:** Wasps tend to get in the fan shields**MONITOR(s):****Location:** Exterior Samplers [☐Roof / ☒ **Ground** / ☐ **Not Present**]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5}	R & P	2025	22134

CALIBRATOR(s): ☒ **Not Present****[Y]** **Are QA/QC Check Gases Vented Outside Shelter?**

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
NA					

Is any analyzer sampling shelter air through its calibration line? **[N]** If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Loudon POPE Initials: TED/JEL Date: February 28, 2017

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits

Issues: None

CYLINDER GAS STANDARDS: ☒ Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
N/A					

Issues: None

SUPPORTING INSTRUMENTATION: Internal

[Y] Temperature Sensor [N] Uninterruptable Power Supply [N] On-Site Computer

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: ☐ Silica Gel ☐ Pink ☐ Blue / ☐ Charcoal / ☐ Purafil / ☐ Hopcalite / Other: _____

[N] Needs Service Last Service Date: _____ Condition: _____

Issues: None

Probe Line(s): ☐ Replaced / ☐ Cleaned] – Frequency: _____ Last Service Date: _____

[Y/N] Clean [Y/N] Heated [Y/N] Insulated [Y/N] Moisture [Y/N] Retractable [Y/N] Old / Unused Lines

[Y/N] Lo Flo Manifold -> [N] Any Open Ports? -> How many analyzers using manifold? _____

Issues: None

MSEF (Page 3/5): Local Site Name: Loudon Pope Initials: TED/JEL Date: February 28, 2017

SHELTER – Exterior ☐ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Metal Sided]

[N] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N/A] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] /X Not Present] [Y/N] Loose Decking (Trip Hazard)

Issues: shelter no longer used

Height of Roof: NA meters Roofing Material: Metal

Issues: None

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: Monthly

Issue(s): WINS cleaned every 5 runs; VSCC cleaned monthly

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)
N/A		

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐ Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐ Rain Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / Stainless Steel / Other: _____]

Probe Line(s): [☐Teflon® / Other: _____] Probe Fitting(s): [☐Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

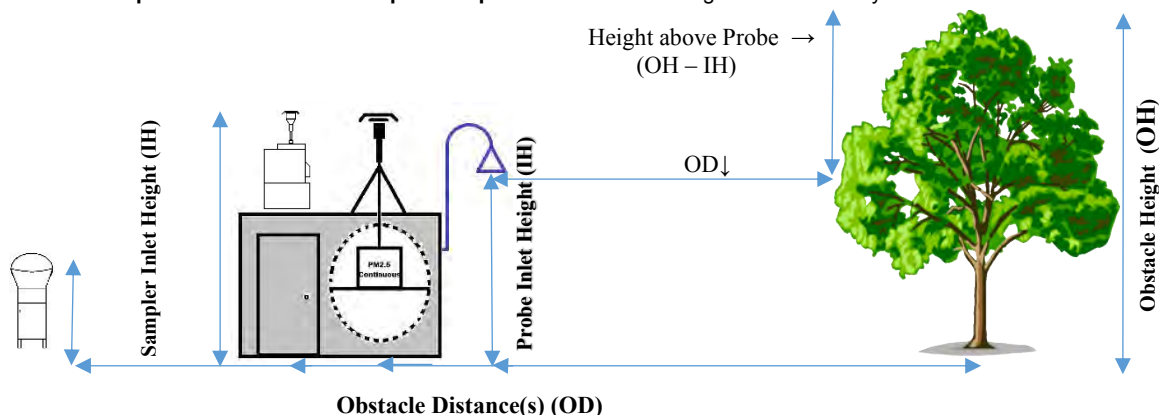
Issue(s):

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5}	2.5	Ground			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2*(OH-IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)	Drip Line
1	2.8	2.5	0.6	1.7	1.0
2	1.6	2.5	0	0	1.0
3	2.5	2.5	0	5.9	4.8
4	5.4	2.5	5.2	10.7	8.0
5	5.0	2.5	5.0	15.1	13.6
6	3.2	2.5	1.4	13.4	0
7	4.4	2.5	3.8	13.4	13.0
8	2.4	2.5	0	0	14.4
9	10.4	2.5	15.8	21.0	19.8

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ No Trees Present

(39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

_____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: _____

Minor Sources:

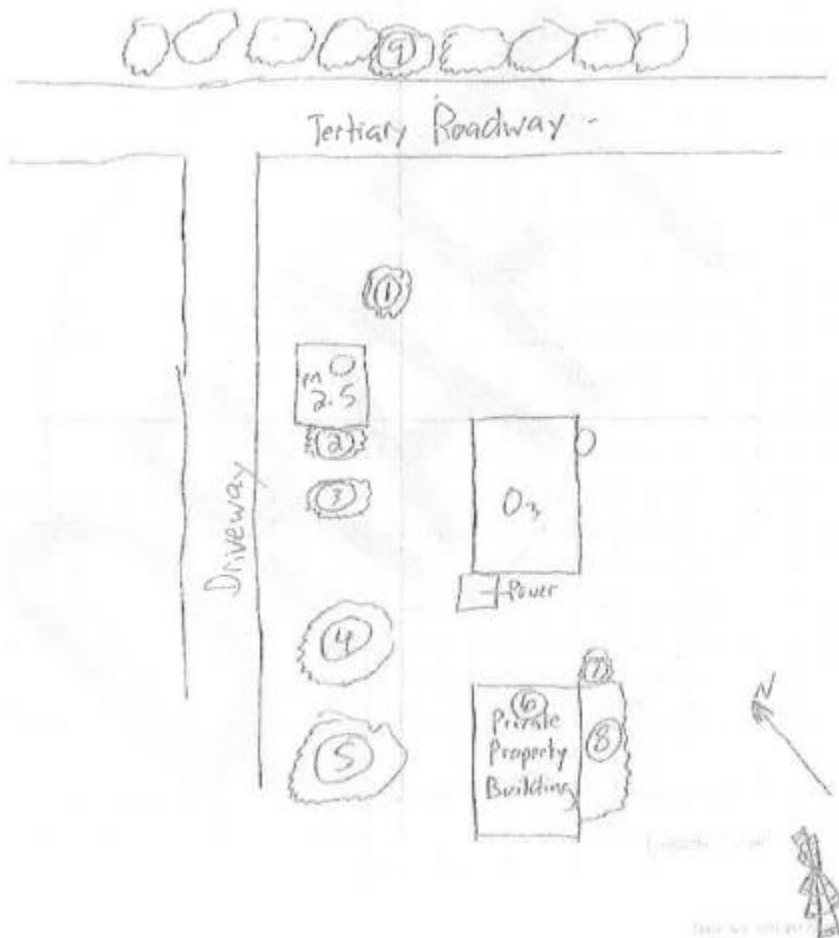
- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking

Relative Distances & Height can be found on pages 6 & 7 in the obstacle calculations boxes for both the PM2.5 & O3 monitors.



UNRESTRICTED AIR FLOW: 360 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

2025 monitor will be relocated to the Loudon Elementary School before or at the end of 2017



PHOTO LOG: **Local Site Name:** Loudon Pope **Initials:** TED/JEL **Date:** February 28, 2017

Camera: X **Personal – Owner:** _____ **Make/Model:** N/A

Filename: 001 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: East away from monitor (East directional)

Filename: 002 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: East toward monitor

Filename: 003 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: West away from monitor (West directional)

Filename: 004 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: West toward monitor

Filename: 005 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: North toward monitor

Filename: 006 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: North away from monitor (North directional)

Filename: 007 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: South toward monitor

Filename: 008 **Date:** 11/18/16 **Time:** 12:00 pm **Photographer:** TED

Description: South away from monitor (South directional)

001-East away from monitor (East directional)



002-East towards monitor



003- West away from monitor (West directional)



004-West toward monitor



005- North toward monitor



006- North away from monitor (North directional)



007- South toward monitor



008- South away from monitor (South directional)



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

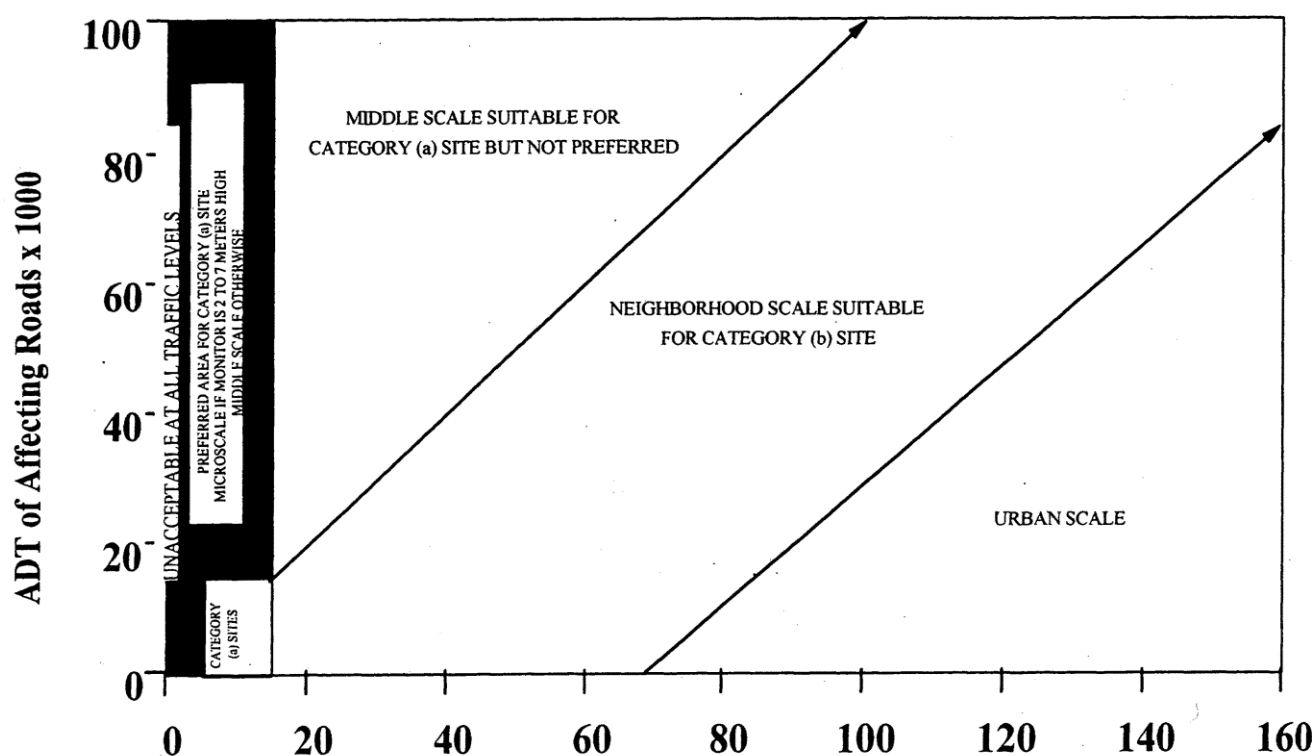


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A US Robotics dial-up modem is used to send the ancillary data from the 2025 to the central office staff.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure: Y**
2. **Trailer: N**
3. **None: N**
4. **Other: N**

What are the shelter(s) made of?

1. _____
2. Aluminum Sheet Metal
3. _____
4. Wood

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? **Y**

With roof top samplers or inlets – is a roof railing present? **N** (May not be required in accordance with local ordinances)

Roof Access: Stairs or Ladder? **Y Ladder**

Stairs can be inside or outside – Ladders are usually permanently attached or removable? **Y removable**

Write additional comments on the shelters below:

Shelter (trailer) is no longer in use; ozone equipment moved to Loudon Elementary School site 2025 monitor platform has boards that need replacing and equipment need cleaned of mold growing on them

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

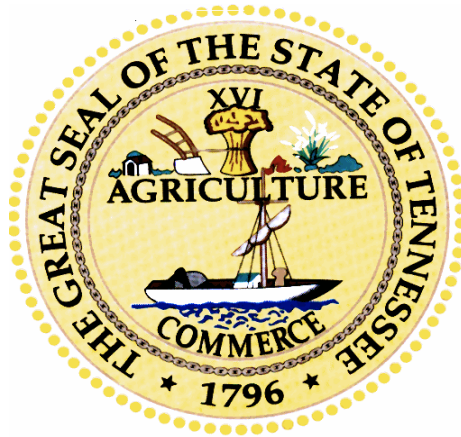
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: February 15, 2017

Location: Maryville, TN

AQS Number: 47-009-0011

Site Name: Maryville PM

Pollutants: PM_{2.5}

Project Leader: EMH

Print Name / Signature / Initials / Duties

1: Evelyn M. Haskin

EMH Team 3 Lead

2: Justin E. Long

JEL Team 3 member

3: Thomas E. Dalton

TED Team 3 member

Air Monitoring Site Evaluation Summary

Local Site Name: Maryville Initials: TED Date: 2-15-17

Additional Comments:

Electrical meter #63109 with Maryville Electric Department. Platforms warped and split boards scheduled for replacement. Photos taken on 11-23-16 and 2-15-17. Distance to nearest traffic lane measured by Google Earth Pro which provided 89.6 meters or 294 feet. Landowner is the City of Maryville with the property location of 2001 Sequoyah Ave., Map 047K, Group B, Control map 047F, parcel 051.00.

MONITORING SITE EVALUATION FORM (MSEF) (Page 1/5):**Local Site Name:** Maryville **Initials:** TED **Date:** 2-15-17

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 11:00 am **Departure Time:** 12:00 pm **Primary Operator:** Justin Long (JEL)**Observer(s):** JEL for photos on 2-15-17**SITE**

[Y]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [N] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] **Date:** N/A [N/A] Police Report Filed _____**Issues:** None**SHELTER - Interior****Arrival Temperature:** N/A °C (from data logger) **Operator Site Visits:** 1-2 per [week][N/A] Leaking Roof [Damaged: ☐Ceiling / X Floor / ☐Walls] [Y] Clean / Neat [Y] Fire Extinguisher [N]

[Y] Insect / Wildlife Issues [Y] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: Wasps occasionally**MONITOR(s):****Location:** Exterior Samplers [☐Roof / X Ground / ☐ Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
PM _{2.5}	R & P	2025	21026
PM _{2.5} TEOM	R & P	1400a	25136

CALIBRATOR(s): ☒ Not Present

[Y/N] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
N/A					

Is any analyzer sampling shelter air through its calibration line? [Y/N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: Maryville Initials: TED Date: 2-15-17

All Gas Standards Pass thru all Filters during: [Y/N] Calibrations [Y/N] Precision Checks [Y/N] Audits

Issues: N/A

CYLINDER GAS STANDARDS: ☐ Not Present

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
N/A					

Issues: None

SUPPORTING INSTRUMENTATION: Internal N/A

[Y/N] Temperature Sensor [Y/N] Uninterruptable Power Supply [Y/N] On-Site Computer

Zero Air System: Commercial System (Make / Model): _____

Cartridge System: ☐Silica Gel ☐Pink / ☐Blue / ☐Charcoal / ☐Purafil / ☐Hopcalite / Other: _____

[Y/N] Needs Service Last Service Date: _____ Condition: _____

Issues: N/A

Probe Line(s): ☐Replaced / ☐Cleaned] – Frequency: _____ Last Service Date: _____

[Y/N] Clean [Y/N] Heated [Y/N] Insulated [Y/N] Moisture [Y/N] Retractable [Y/N] Old / Unused Lines

[Y/N] Lo Flo Manifold -> [Y/N] Any Open Ports? -> How many analyzers using manifold? _____

Issues: N/A

MSEF (Page 3/5): Local Site Name: Maryville Initials: TED Date: 2-15-17

SHELTER – Exterior ☒ Not Present

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: _____]

[Y/N] Needs Maintenance (specify) [Y/N] Tied Down [Y/N] Electrically Grounded [Y/N] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / ☐ Not Present] [Y/N] Loose Decking (Trip Hazard)

Issues:

N/A

Height of Roof: N/A meters Roofing Material: N/A

Issues: N/A

OUTDOOR SAMPLERS ☐ Not Present

[Y] Locked [Y] Electrically Grounded [Y] Stabilized [Y] Clean Inside [Y] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: Every 5 runs or less PM₁₀ Head Clean Schedule: Monthly

Issue(s): None

COLLOCATED SAMPLERS: ☒ Not Present (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☒ Not Present

Inlet Type: [☐Single Line / ☐Dual Line / ☐Bell Type (CAS design)]

Funnel(s): [☐Rain Shield / ☐Part of Probe] Funnel Material: [☐Teflon® / ☐Glass / ☐Stainless Steel / Other: _____]

Probe Line(s): [☐Teflon® / Other: _____] Probe Fitting(s): [☐Teflon® / Other: _____ / ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

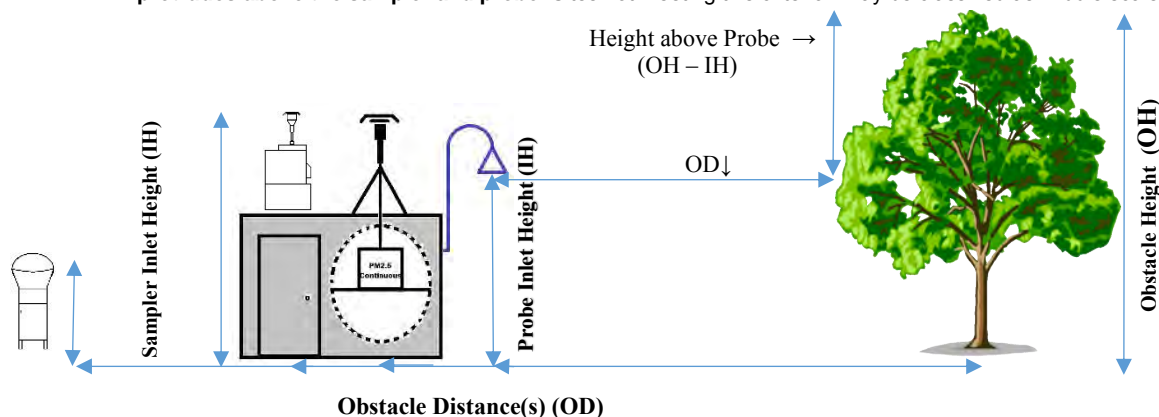
Issue(s):

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
PM _{2.5}	2.2	Ground	>2m		Neighborhood	Neighborhood
PM _{2.5} TEOM	2.2	Ground	>2m		Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2 \cdot (OH - IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2 \cdot (OH - IH)]$	Obstacle Distance (OD)
Water Tower	26.6 meter	2.2 meter	48.8 meter	35.0

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: None

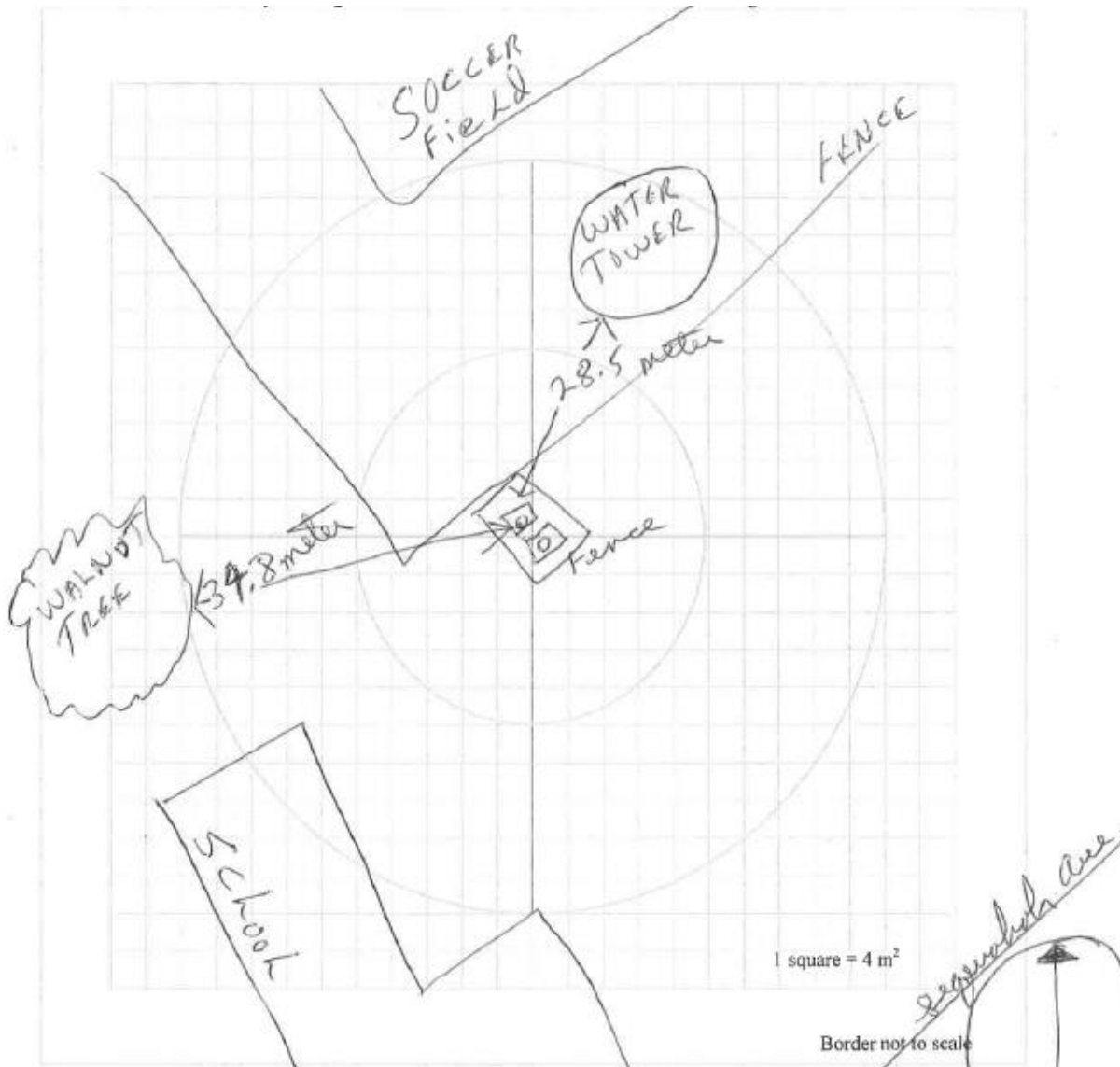
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: >330° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Tree that was an obstacle during 11-23-16 site evaluation was removed.

Aerial Photo with Wind Rose



PHOTO LOG: Local Site Name: Maryville Initials: TED Date: 2-15-17

Camera [X APC – Owner: _____] Make/Model: Sony Cyber shot St. tag L33518

Filename: 001 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: East toward monitor

Filename: 002 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: East away from monitor (East Directional)

Filename: 003 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: North toward monitor

Filename: 004 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: North away from monitor (North Directional)

Filename: 005 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: South toward monitor

Filename: 006 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: South away from monitor (South Directional)

Filename: 007 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: West toward monitor

Filename: 008 Date: 2-15-17 Time: 1:00 PM Photographer: TED

Description: West away from monitor (West Directional)

001-East toward monitor



002-East away from monitor



003-North toward monitor



004-North away from monitor



005-South toward monitor



006-South away from monitor



007-West toward monitor



008-West away from monitor



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1,2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

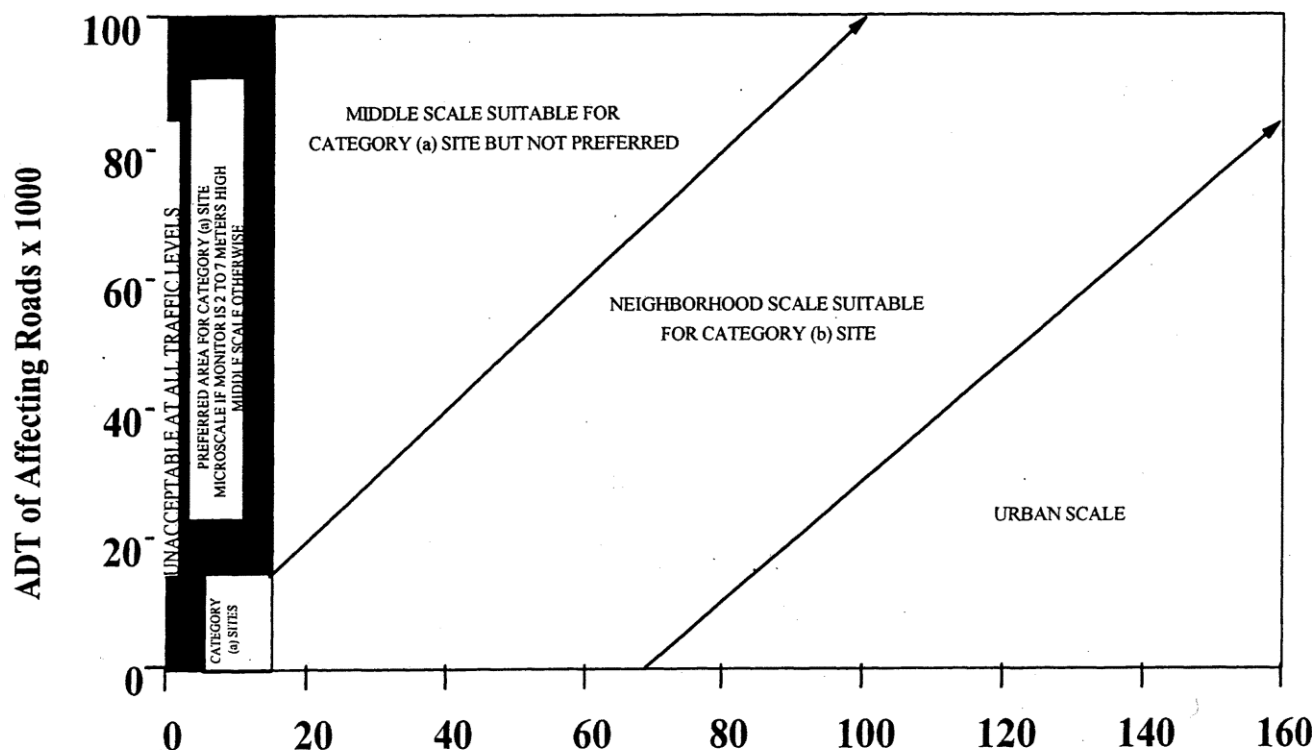


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of ¼” OD tubing at given flow rate - using a 20 second residence time. The ID’s shown are for thick (1/8”), intermediate (5/32”) and thin (3/16”) wall Teflon® tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

An ATT DSL modem (VersaLink B90) provides internet communications to the 8832 logger.

A US Robotics dial-up modem is used to send the ancillary data from the 2025 to the central office staff.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure: Y**
2. **Trailer: N**
3. **None: N**
4. **Other: N**

What are the shelter(s) made of?

1. Steel (TEOM enclosure)
2. _____
3. _____
4. Platforms - wood

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? **Y**

With roof top samplers or inlets – is a roof railing present? **N** (May not be required in accordance with local ordinances)

Roof Access: Stairs or Ladder? **N**

Stairs can be inside or outside – Ladders are usually permanently attached or removable? **N**

Write additional comments on the shelters below:

Platforms need top boards replaced

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and is specified in TDEC DAPC's QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures. Teledyne analyzers are designated FEM for a range of 5-40 °C. Therefore, TDEC DAPC keeps shelters with these monitors within this range (still keeping in mind the 2 deg SD requirement). Shelters are generally kept about 25-26 °C in the warmest months to reduce condensation in sample lines and analyzer.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites? Ants? Wasps/Bees? / Larger wildlife causing problems (such as nesting in the undercarriage or walls or digging dens near the foundation/supports)?

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

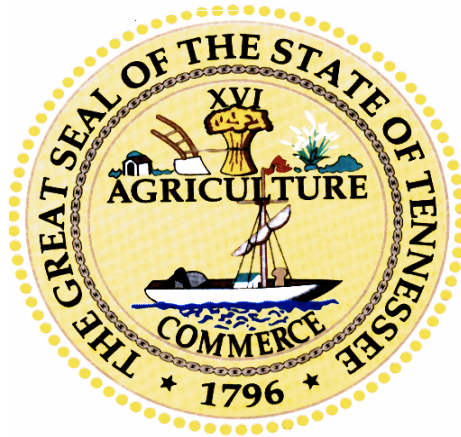
QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated. Some examples of items that can cause this problem are a leaking filter holder or fitting and an uncapped TTP system or sample line tee.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.

**Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243**



Air Monitoring Site Evaluations

TDEC APC

Date: March 3, 2017

Location: New Market, TN

AQS Number: 47-089-0002

Site Name: New Market

Pollutants: O3

Project Leader: EMH

Print Name / Signature / Initials / Duties

1: Evelyn M. Haskin EMH Team 3 lead of site evaluation

2: Thomas E. Dalton TED Site evaluator

3: Justin E. Long JEL Site evaluator

Air Monitoring Site Evaluation Summary

Local Site Name: New Market O3 **Initials:** TED **Date:** March 3, 2017

Additional Comments:

Site has been cleaned of the mold issue. Electric power provided by Appalachian Electric Power under meter number 67 377 701 or bar code *1NF104004600000* . Land owned by George A Miller III and Laura Shannon.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

MONITORING SITE EVALUATION FORM (MSEF) (Page 1/5)**Local Site Name:** New Market O3 **Initials:** TED **Date:** March 3, 2017

APC auditor should document in the Site Logbook – the time / date / purpose of visit / APC representatives present

Arrival Time: 6:40 am **Departure Time:** 7:45 am **Primary Operator:** Sam Barnett**Observer(s):** _____**SITE**

[N]-Security Fence [N]-Razor/Barb Wire [Y] Grass/Shrubs Cut [N] Bare Soil Area

[N] Vandalism – [☐Inside / ☐Outside] **Date:** N/A [N/A] Police Report Filed**Issues:** None**SHELTER - Interior****Arrival Temperature:** 23.02 °C (from data logger) **Operator Site Visits:** Once per [week][Y] Leaking Roof [Damaged: X Ceiling / ☐Floor / X Walls] [Y] Clean / Neat [N] Fire Extinguisher

[Y] Insect / Wildlife Issues [N] Thermometer (min/max) [N] Gasoline (inside shelter)

Issues: Ceiling has mold issues (leaking roof)**MONITOR(s):****Location:** Exterior Samplers [☐Roof / ☐Ground / ☐Not Present]

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	400E	2873

CALIBRATOR(s): ☐ Not Present [Y] Are QA/QC Check Gases Vented Outside Shelter?

QA/QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	329	1-18-17	

Is any analyzer sampling shelter air through its calibration line? [N] If yes, photo, document and notify agency mgr.

MSEF (Page 2/5): Local Site Name: New Market O3 Initials: TED Date: March 3, 2017

All Gas Standards Pass thru all Filters during: [Y] Calibrations [Y] Precision Checks [Y] Audits

Issues: None

CYLINDER GAS STANDARDS: **x Not Present**

VENDOR: (PSI Reading < 200, tank is empty and should not be in service)

QA /QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
NA					

Issues: None

SUPPORTING INSTRUMENTATION: **Internal**

[Y] Temperature Sensor [N] Uninterruptable Power Supply [N] On-Site Computer

Zero Air System: Commercial System (Make / Model): Dasbi 5011

Cartridge System: [☐Silica Gel [☐Pink / ☐Blue] / X Charcoal / ☐Purafil / ☐Hopcalite / Other: _____]

[N] Needs Service Last Service Date: _____ Condition: OK

Issues: None

Probe Line(s): [X Replaced / ☐Cleaned] – Frequency: Once a year Last Service Date: 2/16 2017

[Y] Clean [Y] Heated [N] Insulated [N] Moisture [N] Retractable [N] Old / Unused Lines [Y] Lo Flo

Manifold -> [N] **Any Open Ports?** -> How many analyzers using manifold? One

Issues: None

MSEF (Page 3/5): Local Site Name: New Market O3 Initials: TED Date: March 3, 2017

SHELTER – Exterior

Type: [☐Freezer / ☐Wood Building / ☐Brick-Block / Other: Mobile home type]

[Y] Needs Maintenance (specify) [Y] Tied Down [Y] Electrically Grounded [N] Roof Railing

Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / **X Not Present**] [N] Loose Decking (Trip Hazard)

Issues: Ladder has to be brought to the site. Maintenance of clean the interior/wash the roof and coat to exclude water from the inside.

Height of Roof: 3 meters Roofing Material: Metal

Issues: Roof Leaks

OUTDOOR SAMPLERS **X Not Present**

[Y/N] Locked [Y/N] Electrically Grounded [Y/N] Stabilized [Y/N] Clean Inside [Y/N] Head/Separator Clean

Operator / Log: VSCC/WINS Clean Schedule: _____ PM₁₀ Head Clean Schedule: _____

Issue(s): None

COLLOCATED SAMPLERS: **X Not Present** (39.4 inches = 1 meter)

Pollutant	Flow (Hi / Lo)	Separation Distance (meters)
N/A		

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

PROBE SYSTEM(s): External ☐ Not Present

Inlet Type: [☒ Single Line / ☐ Dual Line / ☐ Bell Type (CAS design)]

Funnel(s): [☒ Rain Shield / ☐ Part of Probe] Funnel Material: [☐ Teflon® / ☐ Glass / ☒ Stainless Steel / Other: _____]

Probe Line(s): [☒ Teflon® / Other: _____] Probe Fitting(s): [☒ Teflon® / Other: Stainless Steel ☐ Not Present]

Residence Time: (20 sec. max) (Refer to chart for maximum line lengths)

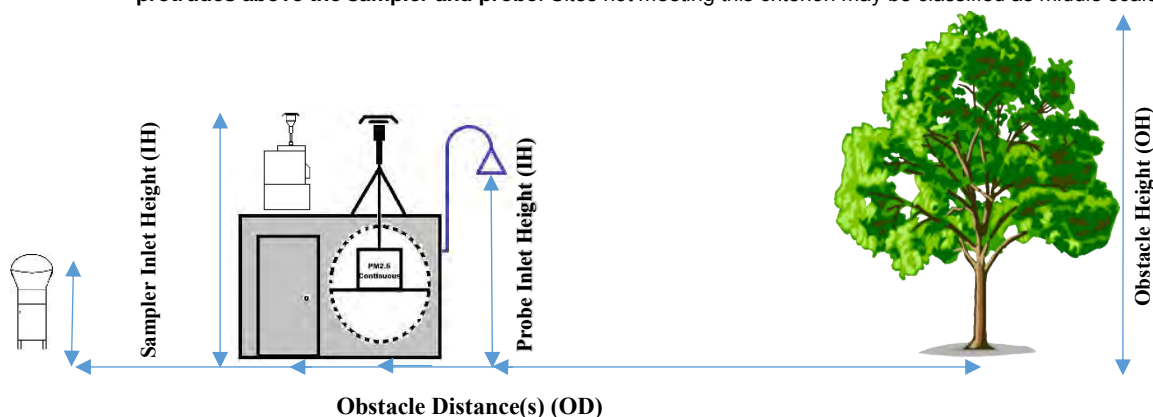
Issue(s): _____

Pollutant(s)	Inlet Height (meters)	Inlet Location (Side of Shelter, Ground, Roof)	Horizontal Distance (meters) If Applicable	Vertical Distance (meters) If Applicable	Monitoring SCALE	
					AQS	Annual Network Plan
O3	4.1	Side of shelter	N/A	>1		

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O₃, SO₂) & (2 meters for PM, Pb)

When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

OBSTRUCTION(s): Distance from sampler, probe to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler and probe. Sites not meeting this criterion may be classified as middle scale.



All distances in meters

OD **MUST** be $\geq [2*(OH-IH)]$

Obstacle(s)	Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	$[2*(OH-IH)]$	Obstacle Distance (OD)
N/A				

Please identify each of these obstacles in the SITE DRAWING (next page)

TREE DRIPLINE(s): _____ inches = _____ meters (nearest inlet to dripline) ☐ **No Trees Present**
 (39.4 inches = 1 meter) _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present
 _____ inches = _____ meters (nearest inlet to dripline) ☐ Not Present

Should be greater than **20 meters** from the dripline of tree(s) and **must be 10 meters** from the dripline when the tree(s) act as an obstruction.

Issues: _____

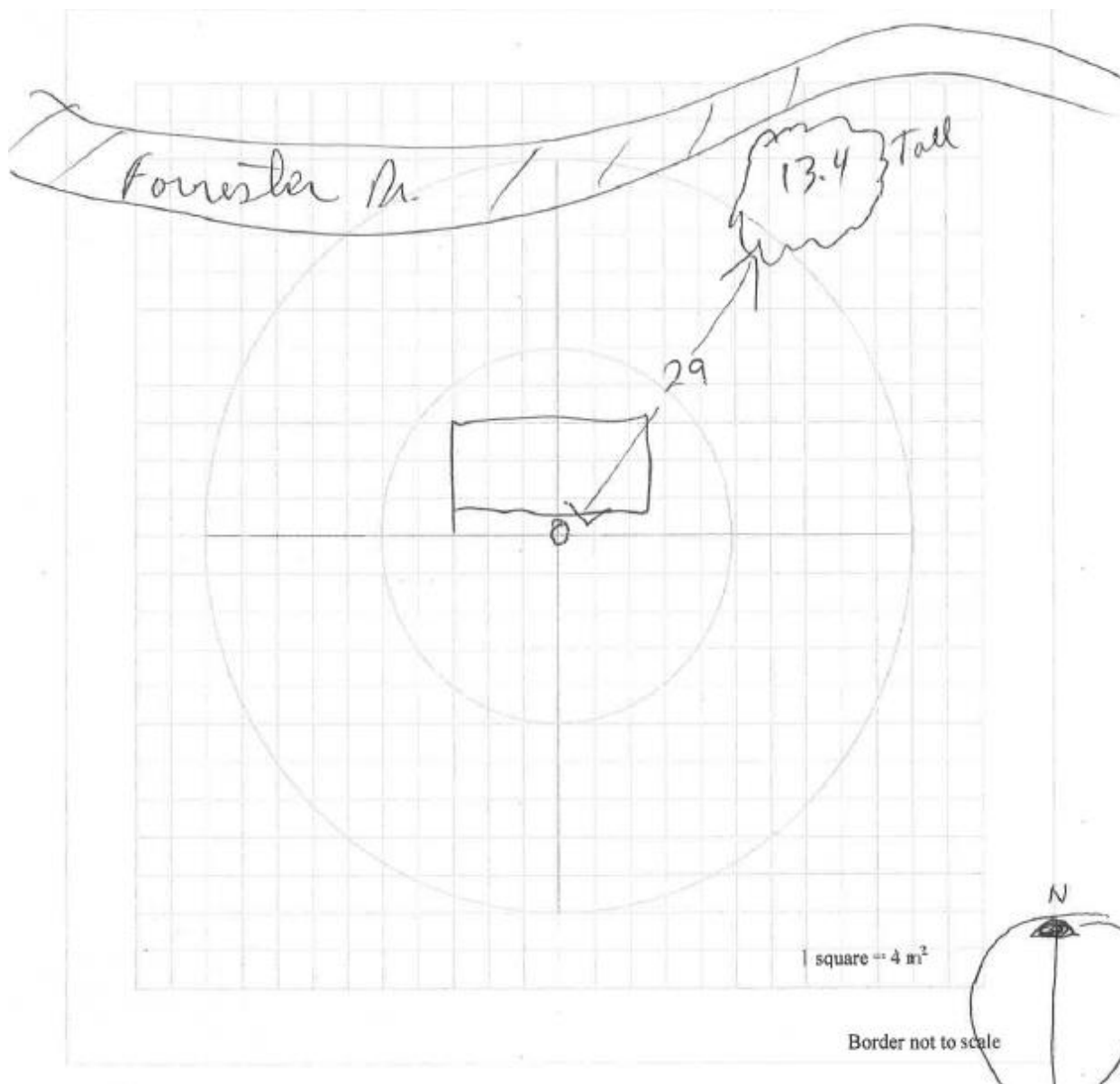
Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO₂ or SO₂ analyzers

Issues: None

SITE DRAWING - Please Indicate: (relevant distance / height measurements)

Direction NORTH	Monitoring Shelter	Nearby Trees/Shrubs	Possible Sources
Primary Wind Dir	Probe Position(s)	Roadways	Paved / Unpaved Areas
Security Issues	Exterior Samplers	Buildings	Nearby Construction
Sloping Areas	Met Tower	Walls	Flues, Vents, Boilers
	Security Fencing	Other Obstructions	Meat Cooking



UNRESTRICTED AIR FLOW: > 270 ° Estimated Degrees of Clearance

Must have unrestricted airflow **270 degrees** around the probe or sampler; **180 degrees** if the probe is on the **side of a building** or a wall.

Additional Information:

Only tree in area is NE of monitor at 29 meters distance. Height is 13.4 meters and the distance is 29 meters with inlet being 4.2 meters. $13.4 - 4.2 \times 2 = 18.4$. Distance being 29 meter and 18.4 meter (29 is greater than 18.4 making this not an obstacle).

The mold problem has been cleaned and painted (covered)

Aerial Photo with Wind Rose



PHOTO LOG: **Local Site Name:** New Market O3 **Initials:** TED **Date:** March 3, 2017

Camera [☐ APC / X Personal – **Owner:** _____] **Make/Model:** personal phone

Filename: 001 **Date:** 3-3-17 **Time:** 7:30 am **Photographer:** TED

Description: 001 - West toward monitor

Filename: 002 **Date:** 3-3-17 **Time:** 7:30am **Photographer:** TED

Description: 002 - West away from monitor (west directional)

Filename: 003 **Date:** 3-3-17 **Time:** 7:30 am **Photographer:** TED

Description: 003 - South toward monitor

Filename: 004 **Date:** 3-3-17 **Time:** 7:30 am **Photographer:** TED

Description: 004 - South away from monitor (south directional)

Filename: 005 **Date:** 3-3-17 **Time:** 7:30 am **Photographer:** TED

Description: 005 - East toward monitor

Filename: 006 **Date:** 3-3-17 **Time:** 7:30 am **Photographer:** TED

Description: 006 – East away from monitor (east directional)

Filename: 007 **Date:** 3-3-17 **Time:** 7:30 am **Photographer:** TED

Description: 007 - North toward monitor

Filename: 008 **Date:** 3-3-17 **Time:** 7:30 am **Photographer:** TED

Description: North away from monitor (north directional)

001-West toward monitor



002- West away from monitor (west directional)



003-South toward monitor



004-South away from monitor (south directional)



005-East toward monitor



006-East away from monitor (east directional)



007-North toward monitor



008-North away from monitor (north directional)



40 CFR Part 58, Appendix E, Tables and Figures

Roadway average daily traffic, vehicles per day	Minimum distance ¹ (meters)	Minimum distance ^{1 2} (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O₃)

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

²Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Required Pollutant Probe Height (meters) vs Monitoring Scale:

Pollutant	Micro	Middle	Neighborhood	Urban	Regional
O ₃	--	2-15	2-15	2-15	2-15
SO ₂	--	2-15	2-15	2-15	2-15
PM, Pb	2-7	2-7	2-15	2-15	2-15

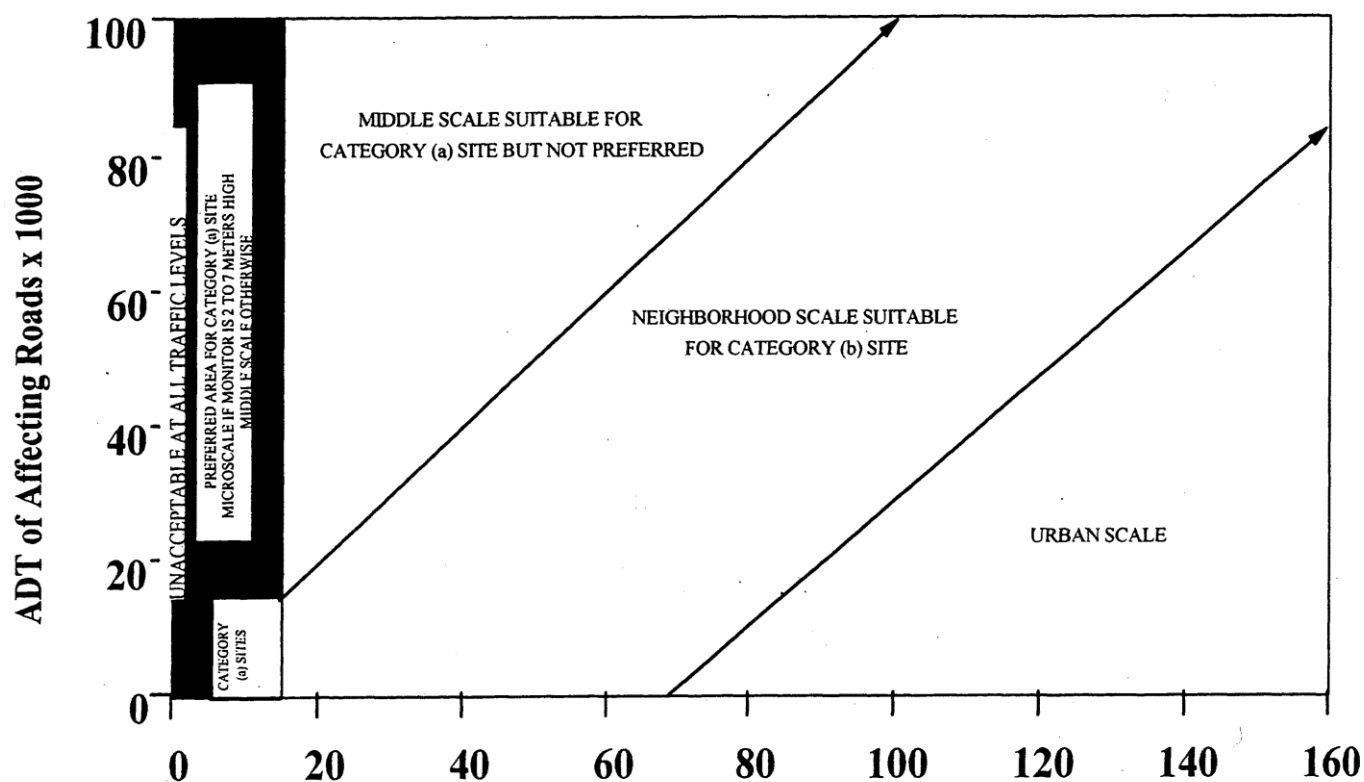


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Residence Time: The chart provides the maximum probe line length (in feet) of 1/4" OD tubing at given flow rate - using a 20 second residence time. The ID's shown are for thick (1/8"), intermediate (5/32") and thin (3/16") wall Teflon[®] tubing. The line lengths shown **do not** account for any lo-flo manifold volumes as part of the probe system.

1/4" Line OD / 20 Sec Residence Time			
Flow Rate	1/8" ID	5/32" ID	3/16" ID
(liters/min)	feet	feet	feet
0.1	13.8	8.8	6.1
0.2	27.6	17.7	12.3
0.3	41.4	26.5	18.4
0.4	55.3	35.4	24.6
0.5	69.1	44.2	30.7
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
0.9	124.3	79.6	55.3
1	138.1	88.4	61.4
1.1	151.9	97.2	67.5
1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
1.4	193.4	123.8	85.9
1.5	207.2	132.6	92.1
1.6	221.0	141.4	98.2
1.7	234.8	150.3	104.4
1.8	248.6	159.1	110.5
1.9	262.4	168.0	116.6
2	276.3	176.8	122.8

ADDITIONAL SUPPORTING INSTRUMENTATION

Uninterruptable Power Supply – not required, but a UPS can offer additional protection to the expensive equipment in the monitoring shelter.

On-Site Computer: not required, can act as a data backup device, can have electronic strip chart information for QC/QA purposes. The operator may utilize a laptop pc instead of one on-site.

Data Logger: Identify system at site
Identify how the analyzers are connected the data logger.

Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

Enter additional information about supporting instrumentation below:

A 4G cellular modem (Sierra Wireless RV50) provides internet communications to the BAM 1022 and to the other instruments at the site via a network switch.

RECORDS – at site
Documents available (QAPPs, SOPs)?

Yes

Are these electronic or hardcopy?

Hardcopy

Are logbooks at the site?

Yes

Charts / Papers on Walls: What do they Track, Up-to-date?

No

SHELTER

Is the shelter tied down – physically tied with hurricane straps?

Is the shelter grounded - look for rod in the ground and lead wire connection?

Type of Shelter(s) located on site:

1. **Enclosure:** N
2. **Trailer:** Y
3. **None:** N
4. **Other:** N

What are the shelter(s) made of?

1. _____
2. Sheet metal _____
3. _____
4. _____

Are any of the shelter(s) in need of maintenance (painting, cleaning, mold removal, repair)? **Yes**

Write additional comments on the shelters below:

The outside of the shelter needs to be cleaned.

INDEX

Local Site Name: prefer name used by agency monitoring staff for this site, this field should be completed for each page of the evaluation form, if a sheet ever separates from the logbook it can be returned to the proper place.

Initials: Initials of auditor completing form.

Date: current date site is entered by auditor

Reminder: If present, the auditor should add comment to the Site Logbook including: time, date, purpose of visit, auditors present.

Arrival Time: time auditors arrive at site

Departure Time: time auditors depart site

Primary Operator: the sites main operator, include parameters responsible for

Observers: person(s) at site, attending agency staff, site operators, other EPA, State auditors present

Networks: check all that apply, indicates type / purpose of monitoring conducted at site

SITE (Questions to ask yourself)

Security Fence: present or not? Security fencing can help with sample integrity. Is there more than one lock on gate, who has access other than monitoring staff?

Razor/Barb Wire - present or not? Note condition if damaged or aging – rusted? Is wire hanging down out of proper place?

Grass/Shrubs Cut: Is the grass and/or shrubs at the monitoring site cut and trimmed? Who is responsible for grass/shrub/tree maintenance? Is it regularly maintained?

Bare Soil: Does the site area consist of bare soil? Could be a local source for PM samplers (40 CFR Part 58 Appendix E, §3)

Vandalism – Any vandalism history at Site? Inside or Outside / check both if necessary? Date of last occurrence. Were police notified? If vandalism is current/ how serious/ gunfire into shelter?, loss of equipment/records?

SHELTER – Interior note condition/age of shelter, roof issues, water damage, and t, mold - insect issues, any electrical issues, is it clean, are the instruments securely mounted, loud pumps, is the lock secure

Arrival Temperature: Ask operator to provide current reading from data logging system if available. Values should be 20-30 °C generally, can depend on instrumentation present – FRM-FEM designations, and may be specified in agency QAPP. Some agencies keep the shelters near the upper limit in winter to help poorly insulated shelters maintain temperature overnight. May become too warm during mid-day hours. Conversely, an agency may keep the shelter cool in summer to help with high temperatures.

Operator Site Visits: how many times per week or month, what is the schedule? Does logbook confirm?

Leaking Roof: Does roof leak, evidence may be apparent, question operator?

Damage: Ceiling, Wall, Floor: document damage if present – how long did leak exist before repair?

Clean / Neat: Is interior of shelter maintained, are the floors/counters/walls clean, well-organized, neat in appearance?

Fire Extinguisher: not required by EPA, good idea.

Insect/Wildlife Issues: Termites eating shelter? Ants eating operator? Wasps/Bees attacking auditor? / Larger wildlife making shelter its home

Thermometer (min/max): not required, but good insurance measure should temperature probe fail. Operator should document reading at site visit and reset.

Gasoline: Gasoline for weed trimmers, etc. is dangerous to have inside the shelter and can impact concentration values. Gasoline should not be stored in same environment as sample equipment, away from pumps and other electrical equipment as well.

Monitors: document the instrumentation present – monitor / manufacturer / model / serial #, look at the age and/or condition of the instrumentation, clean/dirty, and examine lines for moisture, cleanliness, and kinks/cracks. Moisture in the sample line can scrub pollutant concentrations – data will have to be invalidated if moisture found – determine how long the moisture has been present.

Exterior Samplers – roof or ground.

Met: define the met instrumentation present or not.

Calibrators: can be ozone, gas blenders, audit calibrators, note condition, clean/dirty, and examine lines for moisture, cleanliness, kinks/cracks, examine line from calibrator to analyzer – it should be capped or connected to a solenoid or the calibrator – if the end is open the analyzer may be sampling shelter air – photograph, document, show operator – correct problem, note in site log. For each calibrator present at the site, if the site contains no standards, mark the not present selection and move to the next section.

QA/QC Vented? – Gases should be vented, it's unhealthy for operators to breathe these pollutant concentrations.

Is analyzer sampling Shelter Air? - if the analyzer is sampling shelter air, even partially, all of the data impacted must be invalidated.

FILTERS: For precision checks and audits, all gas standards (including Ozone) MUST pass through the sample line filter at the back of or internal to the instrument. Check the plumbing, interview the operator and qa auditor on this point. Calibrations may or may not pass through the filter, if it does it should be a clean filter and the records – logbook should indicate an ending precision check, then the filter change, then the calibration. If the calibration gas does not pass through the filter, there should be a probe line integrity check after the calibration – demonstrating the probe line has not impacted the pollutant concentration during the calibration.

Cylinder Gas Standards: complete the table as noted: QA/QC how is the standard used for QA or QC operations?, Gas Standard meaning CO, SO₂, NO, NO₂, the PSI reading - a low reading (≤ 200) is a warning that the tank should be considered empty – the gas regulator cannot reliably control lower than this reading. Note the expiration date, standard concentration and tank serial number from the certification information with the tank.