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 Evaluation
TDEC APC

Date: 03/13/2023
AQS Number: 47-001-0101
Site Name: Freel's Bend O3

Location: Oak Ridge, Tennessee
Pollutants: O3

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Freel's Bend Road	145.0 m	W	Thru St	NA	NA
Bull Run Road	700.0 m	N	Local St	NA	NA
Pumphouse Road	1492.6 m	NE	Local St	NA	NA
Bethel Valley Road	1849.5 m	N	Local St	10093	2022

Electrical

Utilities Company: City of Oak Ridge Electric Meter #: 115623305

Additional Comments:

1. Arrival, departure, and photo times are Eastern time.
2. Shelter temperature was 72 degrees F (22.2 degrees C)
3. Shelter is bolted to cement pad.
4. Fire extinguisher is in good condition.
5. SO2 sampling ended 12/31/2019.
6. Shelter is located on gated Department of Energy (DOE) property.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [□ Yes □ No] **Completed**

Arrival Time: 1:30 pm **Departure Time:** 2:30 pm **Primary Operator:** Erin Sturgill

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [□ Yes □ No ■ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.2 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel with duro-last single plu membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

MONITOR(s): **Location:** Exterior Samplers [□ **Roof** / □**Ground** / ■ **Not Present**]

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

CALIBRATOR(s): □ **Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	648	01/31/23	07/31/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: ■ **Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610268021016	Modem	Main
Agilaire	8872	532A	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 857)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/14/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/14/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS ■ **Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

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: 5.8 sec (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 O_3, SO_2,) & (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.

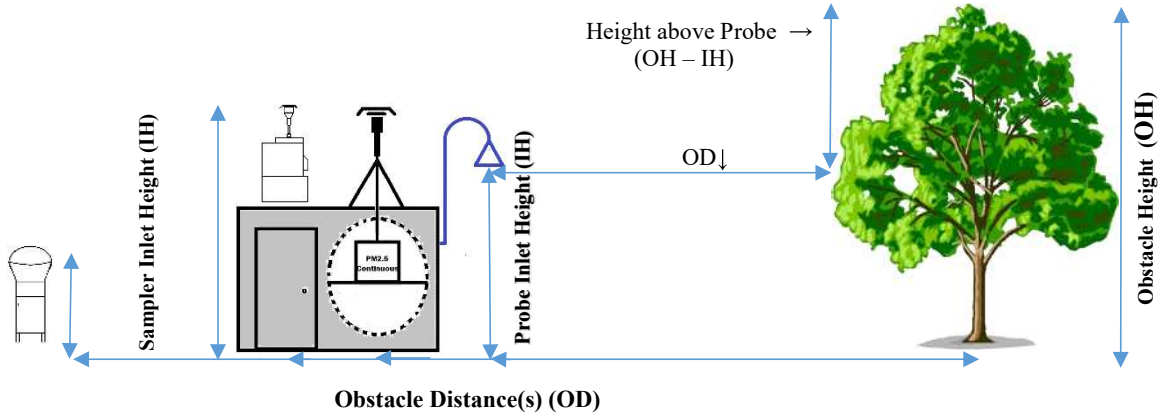
MSEF: Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 06/03/21

MSEF: Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Trees	10.9	4.0	13.8	67.0		233
2	Tree	10.9	4.0	13.8	36.4		66
3	Tree	13.2	4.0	18.4	32.2		58
4	Trees	12.8	4.0	17.6	33.0		51
5	Trees	13.1	4.0	18.2	35.0		43
6	Tree	15.5	4.0	23.0	60.0		13
7	Tree	6.2	4.0	4.4	45.0		4
8	Trees	10.9	4.0	13.8	52.0		6
9	Tree	9.0	4.0	10.0	58.0		333
10	Tree	9.9	4.0	11.8	67.0		297
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

TREE DRIPLINE(s): 32.2 **meters** (nearest inlet to dripline) □ **No Trees Present**
33.0 **meters** (nearest inlet to dripline) ☐ Not Present
35.0 **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 NO_2 or SO_2 analyzers

Issues: None

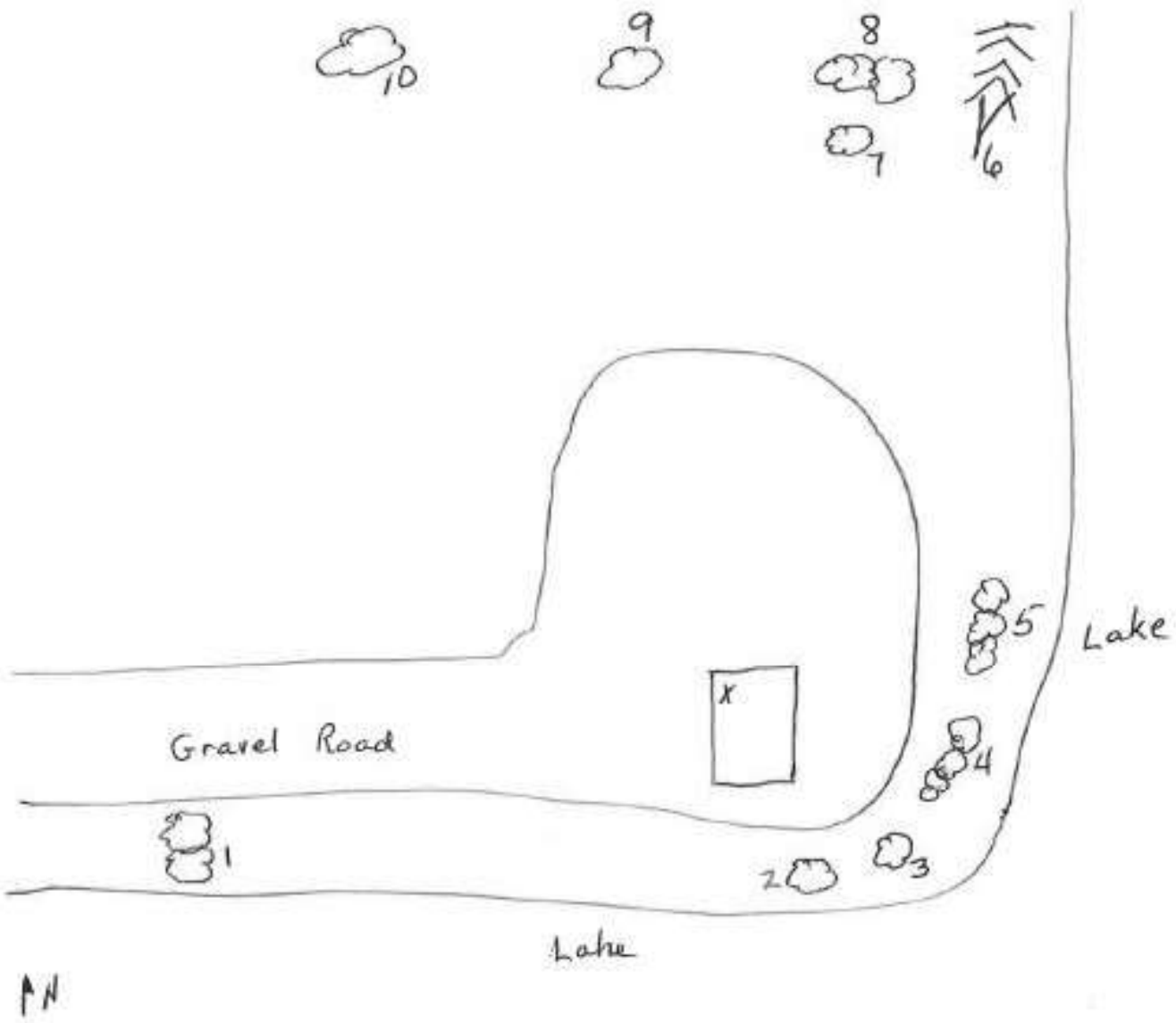
Additional Information:

Closest tree is greater than 20 meters from probe; therefore there are no tree dripline issues.

MSEF : Local Site Name: Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

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.

PHOTO LOG: **Local Site Name:** Freel's Bend O3 **Initials:** EMH **Date:** 03/13/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: North DIrectional

Photo: 002 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/13/23 **Time:** 2:15 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/13/23 Time: 2:15 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 03/13/23 **Time:** 2:15 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

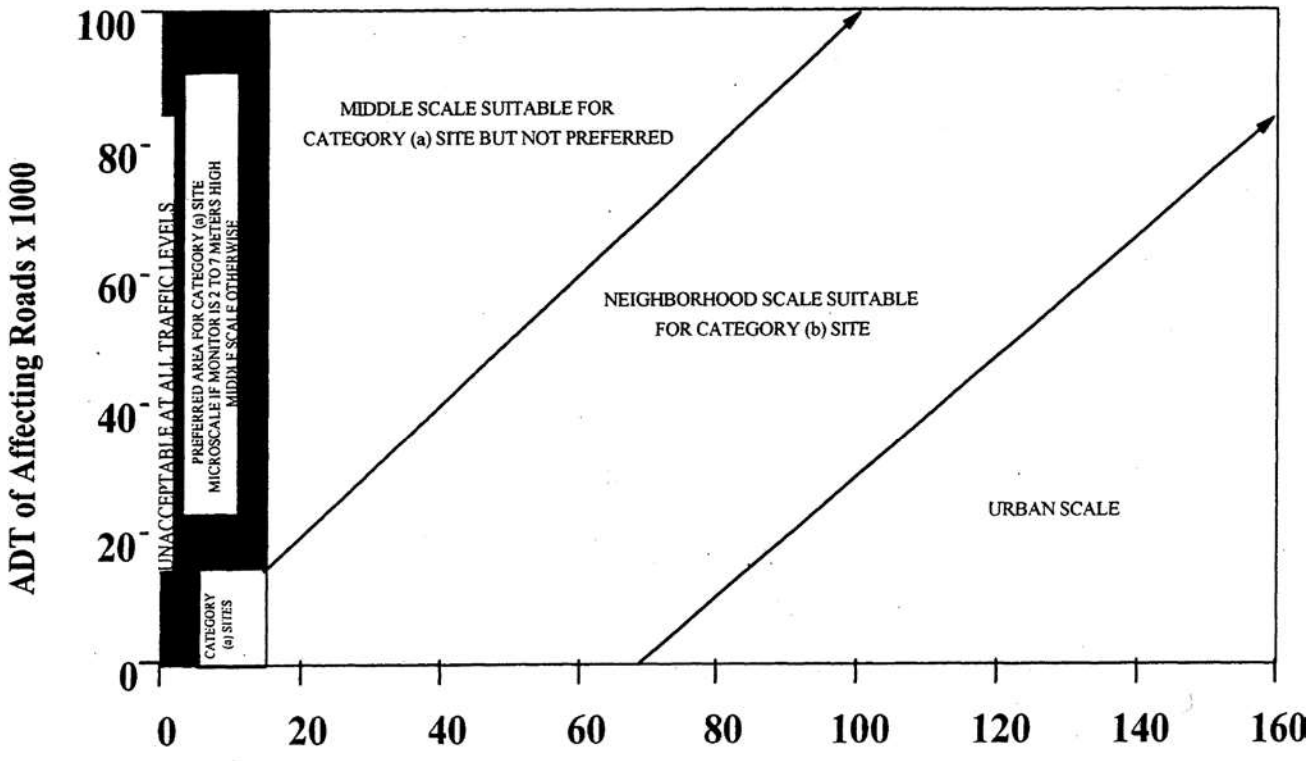


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/14/23
AQS Number: 47-009-0011
Site Name: Maryville PM

Location: Maryville, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Maryville PM **Initials:** EMH **Date:** 03/14/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Sequoyah Avenue	85.0 m	S	Local St	NA	NA
Brown School Road	606.0 m	NE	Local St	4676	2022
Genesis Street	607.0 m	SW	Local St	1416	2022
Cheltenham Road	563.0 m	NW	Local St	522	2022

Electrical

Utilities Company: Maryville Electric Department Meter #: 63109

Additional Comments:

1. Arrival, departure and photo are Eastern time.
2. Platform is in fair condition. There are some loose nails. Decking consists of 11 boards (60"L x 6"W x 1"T).

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Maryville PM **Initials:** EMH **Date:** 03/14/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 10:10 am **Departure Time:** 11:00 am **Primary Operator:** Justin Long

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	T17009

MSEF: Local Site Name: Maryville PM **Initials:** EMH **Date:** 03/14/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610225021016	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/ 30 days **PM_{10} Head Clean Schedule:** 1/30 days

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.

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			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

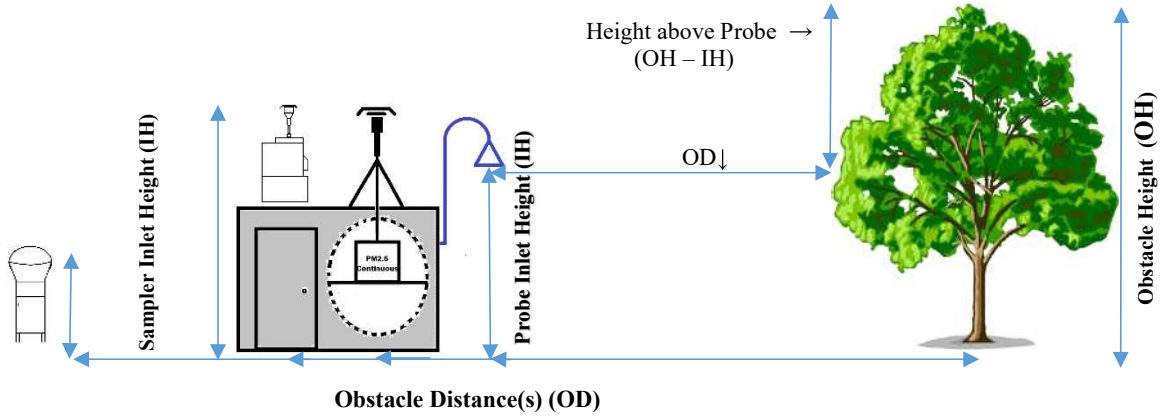
MSEF: Local Site Name: Maryville PM **Initials:** EMH **Date:** 03/14/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 09/11/21

MSEF: Local Site Name: Maryville PM **Initials:** EMH **Date:** 03/14/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Water Tower	27.0	2.6	48.8	34.7	✓	45
2	Tree	19.3	2.6	33.4	51.5		125
3	Trees	9.2	2.6	13.2	27.0		133
4	Shrub	4.0	2.6	2.8	20.0		191
5	Building	6.9	2.6	8.6	35.2		263
6	Trees	13.0	2.6	20.8	37.0		297
7	Tree	3.4	2.6	1.6	46.0		315
8	Building	4.1	2.6	3.0	27.8		341
9	Building	5.7	2.6	6.2	56.5		348
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Maryville PM **Initials:** EMH **Date:** 03/14/23

TREE DRIPLINE(s): 27.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

37.0 **meters** (nearest inlet to dripline) □ Not Present

46.0 **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 NO_2 or SO_2 analyzers

Issues: None

Additional Information:

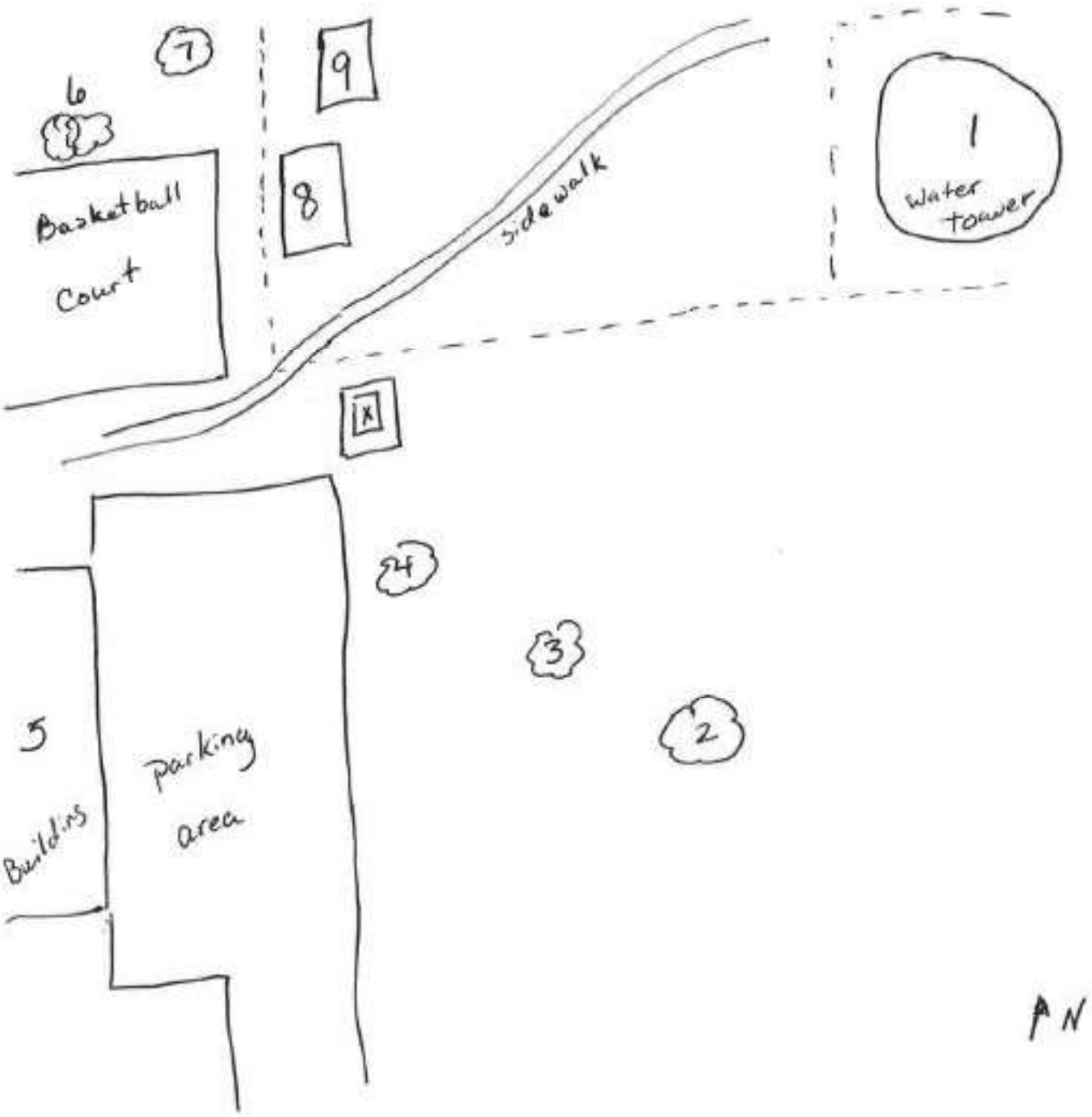
The closest tree is greater than 20 meters; therefore there are no tree dripline issues.

Object #1 (Water tower) is considered an obstacle. It falls within one 90 degree quadrant, allowing more than 270 degrees of unrestricted air flow around the PM inlet.

MSEF : Local Site Name: Maryville PM **Initials:** EMH **Date:** 03/14/23

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.

PHOTO LOG: **Local Site Name:** Maryville PM **Initials:** EMH **Date:** 03/14/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: North Directional

Photo: 002 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: East Directional

Photo: 004 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: South Directional

Photo: 006 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: West Directional

Photo: 008 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/14/23 **Time:** 10:45 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/14/23 Time: 10:45 am Photographer: EMH Description: Monitor

Photo: 011 **Date:** 03/14/23 **Time:** 10:45 am **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

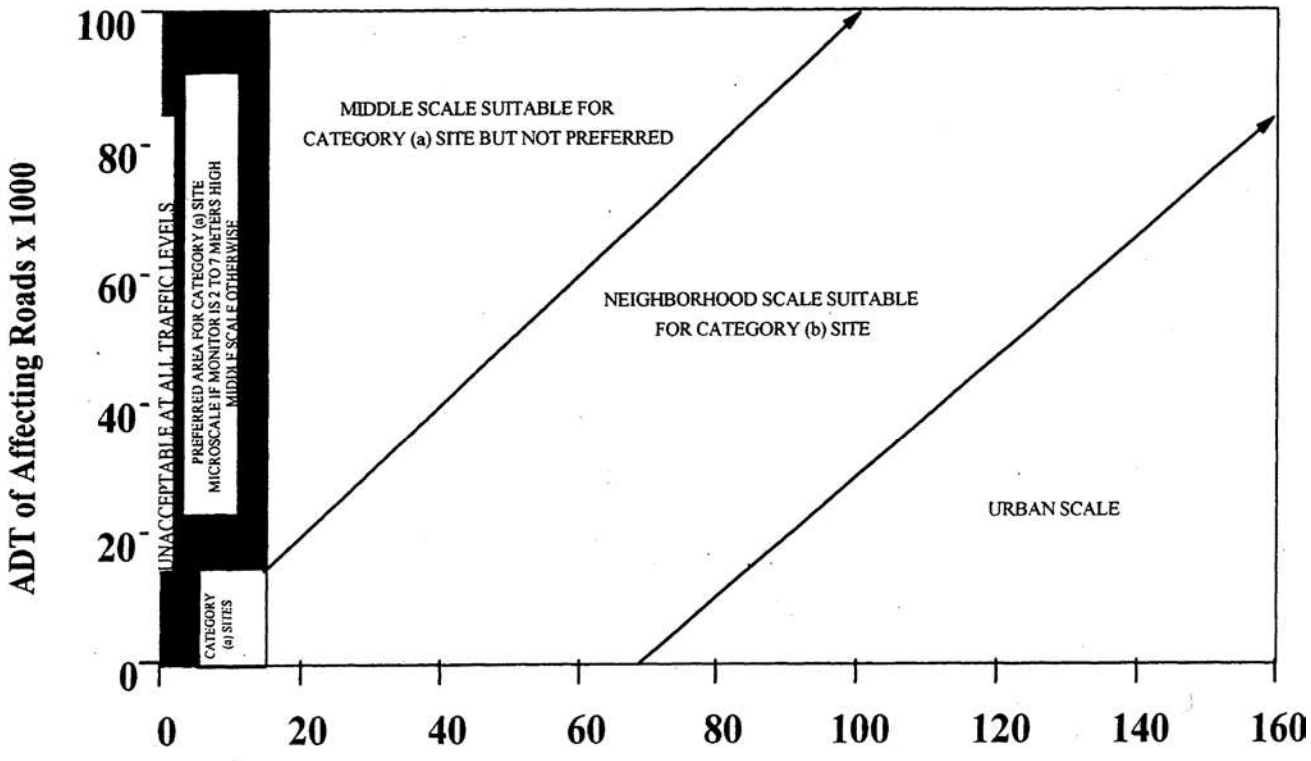


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/23/23
AQS Number: 47-045-0004
Site Name: Dyersburg PM

Location: Dyersburg, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 03/23/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Greenway Street	134.0 m	N	Local St	NA	NA
Parr Avenue	104.5 m	E	Local St	7007	2022

Electrical

Utilities Company: Dyersburg Electric System Meter #: 141259421

Additional Comments:

1. Arrival, departure and photo times are Central time.
2. The platform with the BAM monitor is in fair condition. The paint is peeling on it. The decking consists of consists of 6 boards (60" L x 6"W x 1"T) and one board (60" L x 2.5" W x 1"). The other platform with old TEOM shelter needs to be removed.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 03/23/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 1:05 pm **Departure Time:** 2:10 pm **Primary Operator:** Brad Garrett

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	C20241

MSEF: Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 03/23/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R91110670021009	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/ 30 days **PM_{10} Head Clean Schedule:** 1/ 30 days

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.

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 O_3, SO_2,) & (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.

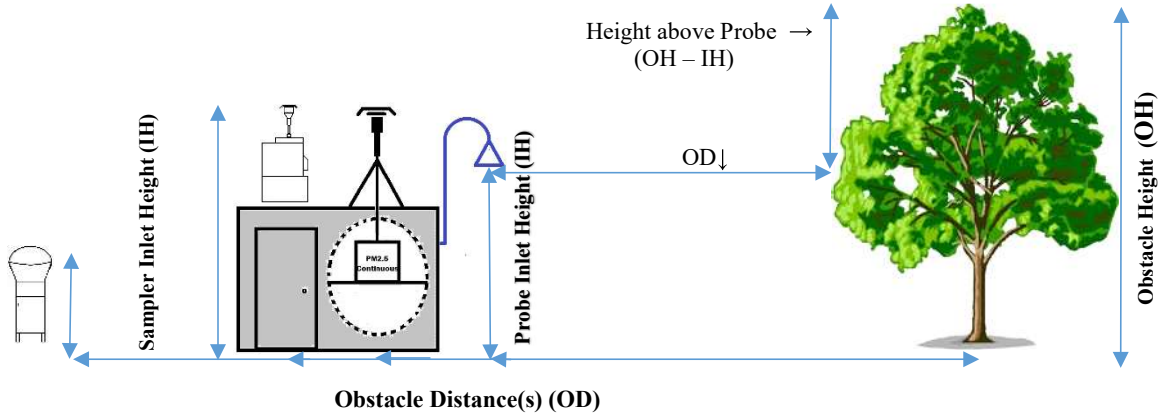
MSEF: Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 03/23/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 02/01/22

MSEF: Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 03/23/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Apartment Building	5.2	2.5	5.4	32.3		345
2	Apartment Building	5.2	2.5	5.4	22.8		315
3	Trees	8.1	2.5	11.2	22.0		294
4	Trees	12.0	2.5	19.0	24.5		91
5	Trees	12.3	2.5	19.6	38.0		58
6	Trees	11.0	2.5	17.0	45.0		47
7	Tree	11.6	2.5	18.2	55.2		42
8	Building	3.7	2.5	2.4	27.0		68
9	Substation	4.8	2.5	4.6	95.0		22
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 03/23/23

TREE DRIPLINE(s): 22.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

24.5 **meters** (nearest inlet to dripline) ☐ Not Present

38.0 **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 NO_2 or SO_2 analyzers

Issues: None

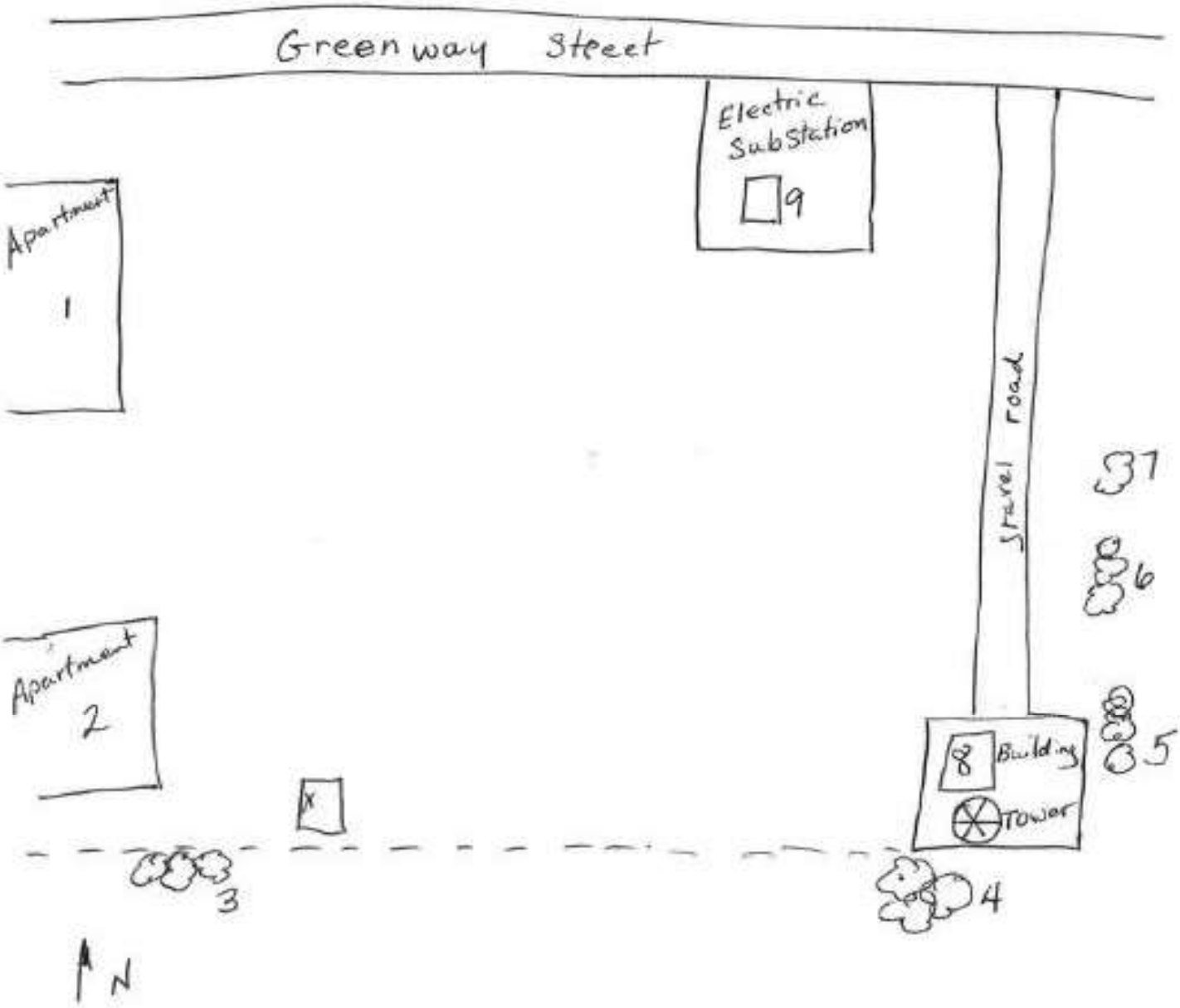
Additional Information:

The closest tree is greater than 20 meters from inlet; therefore there are no tree dripline issues.

MSEF : Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 03/23/23

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.

PHOTO LOG: **Local Site Name:** Dyersburg PM **Initials:** EMH **Date:** 03/23/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/23/23 **Time:** 1:45 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/23/23 Time: 1:45 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 03/23/23 **Time:** 1:45 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

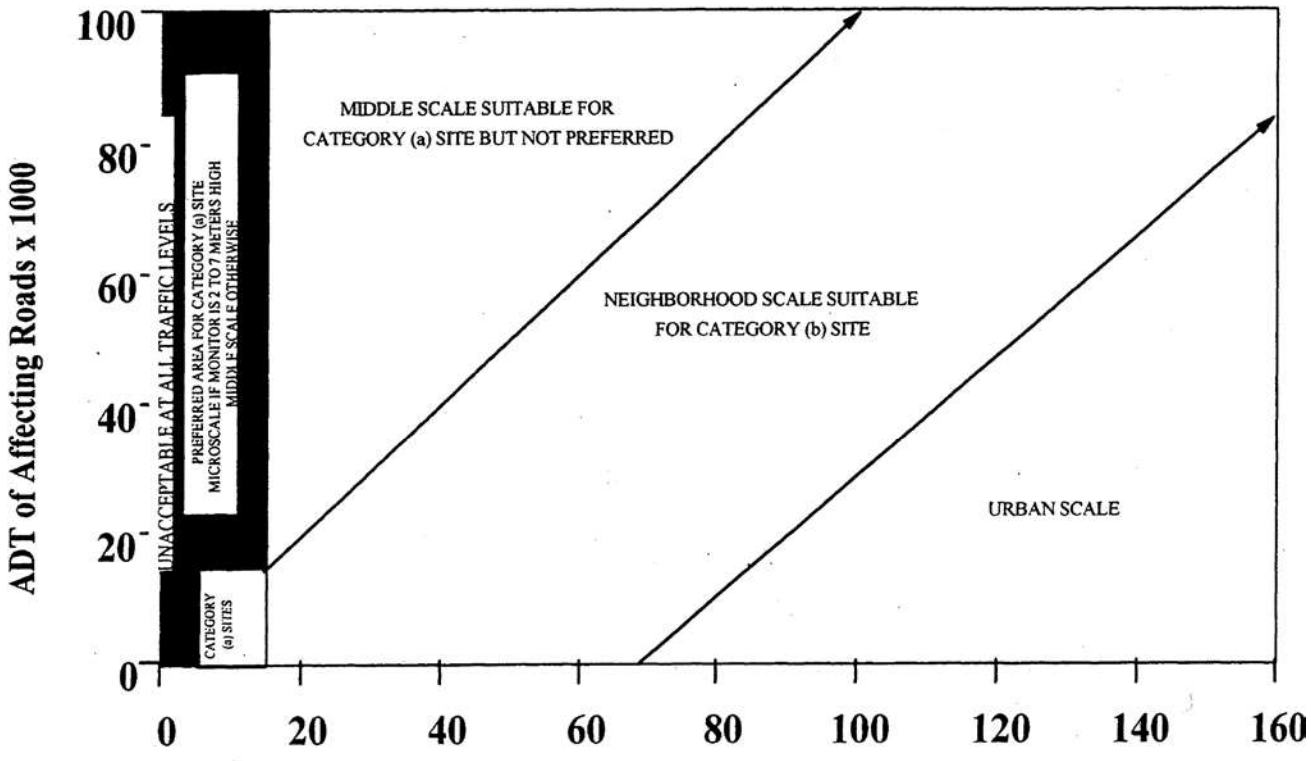


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/14/2023
AQS Number: 47-089-0002
Site Name: New Market O3

Location: New Market, Tennessee
Pollutants: O3

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Forester Road	10.0 m	N	Local St	NA	NA
Lost Creek Road	696.0 m	W	Local St	402	2022

Electrical

Utilities Company: Appalachian Electric Corp. Meter #: 333594941

Additional Comments:

1. Arrival, departure and photo times are Eastern times.
2. Forester Road is 10.0 meters away from the probe (measured by the laser range finder).
3. Shelter temperature was 72 degrees F (22.2 C).
4. Fire extinguisher is in good condition.
5. Shelter is bolted to cement pad.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 11:55 am **Departure Time:** 12:35 pm **Primary Operator:** Erin Sturgill

Observer(s): _____

SITE

[□ Yes ■ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.8 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel with Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Comments: _____

MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

MONITOR(s): **Location:** Exterior Samplers [□ **Roof** / □**Ground** / ■ **Not Present**]

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	4511

CALIBRATOR(s): □ **Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	645	01/31/23	07/31/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: ■ **Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610246021016	Modem	Main
Agilaire	8872	513	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 1344)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/13/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 02/13/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

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: 5.8 seconds (20 sec. max) (Refer to chart for maximum line lengths)

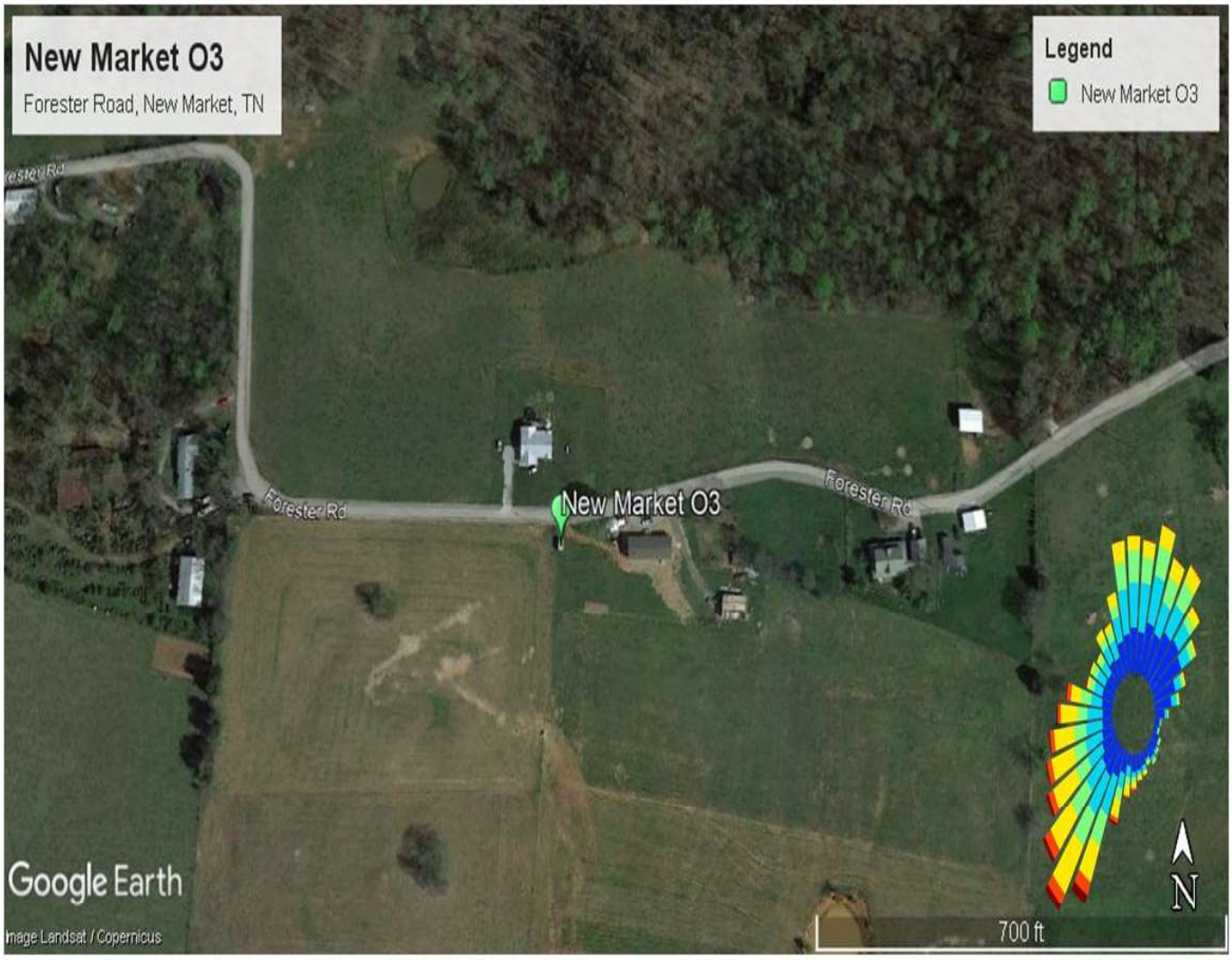
Issue(s): _____

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			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

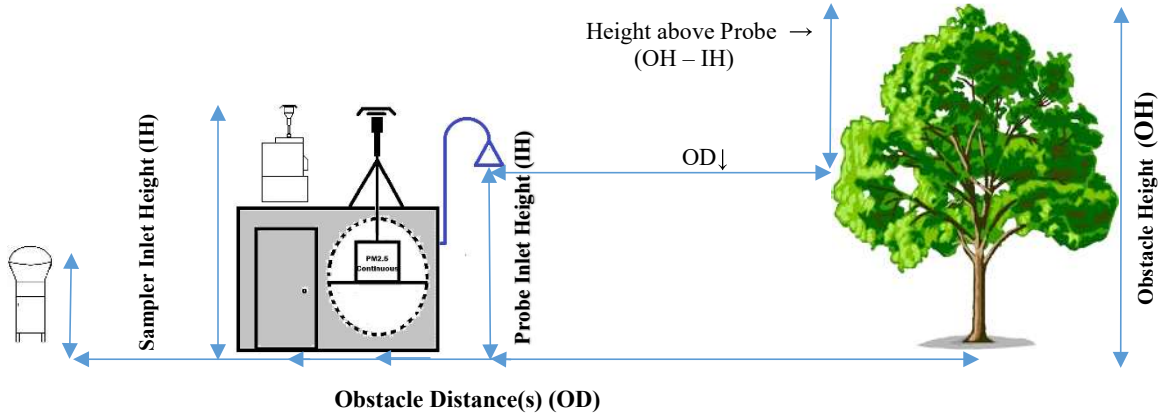
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 04/03/21

MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Blue house	4.5	4.0	1.0	36.0	☐	10
2	Tree	14.3	4.0	20.6	22.0	☐	68
3	Green house	6.2	4.0	4.4	38.8	☐	90
4	Trees	9.7	4.0	11.4	133.0	☐	212
5	Trees	10.6	4.0	13.2	102.0	☐	285
6						☐	
7						☐	
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

TREE DRIPLINE(s): 22.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

102.0 **meters** (nearest inlet to dripline) □ Not Present

133.0 **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 NO_2 or SO_2 analyzers

Issues: None

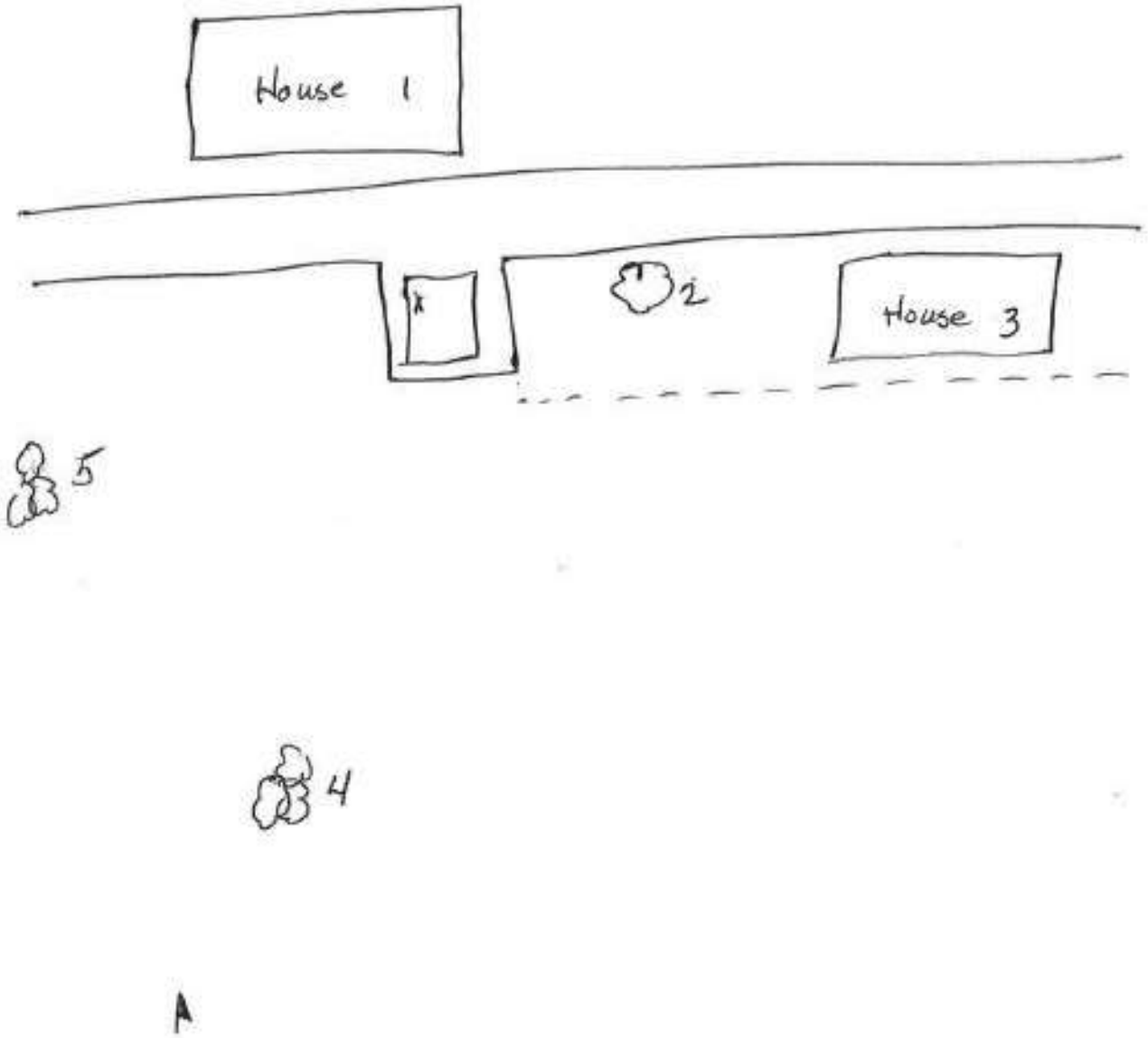
Additional Information:

The closest tree is greater than 20 meters from the probe; therefore there are no tree dripline issues.

MSEF : Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/14/23

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.

PHOTO LOG: **Local Site Name:** New Market O3 **Initials:** EMH **Date:** 03/14/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/14/23 **Time:** 12:20 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/14/23 Time: 12:20 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 03/14/23 **Time:** 12:20 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

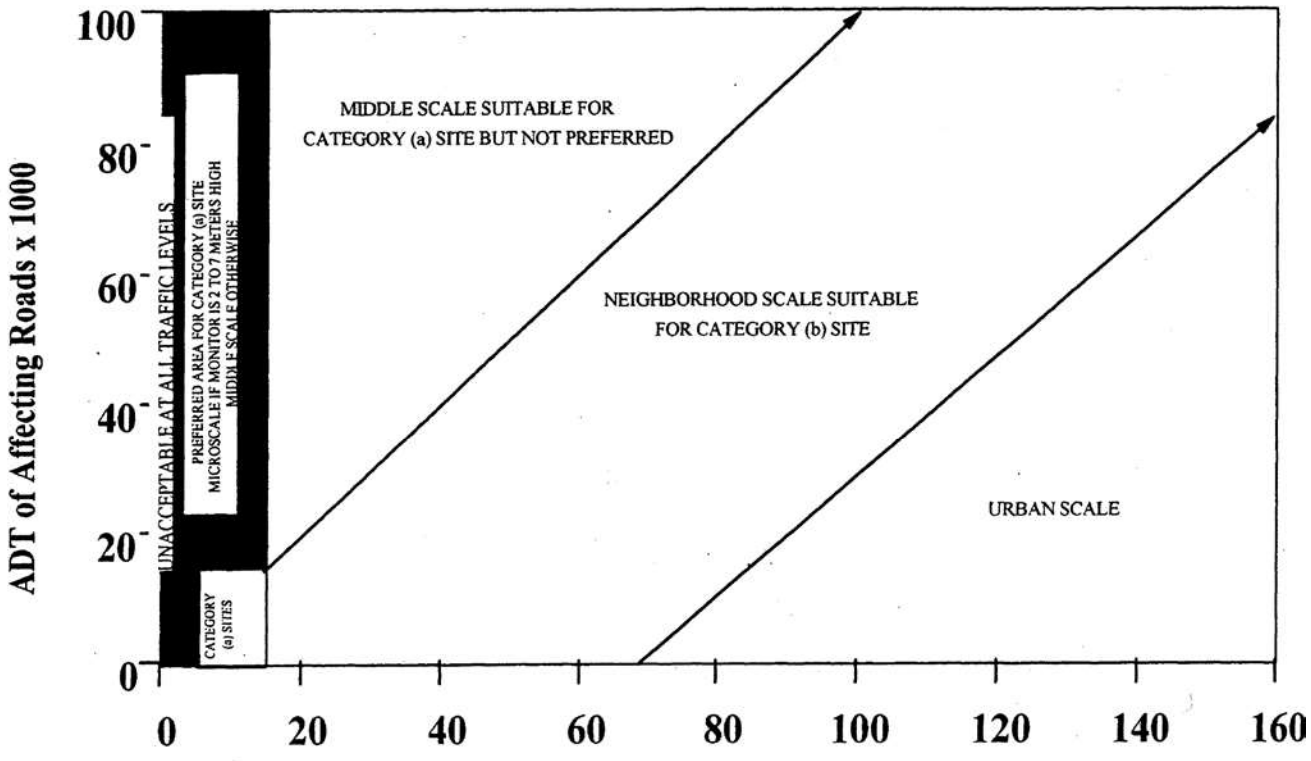


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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.

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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.

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Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

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

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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.

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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.

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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 Evaluation
TDEC APC

Date: 02/23/23 **Location:** Loretto, Tennessee

AQS Number: 47-099-0003

Site Name: Loretto PM **Pollutants:** PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Loretto PM **Initials:** EMH **Date:** 02/23/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Busby Road	268.2 m	S	Local St	1501	2022

Electrical

Utilities Company: NA Meter #: NA

Additional Comments:

1. Electricity for site is provided by the City of Loretto.
2. Arrival, departure and photo times are in Central time.
3. Decking boards were replaced 7/19/22.
4. Site is located within the fenced-area of the Loretto wastewater plant.
5. Loretto is one of the sites with a purple air sensor and a weather station.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Loretto PM **Initials:** EMH **Date:** 02/23/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 10:35 am **Departure Time:** 11:25 am **Primary Operator:** Hattie Benet

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [■ Yes □ No] **Good** [□ Yes ■ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.3	Met One	BAM 1022	T17015

MSEF: Local Site Name: Loretto PM **Initials:** EMH **Date:** 02/23/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R0033042601B118	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/14days **PM_{10} Head Clean Schedule:** 1/14 days

Issue(s): _____

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

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

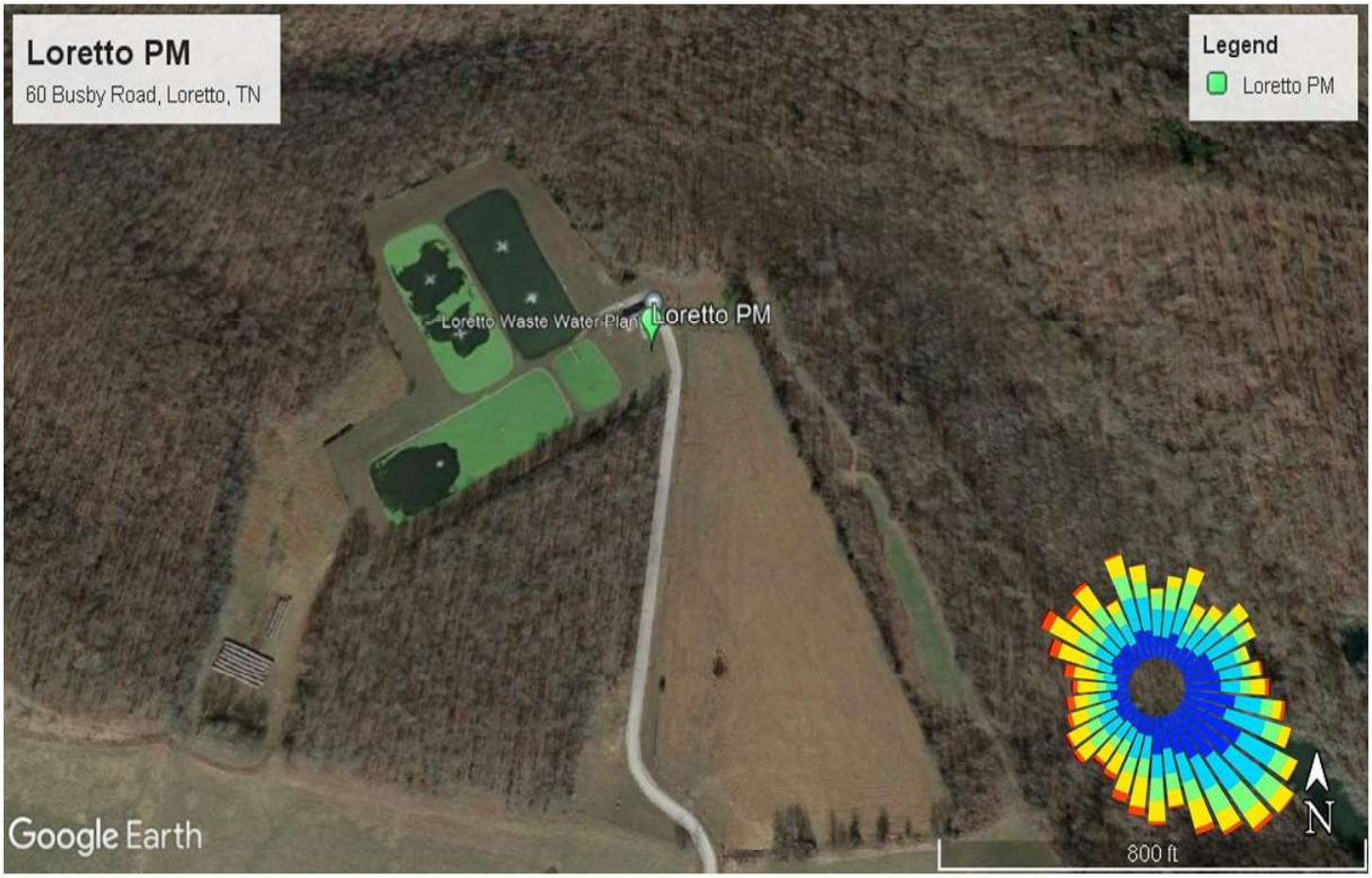
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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			Regional	Regional

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Loretto PM **Initials:** EMH **Date:** 02/23/23

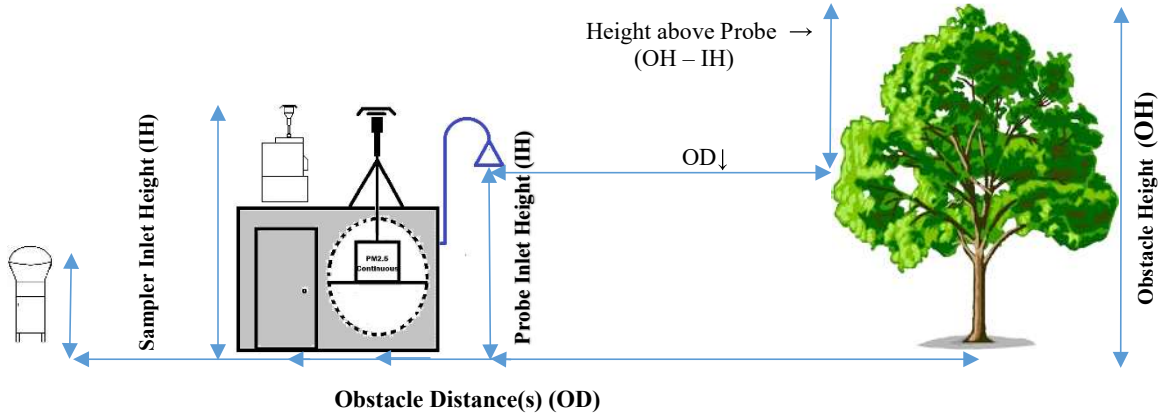
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 01/07/20

MSEF: Local Site Name: Loretto PM **Initials:** EMH **Date:** 02/23/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Trees	16.4	2.6	27.6	40.0		150
2	Pine Tree	12.0	2.6	18.8	45.0		176
3	Tree	4.6	2.6	4.0	60.0		201
4	Building	4.5	2.6	3.8	19.2		344
5	Trees	24.0	2.6	42.8	60.0		22
6	Trees	24.0	2.6	42.8	64.0		33
7	Pine Trees	21.0	2.6	36.8	67.0		66
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Loretto PM **Initials:** EMH **Date:** 02/23/23

TREE DRIPLINE(s): 40.0 **meters** (nearest inlet to dripline) ☐ **No Trees Present**

45.0 **meters** (nearest inlet to dripline) ☐ Not Present

_____ **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 NO_2 or SO_2 analyzers

Issues: None

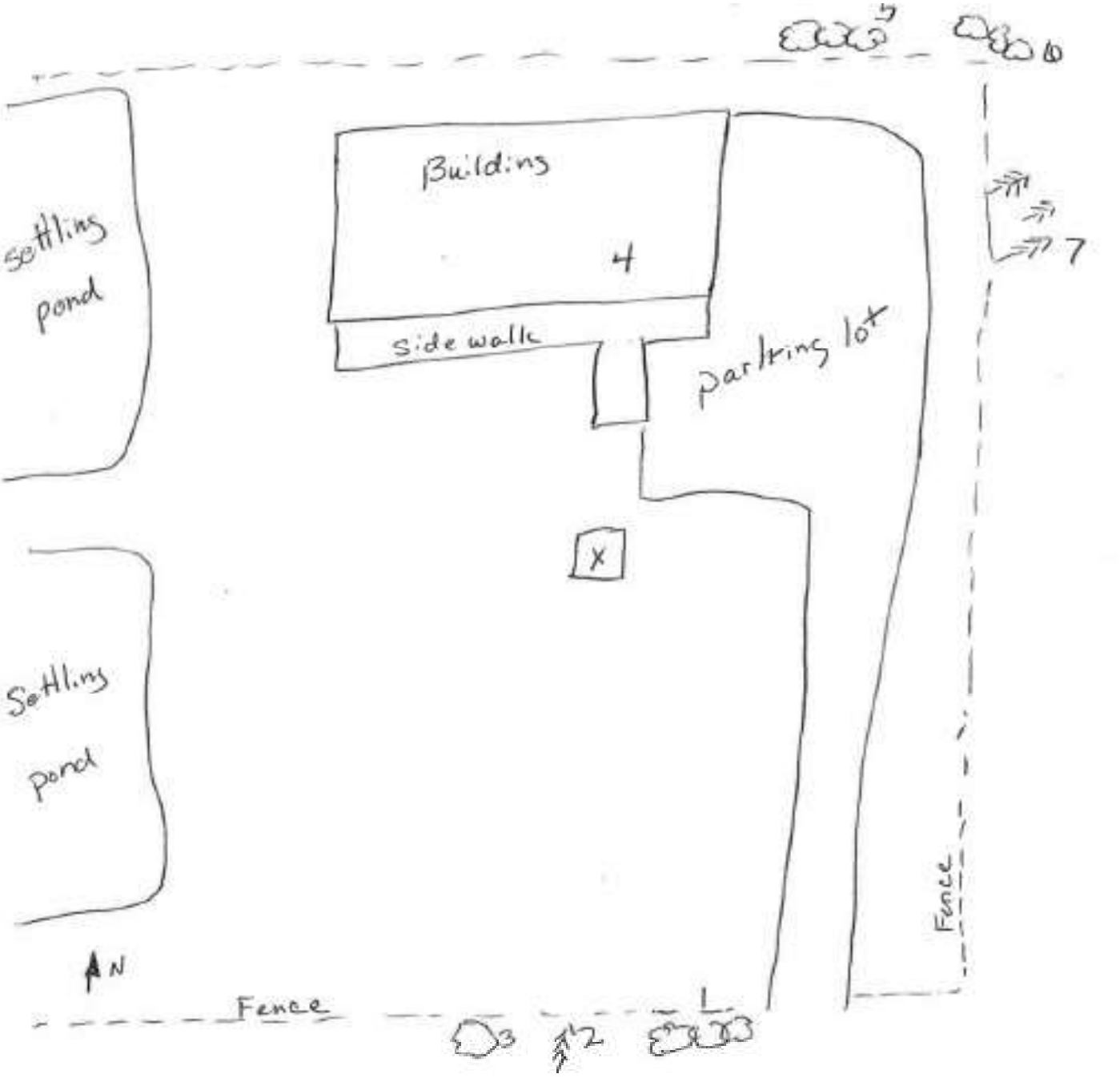
Additional Information:

The closest tree is greater than 20.0 from the inlet; therefore there are no tree dripline issues.

MSEF : Local Site Name: Loretto PM **Initials:** EMH **Date:** 02/23/23

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.

PHOTO LOG: **Local Site Name:** Loretto PM **Initials:** EMH **Date:** 02/23/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: North Directional

Photo: 002 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: East Directional

Photo: 004 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: South Directional

Photo: 006 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: West Directional

Photo: 008 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 02/23/23 **Time:** 11:10 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 02/23/23 Time: 11:10 am Photographer: EMH Description: Monitor

Photo: 011 Date: _____ Time: _____ Photographer: _____ Description:_____

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

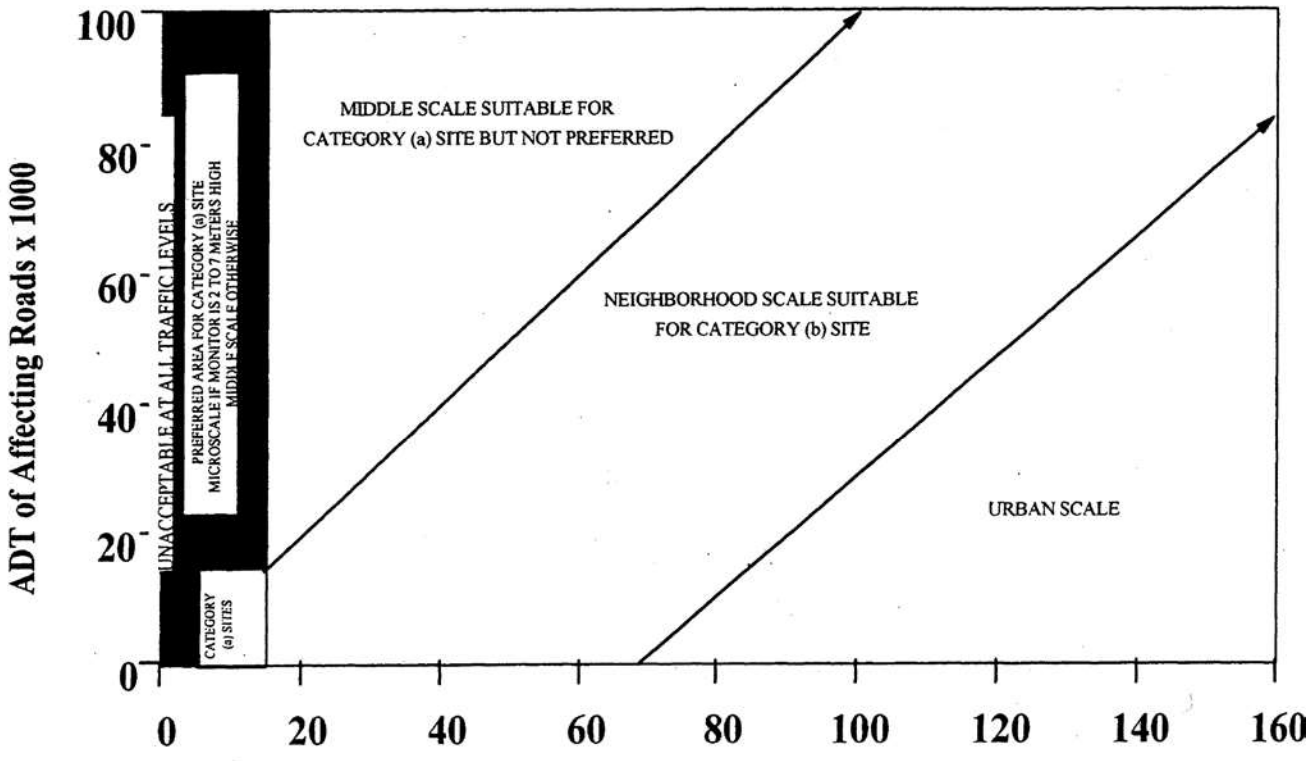


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/13/2023
AQS Number: 47-105-0109
Site Name: Loudon

Location: Loudon, Tennessee
Pollutants: O3, PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Highway 72	109.0 m	N	Major Highway	10274	2022
Roberts Road	176.0 m	S	Local St	NA	NA

Electrical

Utilities Company: Loudon Utilities Meter #: 36726580

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. Shelter temperature is 73 degrees F (22.8 degrees C).
3. Shelter is bolted to cement pad.
4. Fire extinguisher is in good condition.
5. Distance between O3 probe to BAM 1 inlet is 4.5 meters and distance between O3 probe to BAM 2 inlet is 3.8 meters.
6. Both platforms are in fair condition. Paint peeling off of both platforms with BAM 1 being the worse of the two platforms.

BAM 1 platform consists of 5 boards (60"L x 6" W x 1"T) and one board (60" L x 6"W x 1"T).

BAM 2 platform consists of 11 boards (60"L x 6" W x 1"T).

7. The Loudon site has a weather station located on the roof of the shelter.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 3:15 pm **Departure Time:** 4:15 pm **Primary Operator:** Justin Long

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.1 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel with Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: □ Not Present

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / □Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2282
PM2.5 (1)	Met One	BAM 1022	W17126
PM 2.5 (2)	Met One	BAM 1022	T19946

CALIBRATOR(s): **□ Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	644	01/31/23	07/31/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: **■ Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610095011016	Modem	Main
Agilaire	8872	519A	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 1341)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/14/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/14/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **□ Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** 1/30 days **PM_{10} Head Clean Schedule:** 1/30 days

Issue(s): _____

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

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
PM2.5	Lo	1.9
PM2.5	Lo	1.9

*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.

MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

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

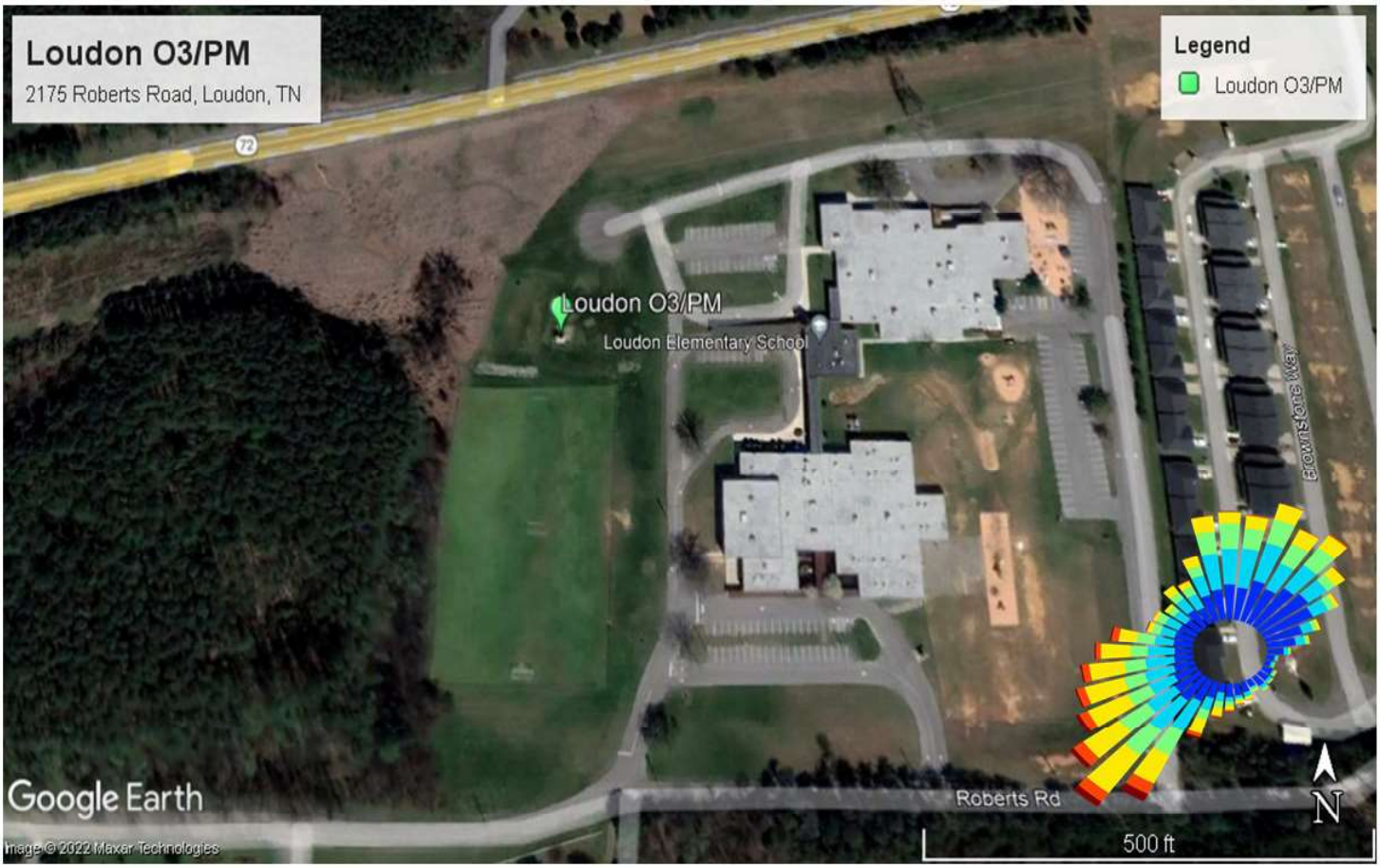
Issue(s): _____

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	4.5	Side of Shelter			Neighborhood	Neighborhood
PM 2.5	2.6	Ground	1.9		Neighborhood	Neighborhood
PM 2.5	2.6	Ground	1.9		Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

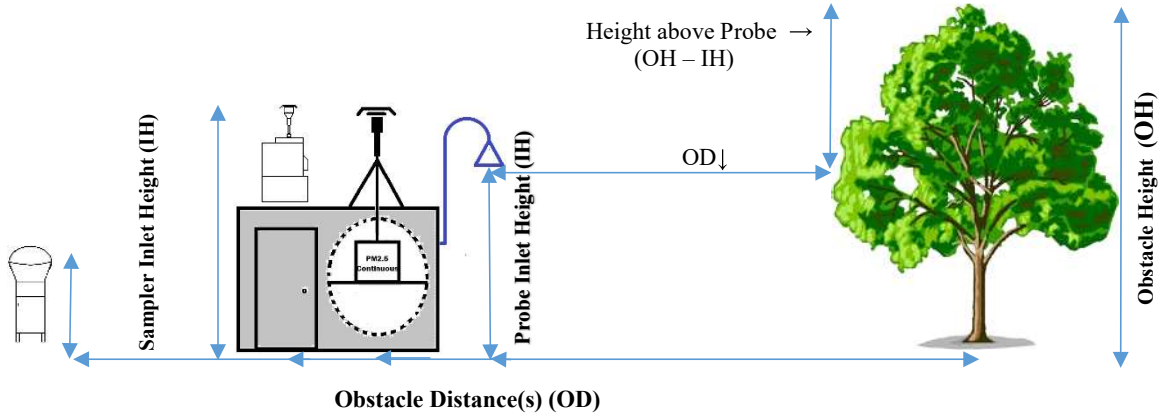
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 04/01/22

MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	School	7.3	4.5	5.6	104.0	☐	84
2	Tree	17.1	4.5	25.2	74.2	☐	115
3	Tree	13.9	4.5	18.8	112.0	☐	130
4	Tree	14.0	4.5	19.0	136.0	☐	139
5	Trees	14.4	2.6	23.6	48.0	☐	290
6						☐	
7						☐	
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

TREE DRIPLINE(s): 48.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

74.2 **meters** (nearest inlet to dripline) □ Not Present

112.0 **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 NO_2 or SO_2 analyzers

Issues: None

Additional Information:

Objects # 1, 2, 3, and 4: distances are measured from O3 probe

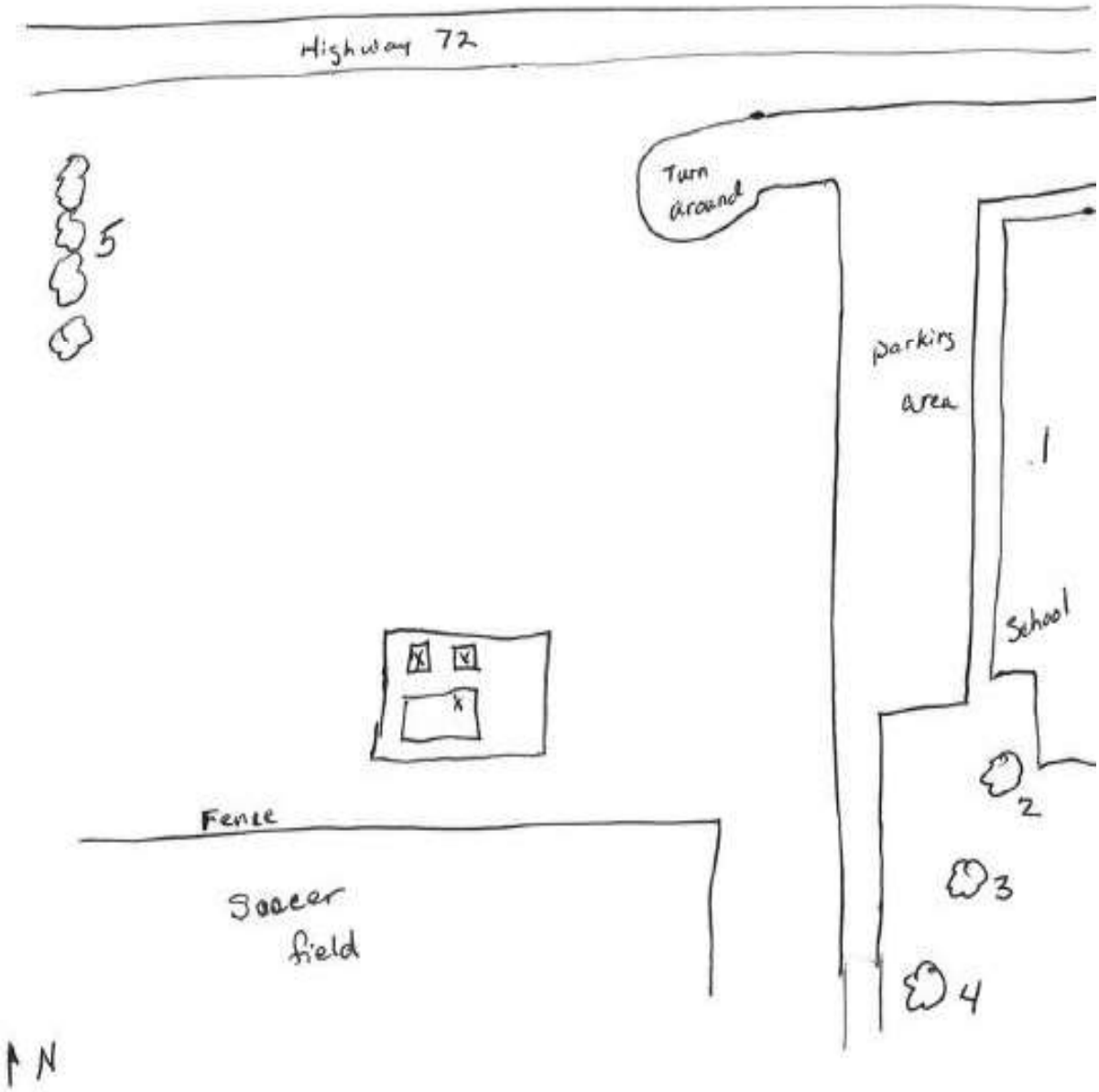
Object # 5: distance measured from BAM 1 inlet

The closest tree is greater than 20 meters from both probe or inlets; therefore there are no tree dripline issue.

MSEF : Local Site Name: Loudon **Initials:** EMH **Date:** 03/13/23

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.

PHOTO LOG: **Local Site Name:** Loudon **Initials:** EMH **Date:** 03/13/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/13/23 **Time:** 3:55 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: Shelter and O3 probe

Photo: 011 **Date:** 03/13/23 **Time:** 3:55 pm **Photographer:** EMH **Description:** Monitors

Photo: 012 Date: 03/13/23 Time: 3:55 pm Photographer: EMH Description: Electric meter

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 (O_3)**

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

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

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

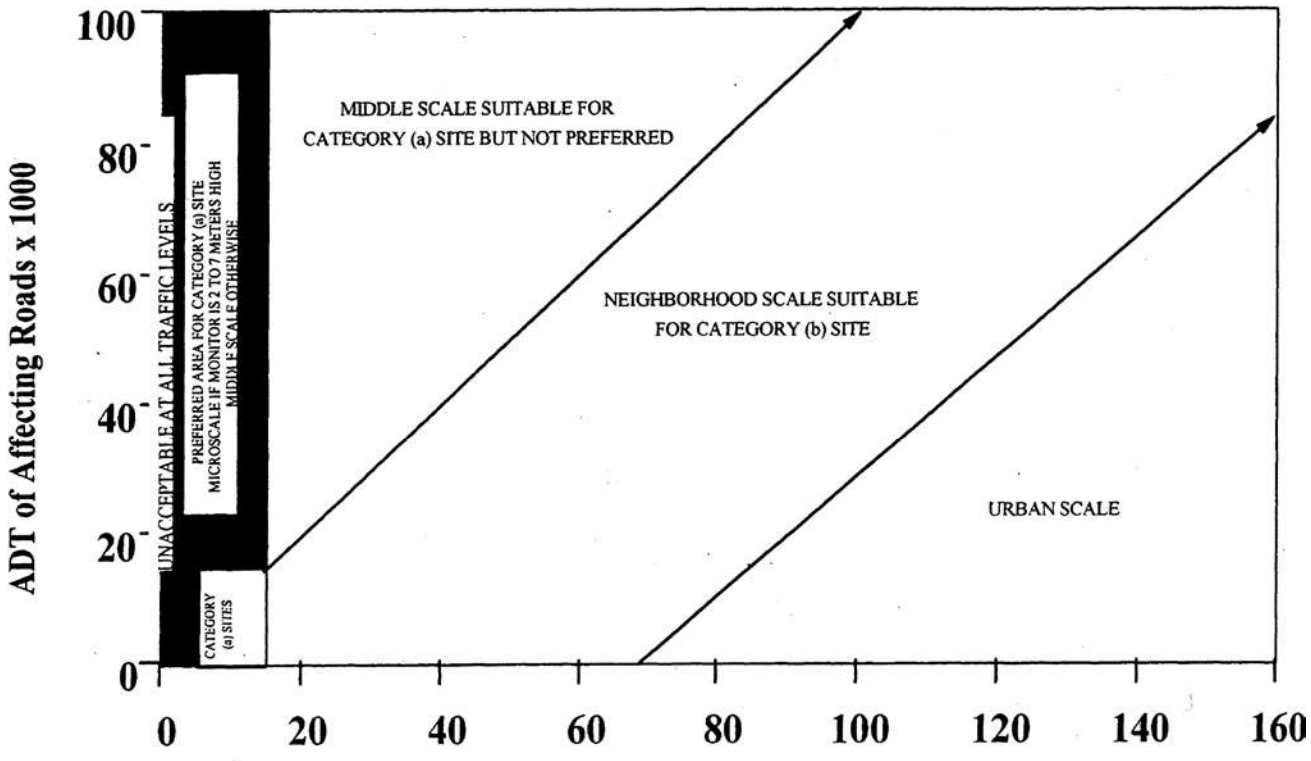


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 02/06/23
AQS Number: 47-107-1002
Site Name: Athens PM

Location: Athens, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Athens PM **Initials:** EMH **Date:** 02/06/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Knoxville Avenue	85.0 m	N	Local St	NA	NA
North Jackson Road	104.5 m	W	Local St	4966	2022

Electrical

Utilities Company: Athens Power Meter #: AP 11233

Additional Comments:

1. Arrival, departure and photo times are in Eastern time.
2. Platforms need repair. BAM Platform: made of 9 boards (48" L x 6" W x 1"T) and TEOM Platform: 10 boards (60" L x 6:wx1"T) and 1 board (60"L x 3"W x 1"T)

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Athens PM **Initials:** EMH **Date:** 02/06/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 11:50 am **Departure Time:** 12:45 pm **Primary Operator:** Stephanie Dyer

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [□ Yes □ No ■ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes ■ No □ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: See Comment on page 2.

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: See Comment on page 2.

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: Hardcopy logbook on site in operator cannot access eSIMS.

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	T21579

MSEF: Local Site Name: Athens PM **Initials:** EMH **Date:** 02/06/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93140235011014	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/30 days **PM_{10} Head Clean Schedule:** 1/30 days

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.

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			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

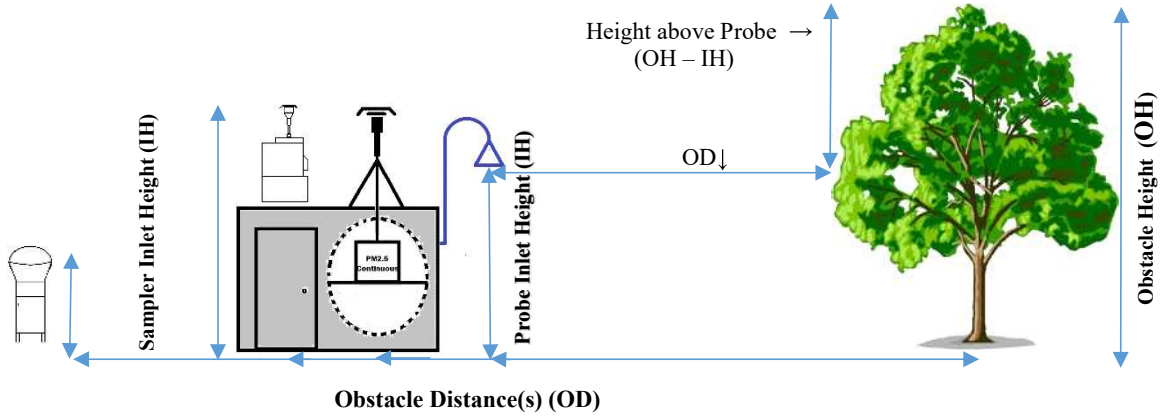
MSEF: Local Site Name: Athens PM **Initials:** EMH **Date:** 02/06/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 11/09/19

MSEF: Local Site Name: Athens PM **Initials:** EMH **Date:** 02/06/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	YMCA Building	8.0	2.6	10.8	52.0		12
2	Tree	18.0	2.6	30.8	64.0		38
3	Tree	14.0	2.6	22.8	90.0		53
4	Tree	12.6	2.6	20.0	84.0		69
5	Blue Building	6.0	2.6	6.8	31.8		149
6	Shed	3.4	2.6	1.6	23.4		259
7	Carport	3.5	2.6	1.8	25.0		305
8	Church	7.0	2.6	8.8	33.0		314
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Athens PM **Initials:** EMH **Date:** 02/06/23

TREE DRIPLINE(s): 64.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

_____ **meters** (nearest inlet to dripline) ☐ Not Present

_____ **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 NO_2 or SO_2 analyzers

Issues: None

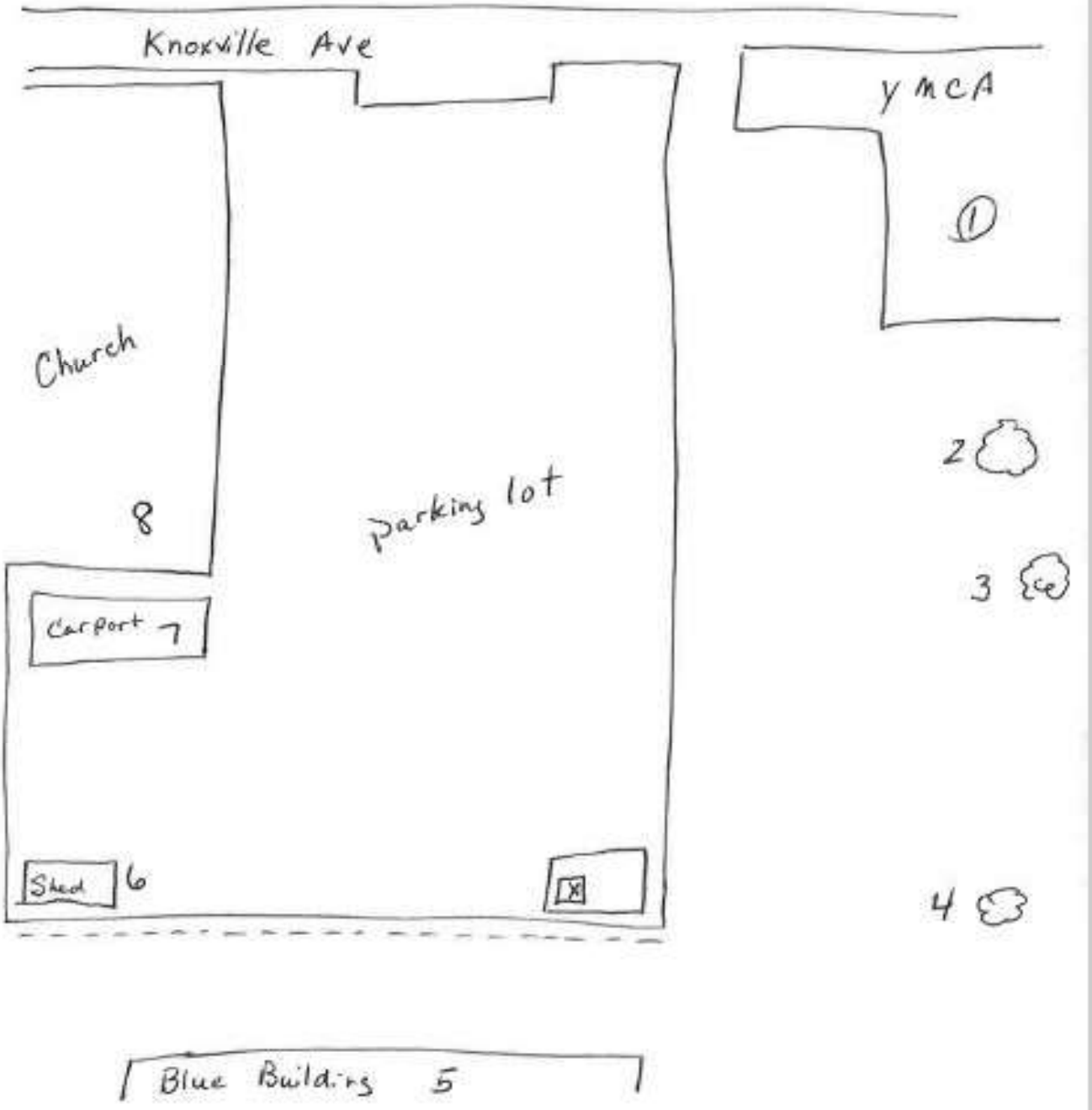
Additional Information:

Closest tree is greater than 20.0 meters from inlet; therefore there are no tree dripline issue.

MSEF : Local Site Name: Athens PM **Initials:** EMH **Date:** 02/06/23

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.

PHOTO LOG: **Local Site Name:** Athens PM **Initials:** EMH **Date:** 02/06/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 02/06/23 **Time:** 12:35 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 02/06/23 Time: 12:35 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 02/06/23 **Time:** 12:35 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

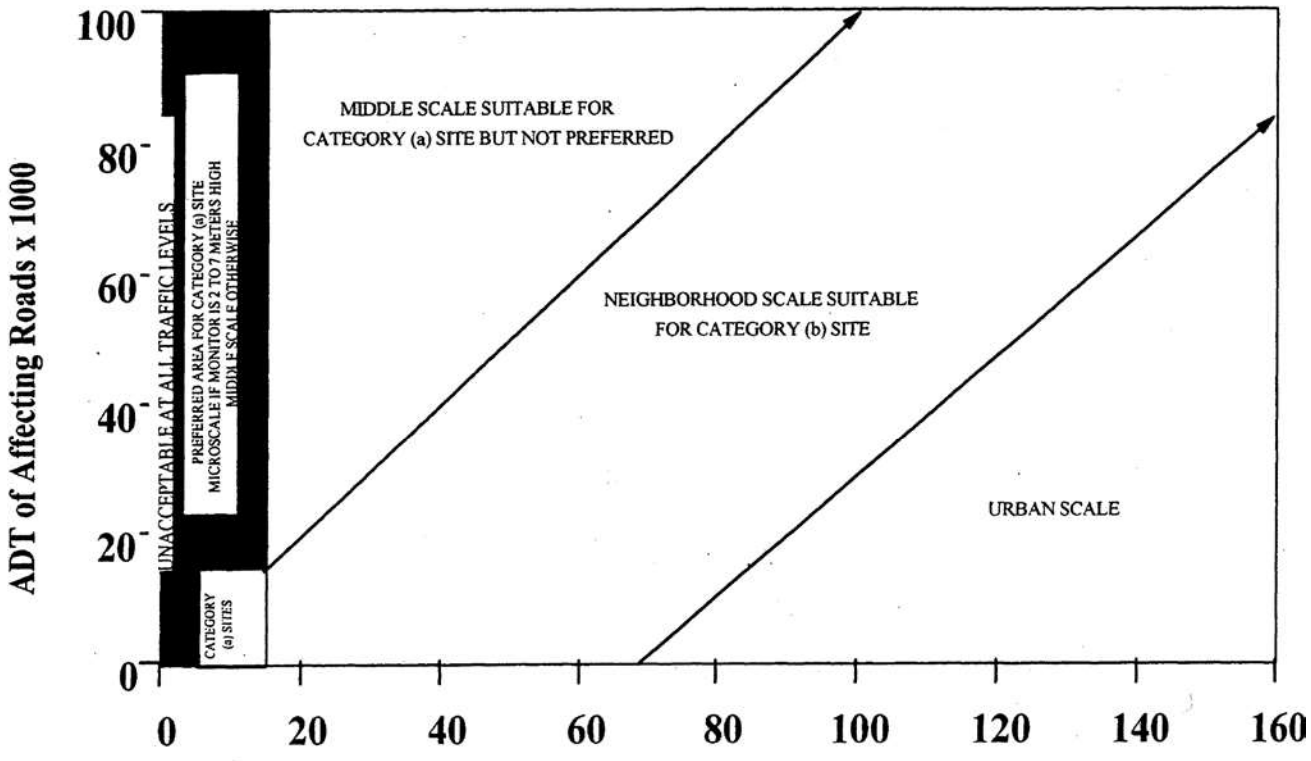


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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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
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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?

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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.

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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 Evaluation
TDEC APC

Date: 03/23/23
Location: Jackson, Tennessee
AQS Number: 47-113-0010
Site Name: Jackson PM
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Jackson PM **Initials:** EMH **Date:** 03/23/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Demonbreun Drive	245.0 m	NW	Local St	NA	NA
North Highland Avenue	1101.8 m	W	Major St	12115	2022

Electrical

Utilities Company: Jackson Electric Authority Meter #: RD2-191819

Additional Comments:

1. Arrival, departure and photo times are Central time.
2. Platform has paint peeling off boards. Decking consists of 6 boards (38.5" L X 6" W x 1"T).
3. Fencing makes an enclosed cage.
4. Jackson is one of the sites with a purple air sensor.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Jackson PM **Initials:** EMH **Date:** 03/23/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 10:30 am **Departure Time:** 11:30 am **Primary Operator:** David Norville

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	C20236

MSEF: Local Site Name: Jackson PM **Initials:** EMH **Date:** 03/23/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93330040021016	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/ 30 days **PM_{10} Head Clean Schedule:** 1/ 30 days

Issue(s): _____

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

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

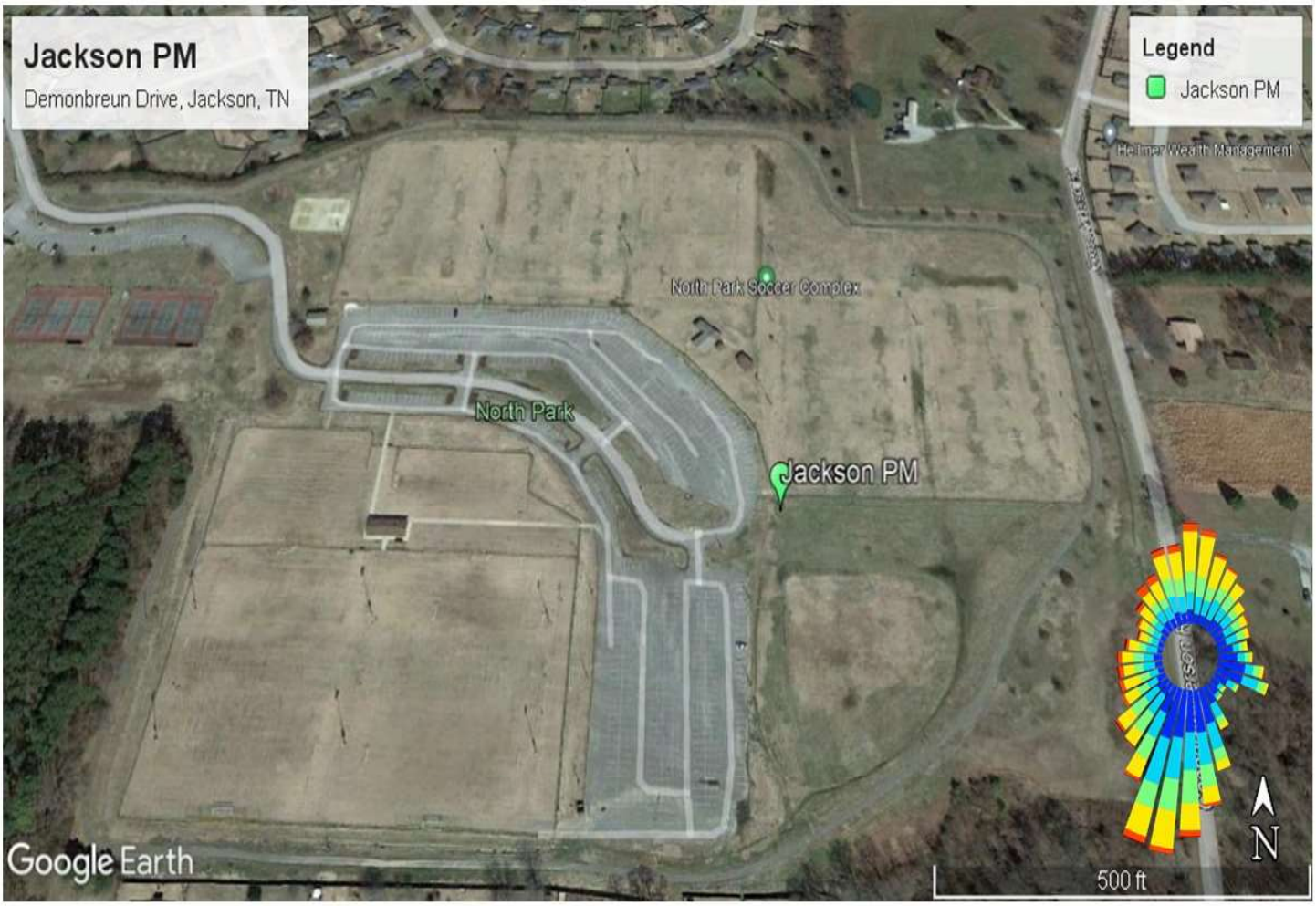
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Jackson PM **Initials:** EMH **Date:** 03/23/23

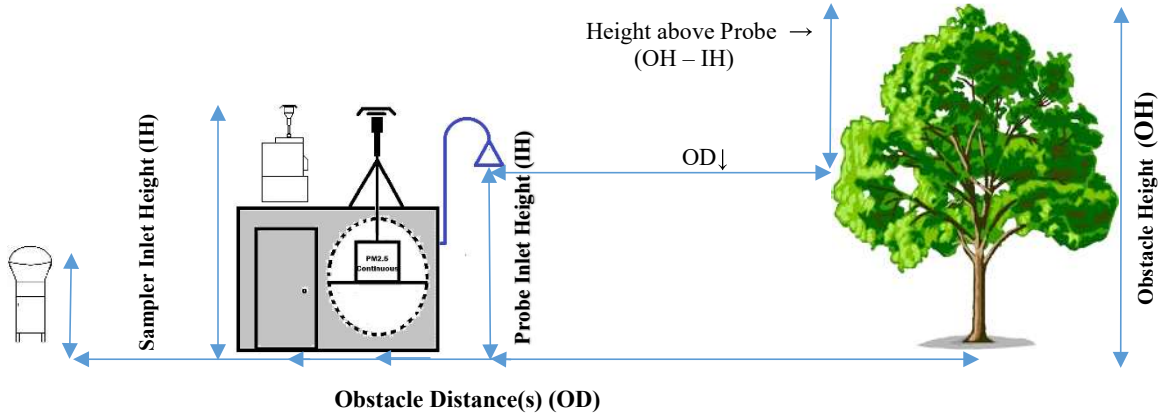
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 02/01/22

MSEF: Local Site Name: Jackson PM **Initials:** EMH **Date:** 03/23/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Building	4.5	2.6	3.8	97.5	☐	359
2	Building	3.0	2.6	0.8	79.0	☐	5
3	Mobile Home	4.3	2.6	3.4	252.0	☐	90
4						☐	
5						☐	
6						☐	
7						☐	
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Jackson PM **Initials:** EMH **Date:** 03/23/23

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

_____**meters** (nearest inlet to dripline) ☐ Not Present

_____**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 NO_2 or SO_2 analyzers

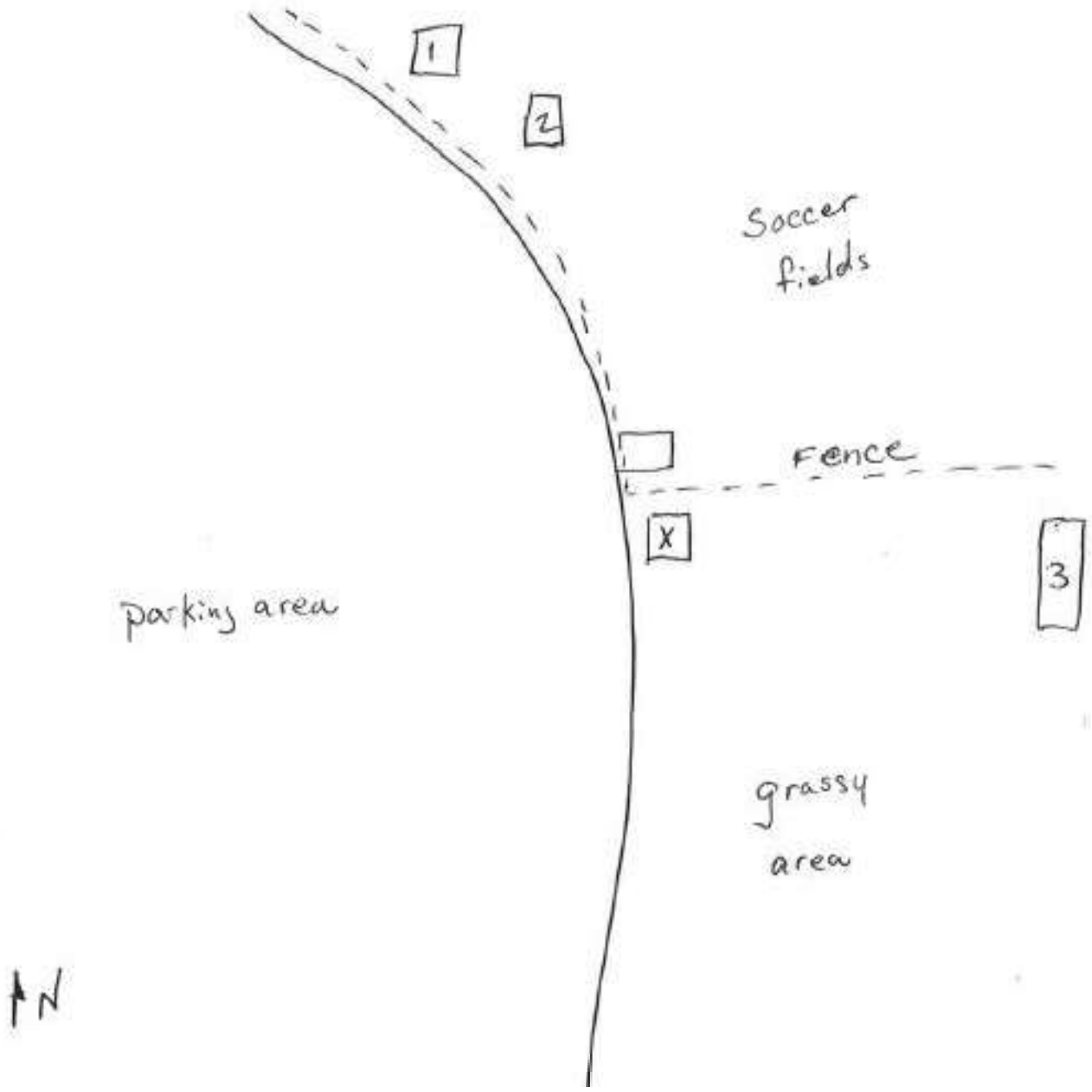
Issues: None

Additional Information:

MSEF : Local Site Name: Jackson PM **Initials:** EMH **Date:** 03/23/23

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.

PHOTO LOG: **Local Site Name:** Jackson PM **Initials:** EMH **Date:** 03/23/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: North Directional

Photo: 002 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: East Directional

Photo: 004 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: South Directional

Photo: 006 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: West Directional

Photo: 008 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/23/23 **Time:** 10:55 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/23/23 Time: 10:55 am Photographer: EMH Description: Monitor

Photo: 011 **Date:** 03/23/23 **Time:** 10:55 am **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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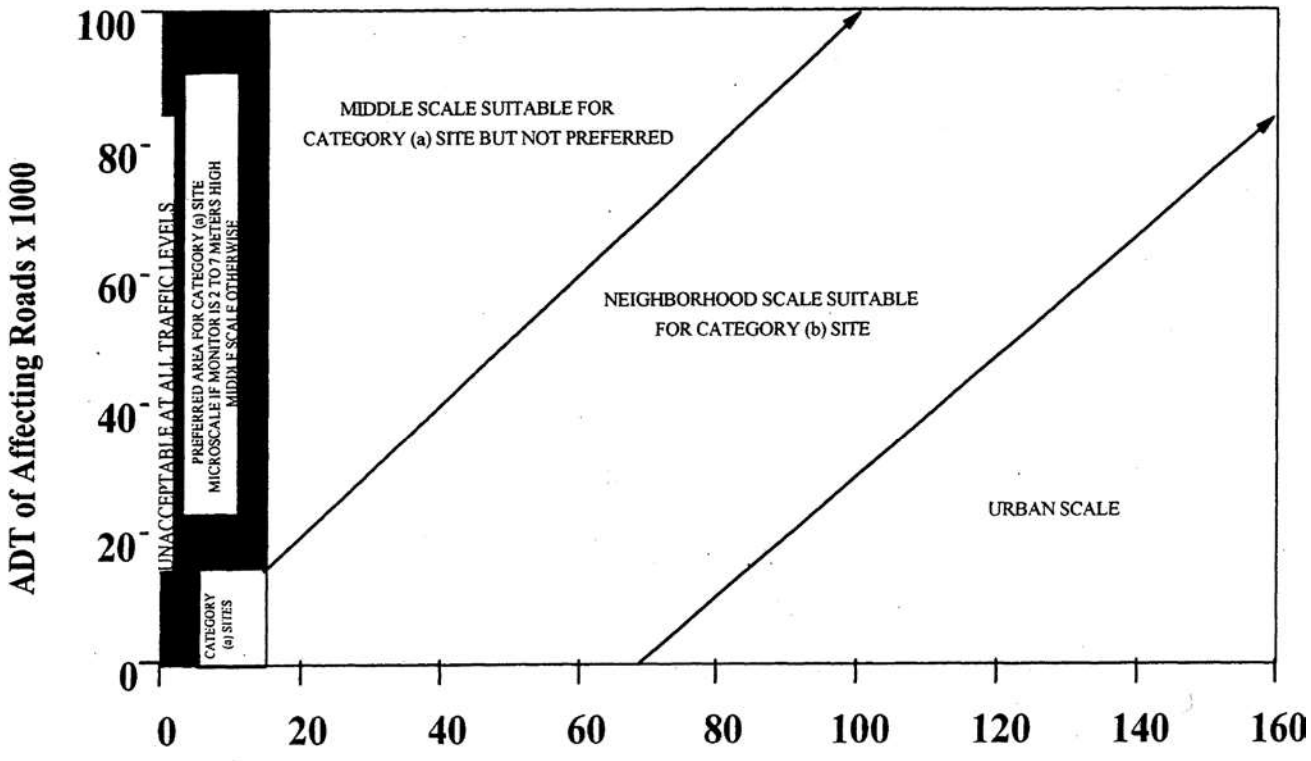

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Tennessee Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Air Monitoring Site Evaluation
TDEC APC

Date: 02/23/23 **Location:** Columbia, Tennessee

AQS Number: 47-119-2007

Site Name: Columbia PM **Pollutants:** PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/23/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Nashville Highway	100.0 m	W	Major Highway	40382	2022

Electrical

Utilities Company: Columbia Power and Water System Meter #: 113050

Additional Comments:

1. Arrival, departure and photo times are in Central time.
2. Decking boards on platform were replaced on 9/8/22.
3. A hardcopy logbook is located on site in case the operator cannot access eSIMS.
4. Columbia is one of the sites with a purple air sensor.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/23/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 1:05 pm **Departure Time:** 2:00 pm **Primary Operator:** Hattie Benet

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [■ Yes □ No] **Good** [□ Yes ■ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	W12887

MSEF: Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/23/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93330095011016	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/30 Days **PM_{10} Head Clean Schedule:** 1/30 days

Issue(s): _____

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

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

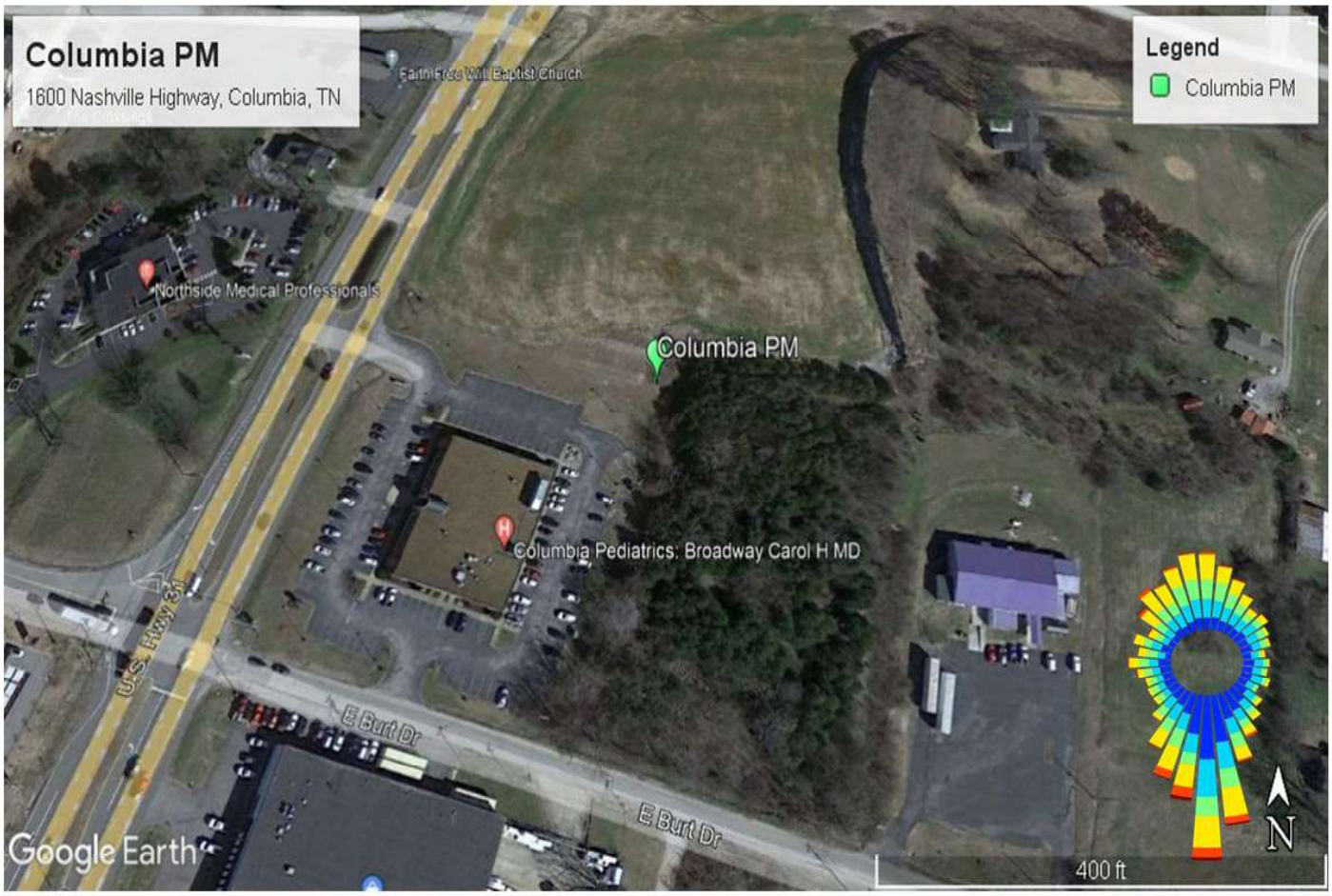
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/23/23

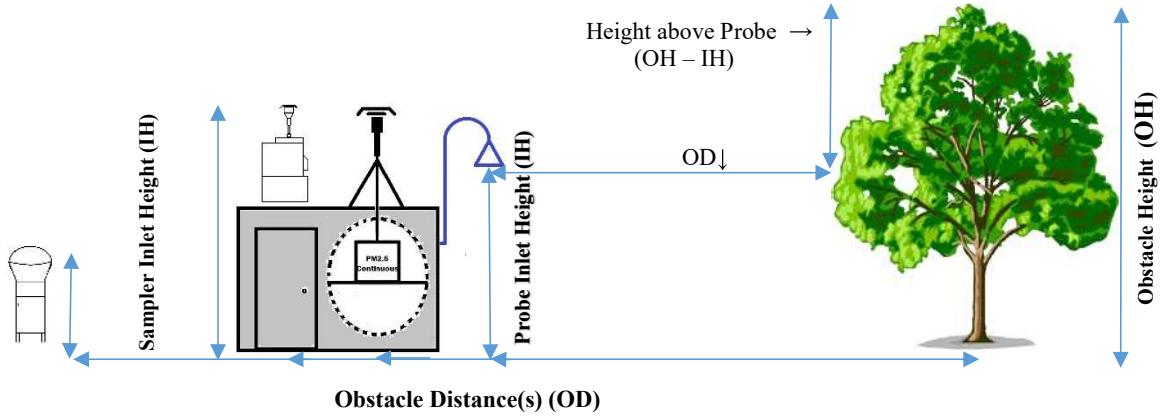
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 03/01/22

MSEF: Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/23/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Trees	5.2	2.6	5.2	13.0	☐	59
2	Trees	6.2	2.6	7.2	13.0	☐	94
3	Trees	7.4	2.6	9.6	13.0	☐	110
4	Building	4.0	2.6	2.8	46.0	☐	223
5						☐	
6						☐	
7						☐	
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/23/23

TREE DRIPLINE(s): 10.8 **meters** (nearest inlet to dripline) □ **No Trees Present**
11.8 **meters** (nearest inlet to dripline) ☐ Not Present
12.0 **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 NO_2 or SO_2 analyzers

Issues: _____

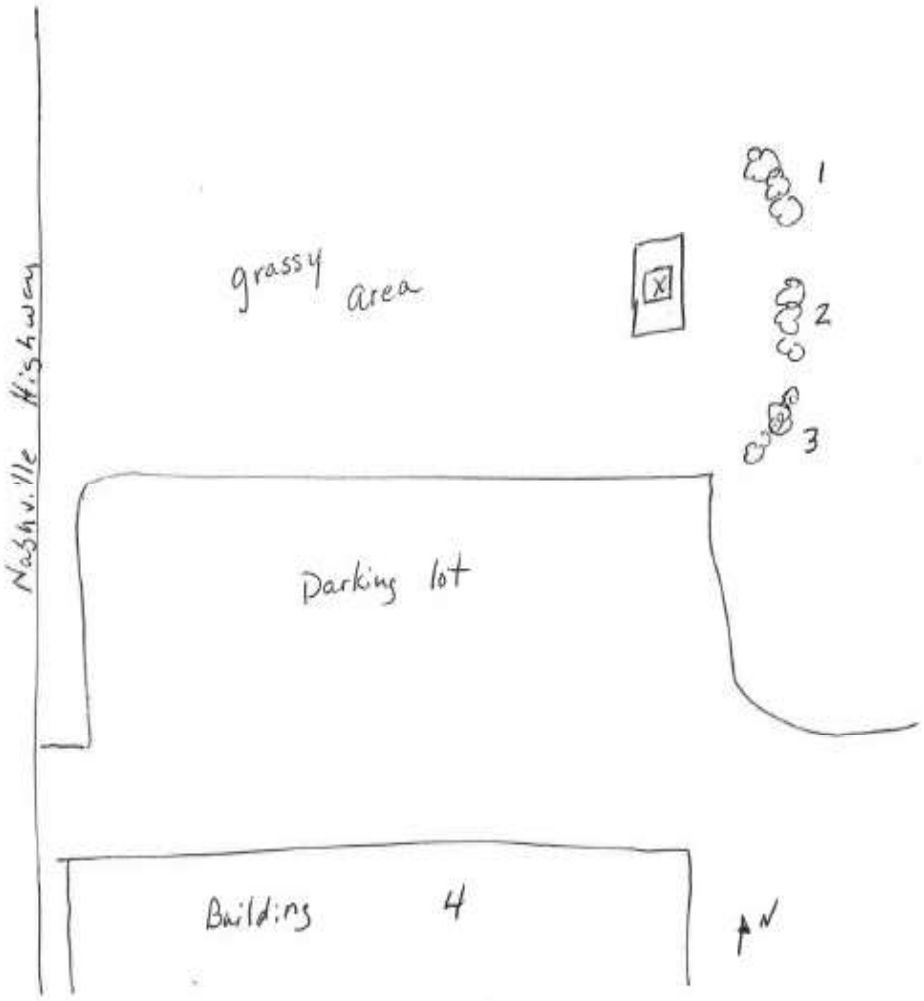
Additional Information:

The cedars trees (east to southeast of the inlet) are greater than 10 meters from the inlet but less than 20 meters from the inlet. None of these are tall enough to be considered obstacles; therefore there are no tree dripline issues.

MSEF : Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/23/23

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.

PHOTO LOG: **Local Site Name:** Columbia PM **Initials:** EMH **Date:** 02/23/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 02/23/23 **Time:** 1:45 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 02/23/23 Time: 1:45 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 02/23/23 **Time:** 1:45 pm **Photographer:** EMH **Description:** Electric Meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

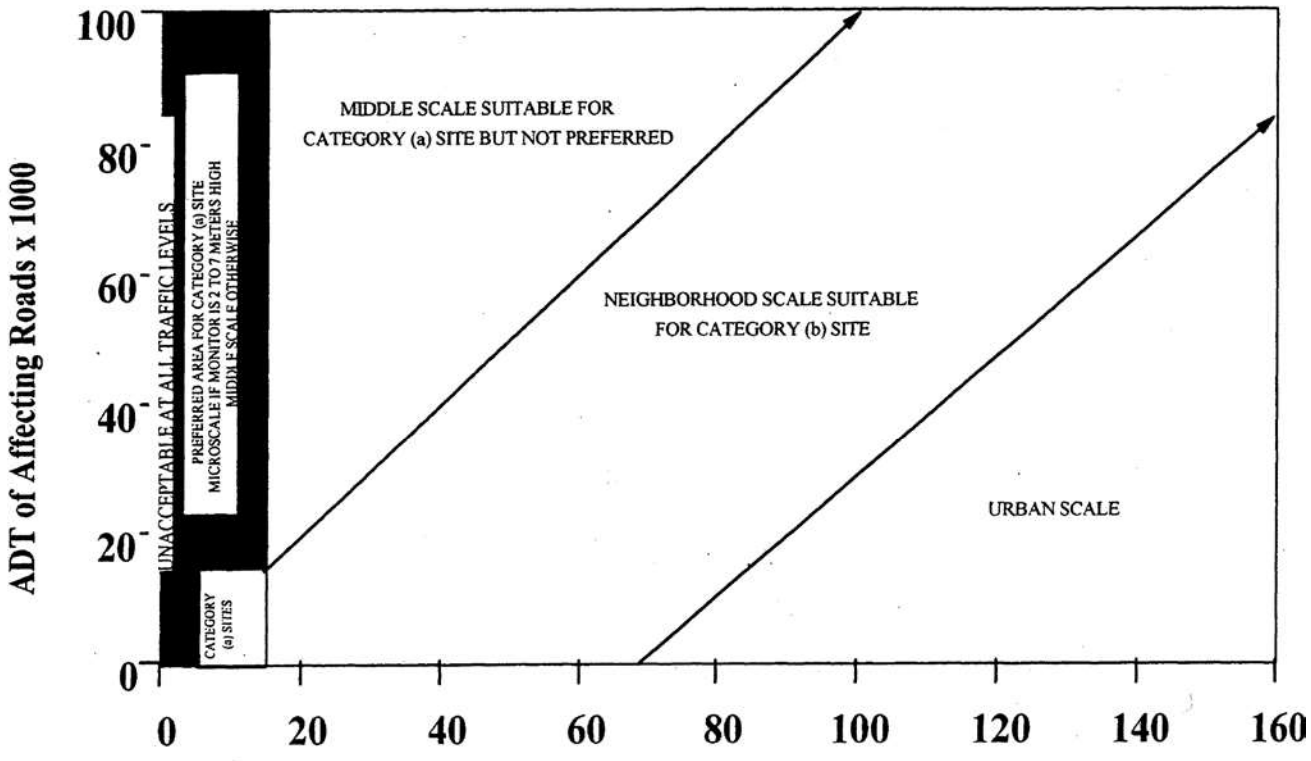


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 01/26/23
AQS Number: 47-125-2001
Site Name: Clarksville PM

Location: Clarksville, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Clarksville PM **Initials:** EMH **Date:** 01/26/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Unknown Road	114.0 m	N to NE	Thru St	NA	NA
West Coyote Trail Road	116.4 m	W	Local St	NA	NA
Peachers Mill Road	573.0 m	E	Major St	20098	2022

Electrical

Utilities Company: Clarksville Power & Electric Meter #: 903675

Additional Comments:

1. Arrival, departure and photo times are in Central time.
2. Monitor is located in an enclosed cage.
3. One board on platform is completely rotten. Boards are 60' L x 5" W x 1" T. There are 11 boards without spacing between them.
4. Clarksville is one of the sites with a purple air sensor.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Clarksville PM **Initials:** EMH **Date:** 01/26/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 11:20 am **Departure Time:** 12:15 pm **Primary Operator:** John Helton

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: Hardcopy logbook kept on site

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	W12880

MSEF: Local Site Name: Clarksville PM **Initials:** EMH **Date:** 01/26/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R9610254021016	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/30 days **PM_{10} Head Clean Schedule:** 1/30 days

Issue(s): _____

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

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

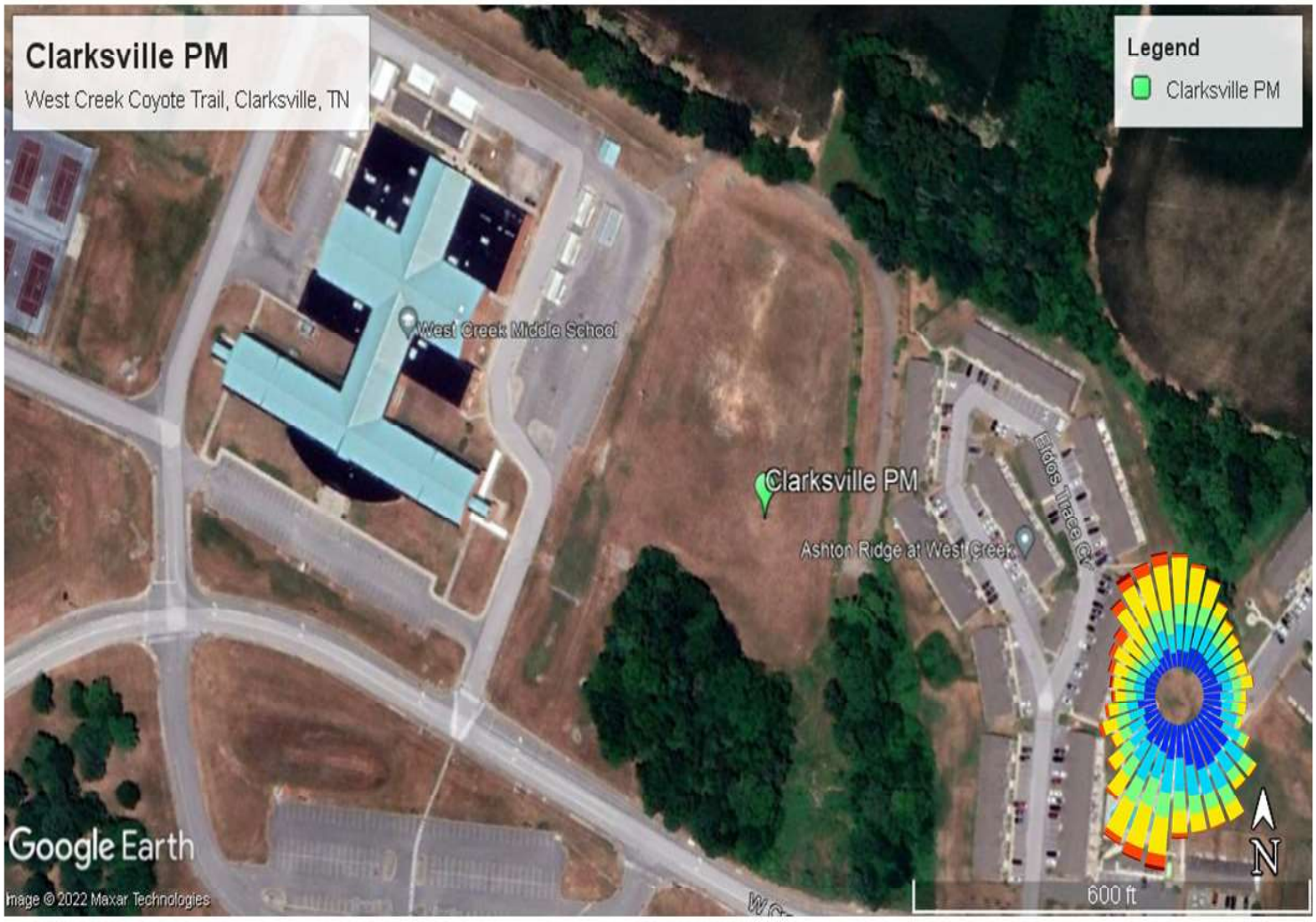
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Clarksville PM **Initials:** EMH **Date:** 01/26/23

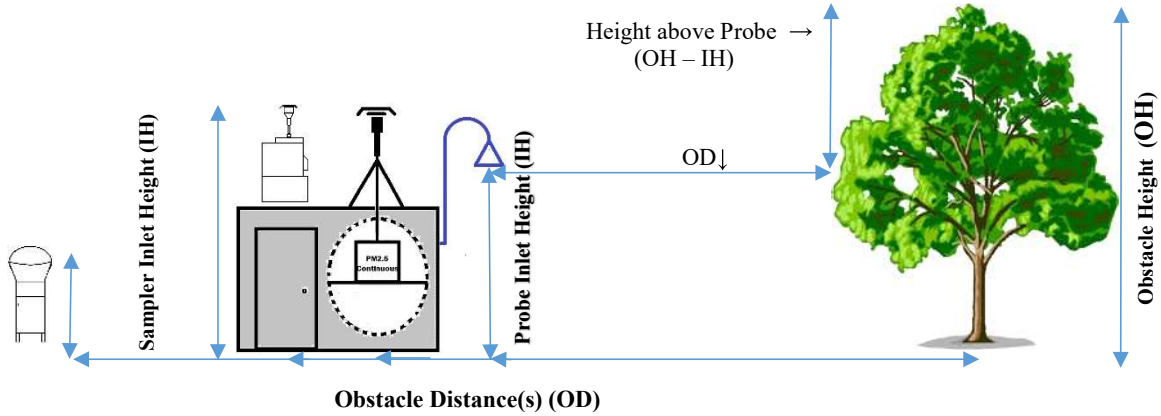
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 06/24/22

MSEF: Local Site Name: Clarksville PM **Initials:** EMH **Date:** 01/26/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	School	17.0	2.6	28.8	148.0	☐	319
2	Tree	23.0	2.6	40.8	133.0	☐	4
3	Trees	20.0	2.6	34.8	125.0	☐	20
4	Trees	22.0	2.6	38.8	119.0	☐	31
5	Apartment	7.0	2.6	8.8	66.0	☐	69
6	Apartment	6.9	2.6	8.6	62.0	☐	80
7	Trees	21.6	2.6	38.0	70.0	☐	125
8	Trees	19.0	2.6	32.8	47.0	☐	228
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Clarksville PM **Initials:** EMH **Date:** 01/26/23

TREE DRIPLINE(s): 47.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

NA **meters** (nearest inlet to dripline) ☐ Not Present

NA **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 NO_2 or SO_2 analyzers

Issues: None

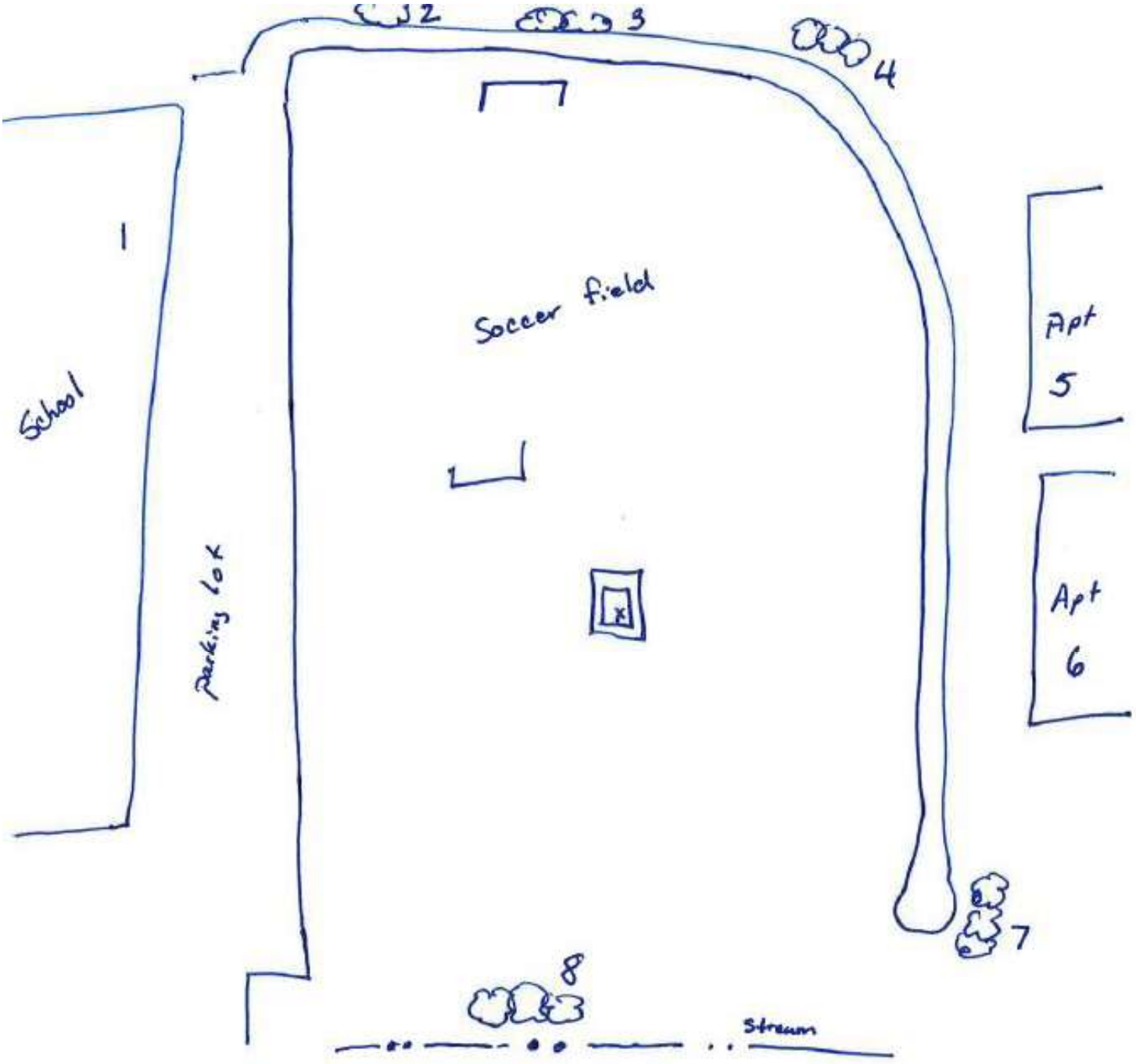
Additional Information:

Closest trees are greater than 20 meters from inlet; therefore there are no tree dripline issues.

MSEF : Local Site Name: Clarksville PM **Initials:** EMH **Date:** 01/26/23

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.

PHOTO LOG: **Local Site Name:** Clarksville PM **Initials:** EMH **Date:** 01/26/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta M12Z

Photo: 001 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: East Directionnal

Photo: 004 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 01/26/23 **Time:** 12:00 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 01/26/23 Time: 12:00 pm Photographer: EMH Description: Electric meter

Photo: 011 Date: _____ Time: _____ Photographer: EMH **Description:_____**

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

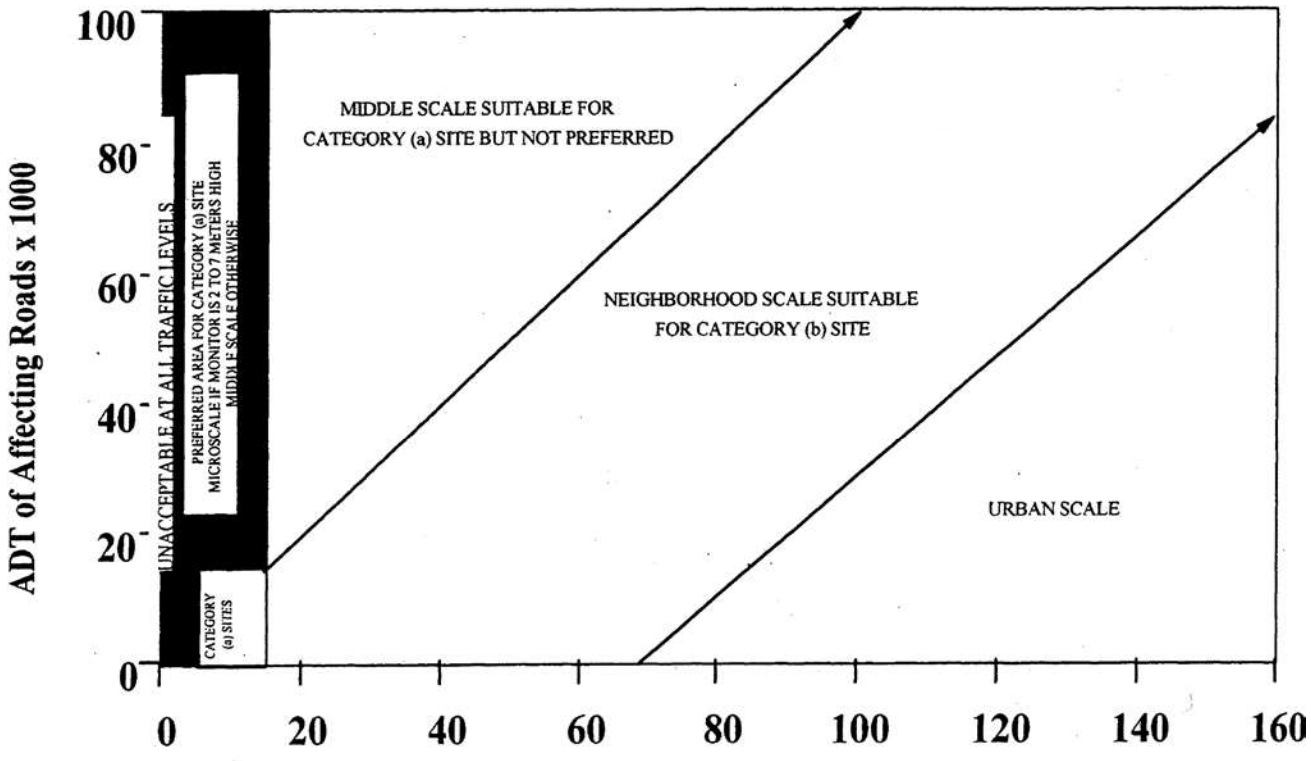


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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1	138.1	88.4	61.4
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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?

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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 Evaluation
TDEC APC

Date: 02/28/23
AQS Number: 47-141-0005
Site Name: Cookeville PM

Location: Cookeville, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Cookeville PM **Initials:** EMH **Date:** 02/28/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Denton Avenue	50.0 m	E	Local St	NA	NA
East 20th Street	166.4 m	N	Local St	NA	NA
North Washington Avenue	348.0 m	W	Local St	14187	2022

Electrical

Utilities Company: Cookeville Utility District Meter #: 20274

Additional Comments:

1. Arrival, departure and photo times are Central time.
2. Paint is peeling off the platform. Platform decking consists of 5 board (60"L x 6"W x 1"T) and 1 board (60"L x 2.5"W x 1"T).

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Cookeville PM **Initials:** EMH **Date:** 02/28/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 11:35 am **Departure Time:** 12:35 pm **Primary Operator:** Joey Cannon

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	W17128

MSEF: Local Site Name: Cookeville PM **Initials:** EMH **Date:** 02/28/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R91110007021009	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/30 days **PM_{10} Head Clean Schedule:** 1/30 days

Issue(s): _____

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

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

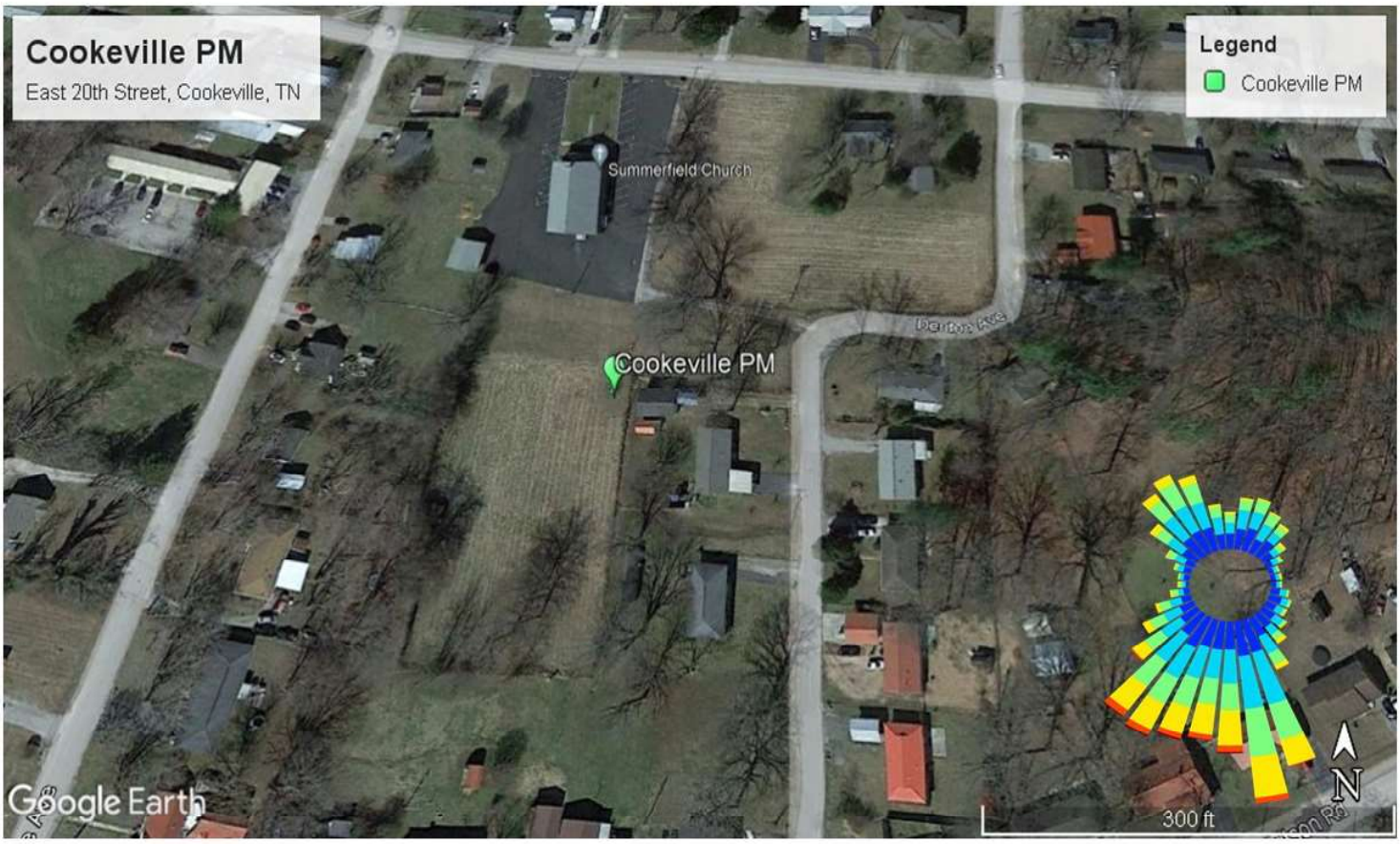
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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	NA	NA	Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Cookeville PM **Initials:** EMH **Date:** 02/28/23

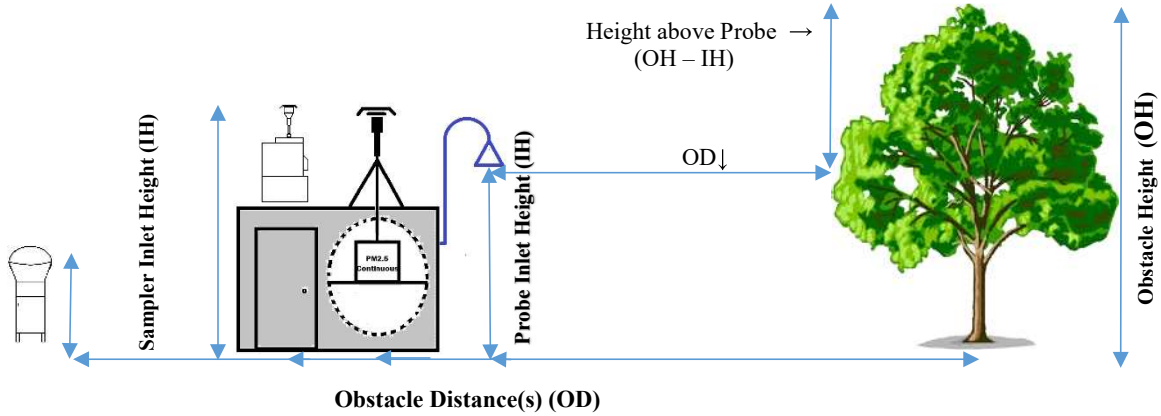
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 02/01/22

MSEF: Local Site Name: Cookeville PM **Initials:** EMH **Date:** 02/28/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Church	9.0	2.6	12.8	50.9	☐	4
2	Trees	24.0	2.6	42.8	58.0	☐	14
3	Tree	22.0	2.6	38.8	34.0	✓	34
4	Tree	19.0	2.6	32.8	27.0	✓	40
5	Tree	21.8	2.6	38.4	26.5	✓	68
6	Tree	21.8	2.6	38.4	30.0	✓	73
7	Garage	4.2	2.6	3.2	7.7	☐	84
8	Tree	10.0	2.6	14.8	17.0	☐	128
9	Tree	16.6	2.6	28.0	42.5	☐	152
10	Trees	16.2	2.6	27.2	54.0	☐	184
11	Trees	18.6	2.6	32.0	64.8	☐	232
12	Tree	8.8	2.6	12.4	46.9	☐	271
13	Tree	18.8	2.6	32.4	42.0	☐	295
14	Trees	16.8	2.6	28.4	41.0	☐	304
15	Tree	17.4	2.6	29.6	46.8	☐	321
16	Shed	4.0	2.6	2.8	48.9	☐	333
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Cookeville PM **Initials:** EMH **Date:** 02/28/23

TREE DRIPLINE(s): 17.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

26.5 **meters** (nearest inlet to dripline) ☐ Not Present

27.0 **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 NO_2 or SO_2 analyzers

Issues: None

Additional Information:

Objects #3, 4, 5 and 6 are obstacles that fall within the same 90 degree quadrant.

Therefore there is 270 degrees of unrestricted airflow around the PM inlet.

The tree (Object #8) is 17.0 meters from the inlet but is not considered an obstacle.

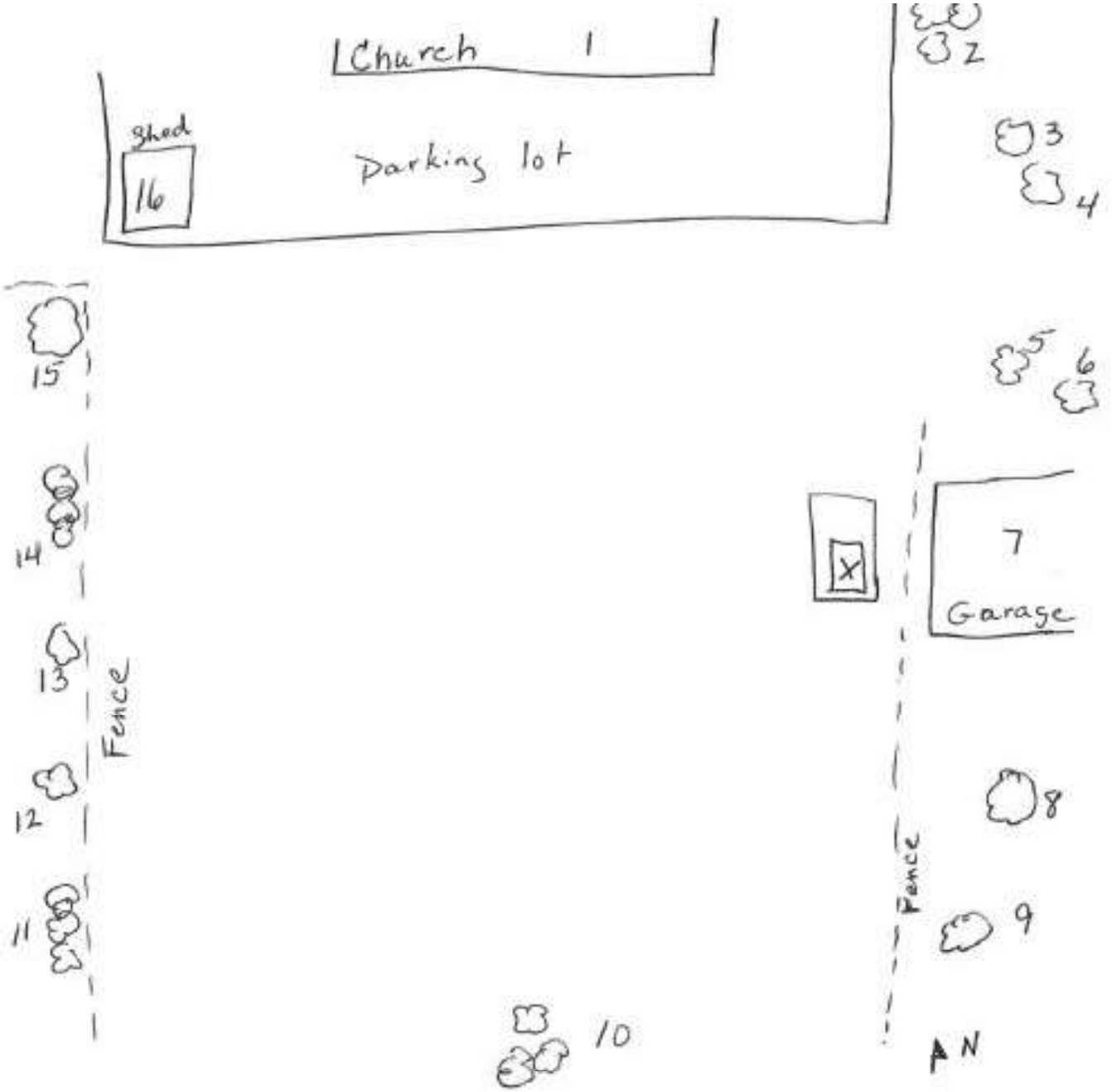
The tree does not pose a tree dripline issue.

The trees (Objects # 3, 4, 5 and 6) which are considered obstacles are greater than 20 meters from the inlet and do not pose a tree dripline issue.

MSEF : Local Site Name: Cookeville PM **Initials:** EMH **Date:** 02/28/23

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.

PHOTO LOG: **Local Site Name:** Cookeville PM **Initials:** EMH **Date:** 02/28/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta M12Z

Photo: 001 Date: 02/28/23 Time: 12:20 pm Photographer: EMH Description: North Directional

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Photo: 009 **Date:** 02/28/23 **Time:** 12:20 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 02/28/23 Time: 12:20 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 02/28/23 **Time:** 12:20 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

CFR Part 58, Appendix E, Tables and Figures

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

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

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

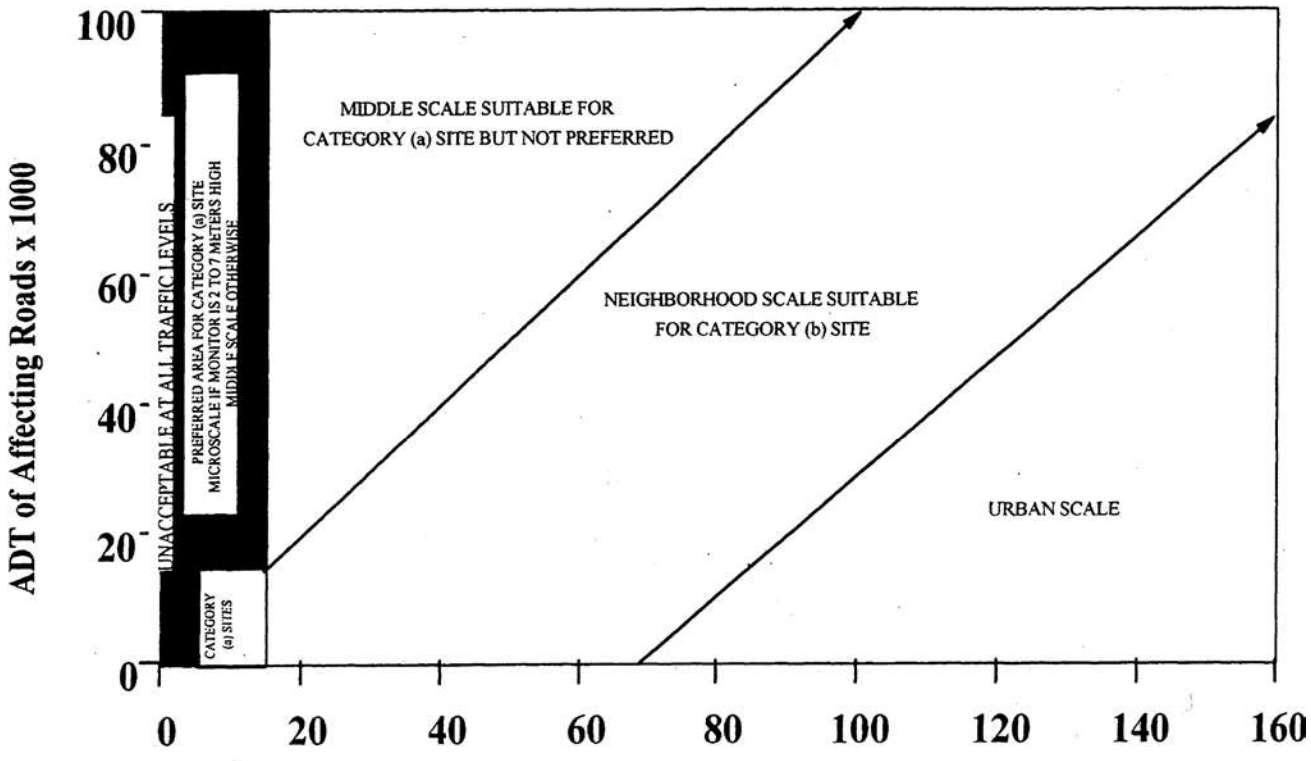

Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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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
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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 Evaluation
TDEC APC

Date: 02/28/23
AQS Number: 47-145-0004
Site Name: Harriman PM

Location: Harriman, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Harriman PM **Initials:** EMH **Date:** 02/28/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Emory Drive	78.8 m	NE	Local St	1916	2022
Clinton Street	75.6 m	S	Local St	NA	NA
North Roane Street	121.0 m	NW	Local St	11559	2022
Georgia Street	223.4 m	SW	Local St	1190	2022

Electrical

Utilities Company: Harriman Utility Board Meter #: 30530

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. There are two platforms on site: one for the BAM monitor and one with a TEOM shelter used for storage. The BAM platform decking has 5 boards (60"L x 6" W x 1"T) and one board (60" L x 2.5" W x 1" T). The TEOM platform decking consists of 17 boards (48" L x 6" W x 1" T). Both platforms are weathered and starting to crack.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Harriman PM **Initials:** EMH **Date:** 02/28/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 3:00 pm **Departure Time:** 3:55 pm **Primary Operator:** Justin Long

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [■ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: Hardcopy logbook located on site.

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM 2.5	Met One	BAM 1022	W19944

MSEF: Local Site Name: Harriman PM **Initials:** EMH **Date:** 02/28/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R91110046011009	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/30 days **PM_{10} Head Clean Schedule:** 1/30 days

Issue(s): _____

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

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

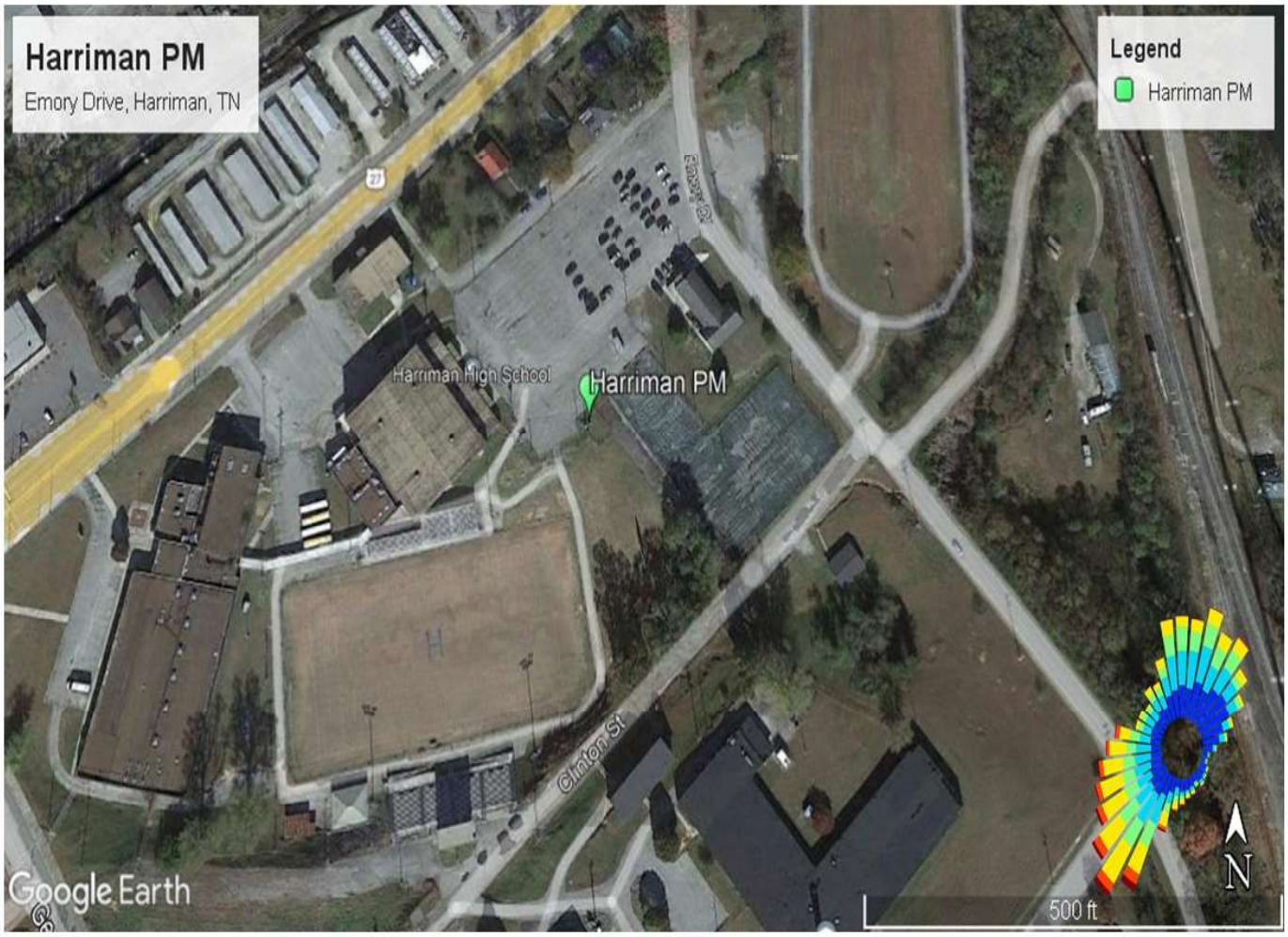
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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	NA	NA	Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Harriman PM **Initials:** EMH **Date:** 02/28/23

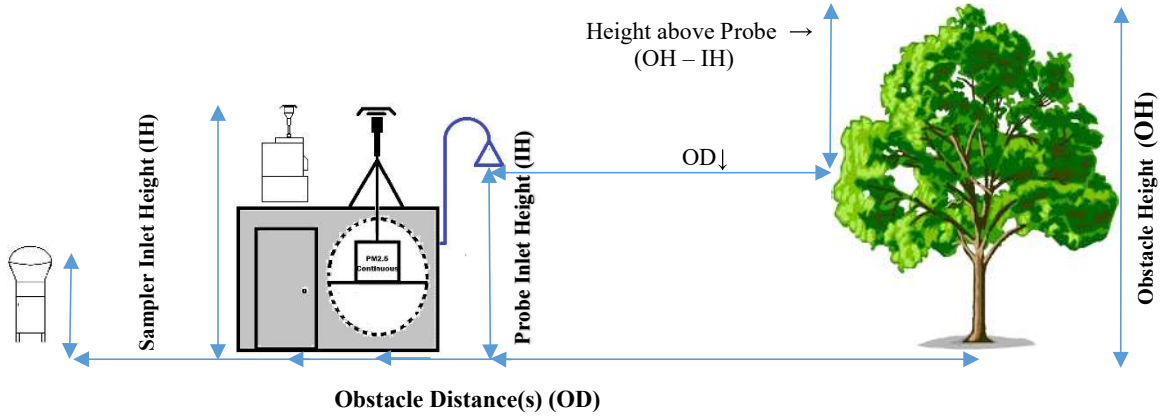
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 11/09/19

MSEF: Local Site Name: Harriman PM **Initials:** EMH **Date:** 02/28/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle ☐	AZ
1	School	7.6	2.6	10.0	40.0	☐	304
2	Trees	6.0	2.6	6.8	79.2	☐	350
3	Tree	14.0	2.6	22.8	93.6	☐	9
4	House	6.0	2.6	6.8	110.0	☐	18
5	Church	7.6	2.6	10.0	57.0	☐	45
6	Tree	8.7	2.6	12.2	44.0	☐	55
7	Tree	12.0	2.6	18.8	53.0	☐	75
8	Tree	13.0	2.6	20.8	52.4	☐	124
9	Trees	17.4	2.6	29.6	71.2	☐	132
10	Tree	26.2	2.6	47.2	83.0	☐	156
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Harriman PM **Initials:** EMH **Date:** 02/28/23

TREE DRIPLINE(s): 44.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

52.4 **meters** (nearest inlet to dripline) ☐ Not Present

53.0 **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 NO_2 or SO_2 analyzers

Issues: None

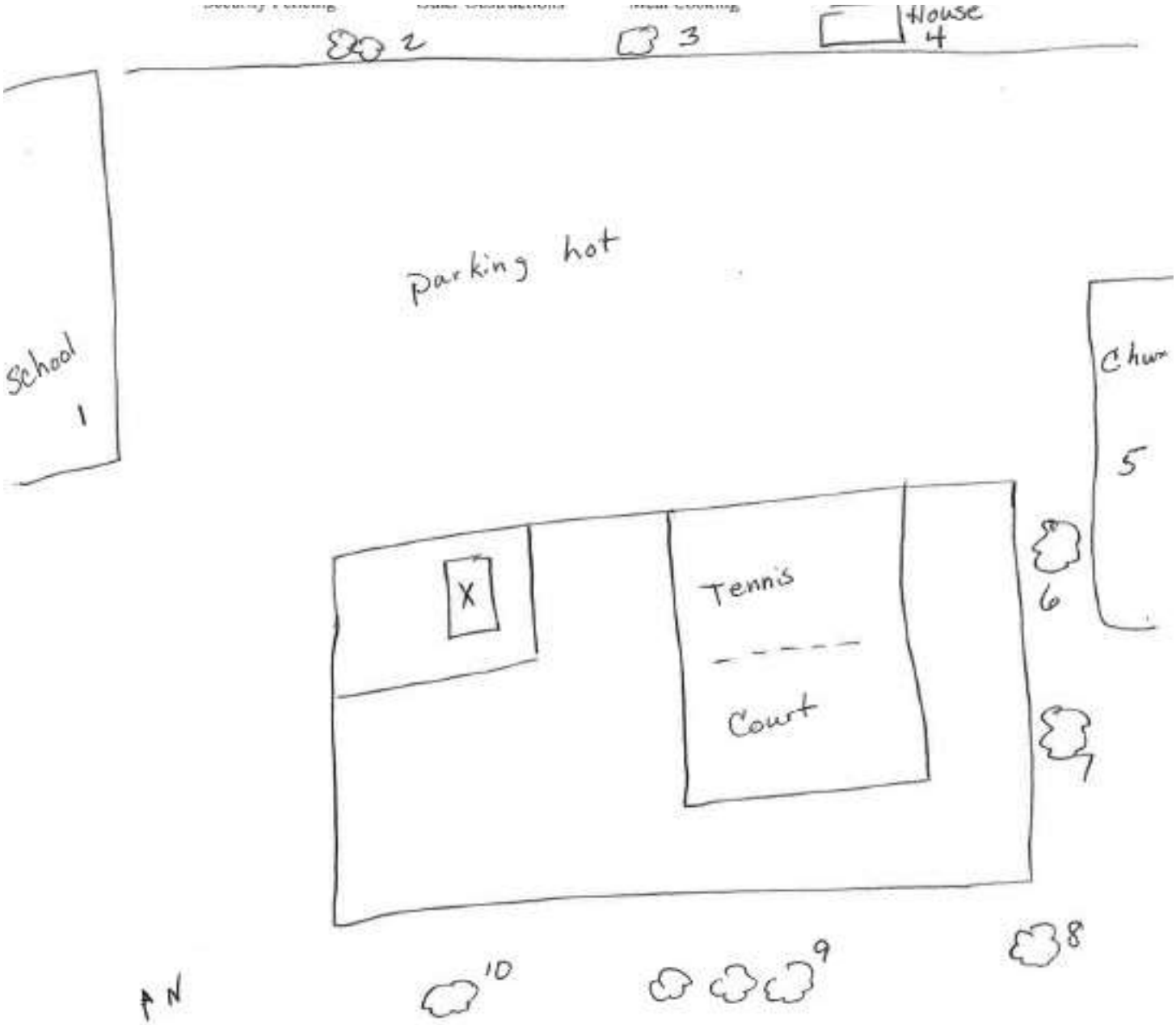
Additional Information:

Closest tree is greater than 20 meters from PM inlet; therefore there are no tree dripline issues.

MSEF : Local Site Name: Harriman PM **Initials:** EMH **Date:** 02/28/23

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.

PHOTO LOG: **Local Site Name:** Harriman PM **Initials:** EMH **Date:** 02/28/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 02/28/23 **Time:** 3:40 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 02/28/23 Time: 3:40 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 02/28/23 **Time:** 3:40 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

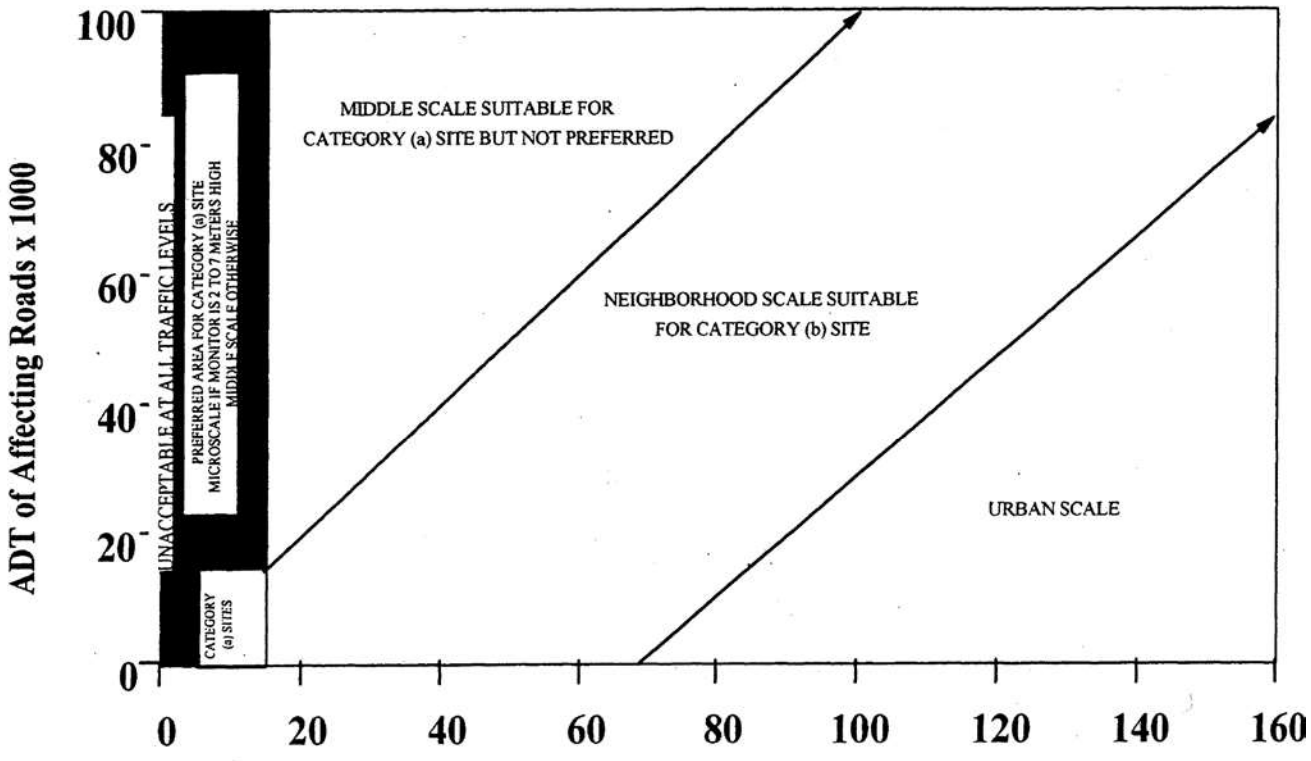


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/15/23
AQS Number: 47-163-1007
Site Name: Kingsport PM

Location: Kingsport, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Kingsport PM **Initials:** EMH **Date:** 03/15/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
East Center Street	197.5 m	S	Local St	12513	2022
D Street	47.0 m	W	Local St	NA	NA
Westmoreland Avenue	37.8 m	N	Local St	NA	NA
E Street	52.4 m	E	Local St	NA	NA

Electrical

Utilities Company: Appalachian Electric Power Meter #: 738191241

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. The distance between the utility pole and PM inlet is 1.4 meters.
3. The platform decking consists of 26 boards (89" L x 6" W x 1" T) and one board (89" L x 6" W x 1"T).

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Kingsport PM **Initials:** EMH **Date:** 03/15/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 2:00 pm **Departure Time:** 3:05 pm **Primary Operator:** Daniel Bowers

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
PM2.5	Met One	BAM 1022	W17127

MSEF: Local Site Name: Kingsport PM **Initials:** EMH **Date:** 03/15/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R9333002011016	Modem	Main

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/ 30 days **PM_{10} Head Clean Schedule:** 1/30 days

Issue(s): _____

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

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

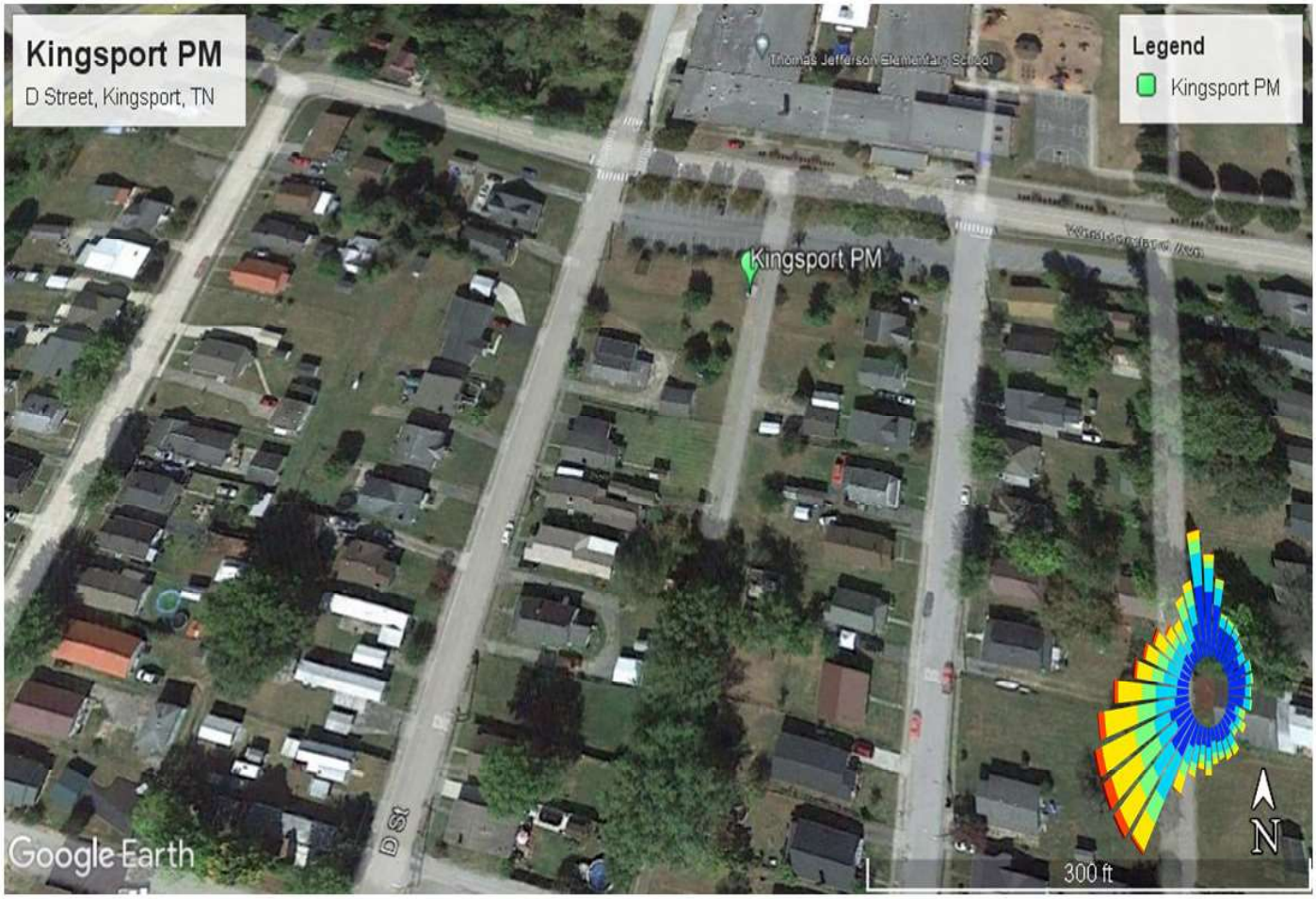
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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	2.7	Ground			Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Kingsport PM Initials: EMH Date: 03/15/23

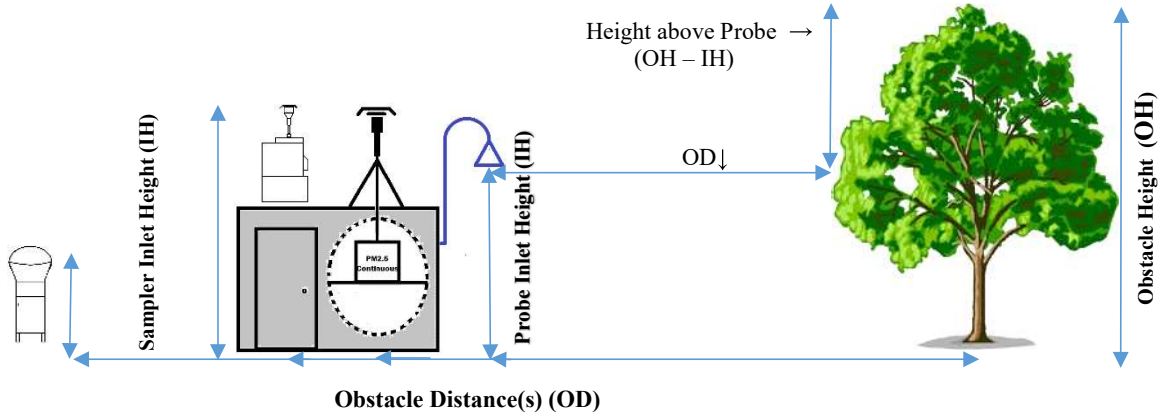
Aerial Photo with Wind Rose



Source: Google Earth Pro Imagery Date: 10/17/19

MSEF: Local Site Name: Kingsport PM **Initials:** EMH **Date:** 03/15/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Tree	9.7	2.7	14.2	31.0		41
2	Tree	6.6	2.7	7.8	32.0		19
3	Tree	6.6	2.7	7.8	32.0		4
4	Tree	4.7	2.7	4.0	18.0		332
5	Tree	3.3	2.7	1.2	11.6		341
6	Shrubs	3.1	2.7	0.8	10.0		14
7	Tree	6.4	2.7	7.4	15.8		51
8	Shrubs	2.6	2.7	NA	12.3		66
9	Trees	4.0	2.7	2.6	18.0		75
10	Tree	12.0	2.7	18.6	27.4		99
11	Tree	10.6	2.7	15.8	19.5		121
12	Tree	8.8	2.7	12.2	16.6		311
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Kingsport PM **Initials:** EMH **Date:** 03/15/23

TREE DRIPLINE(s): 12.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

_____ **meters** (nearest inlet to dripline) ☐ Not Present

_____ **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 NO_2 or SO_2 analyzers

Issues: None

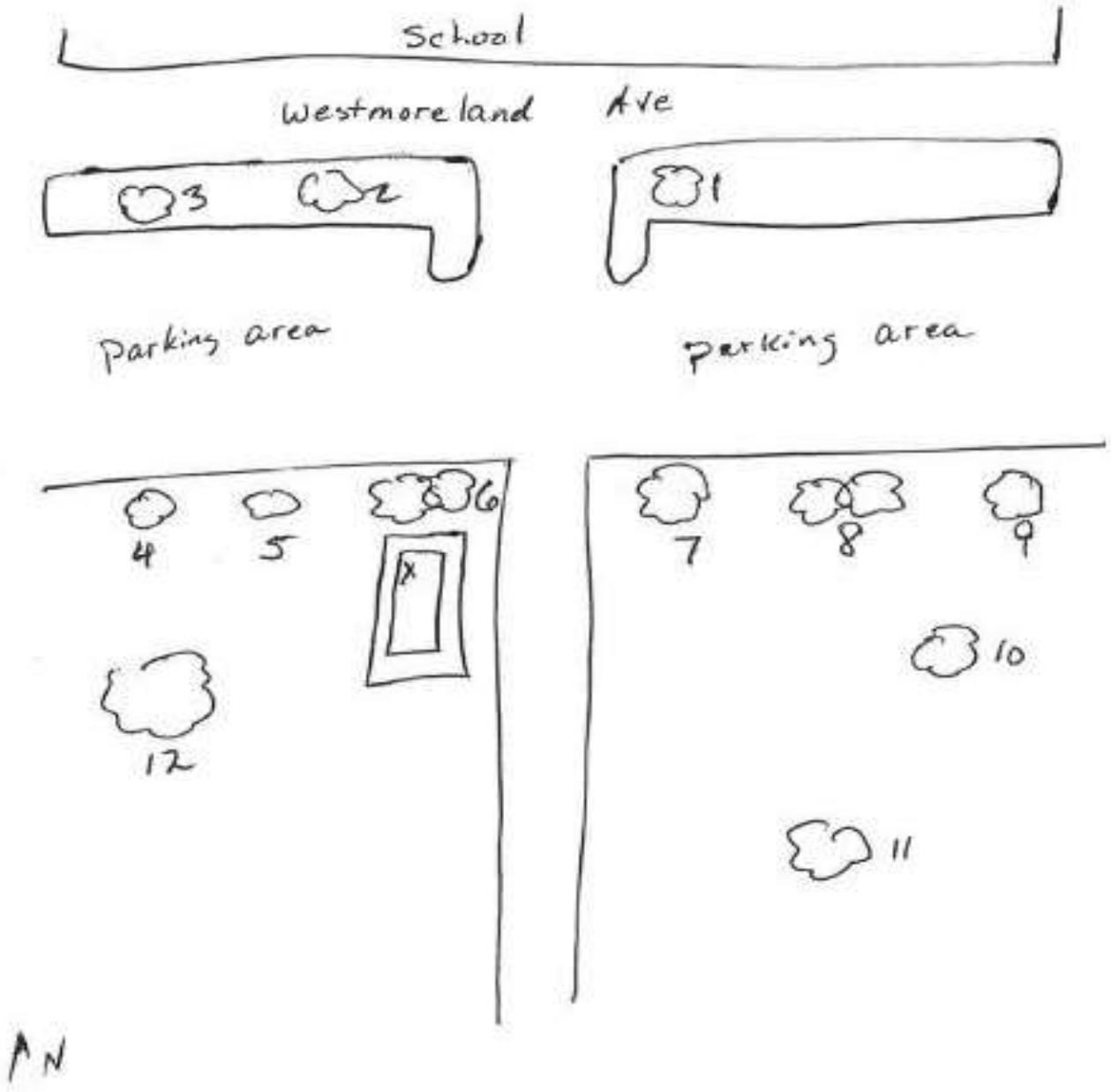
Additional Information:

The closest tree has a tree dripline of 12.0 meters and is not an obstacle.

MSEF : Local Site Name: Kingsport PM **Initials:** EMH **Date:** 03/15/23

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.

PHOTO LOG: **Local Site Name:** Kingsport PM **Initials:** EMH **Date:** 03/15/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/15/23 **Time:** 2:50 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/15/23 Time: 2:50 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 03/15/23 **Time:** 2:50 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

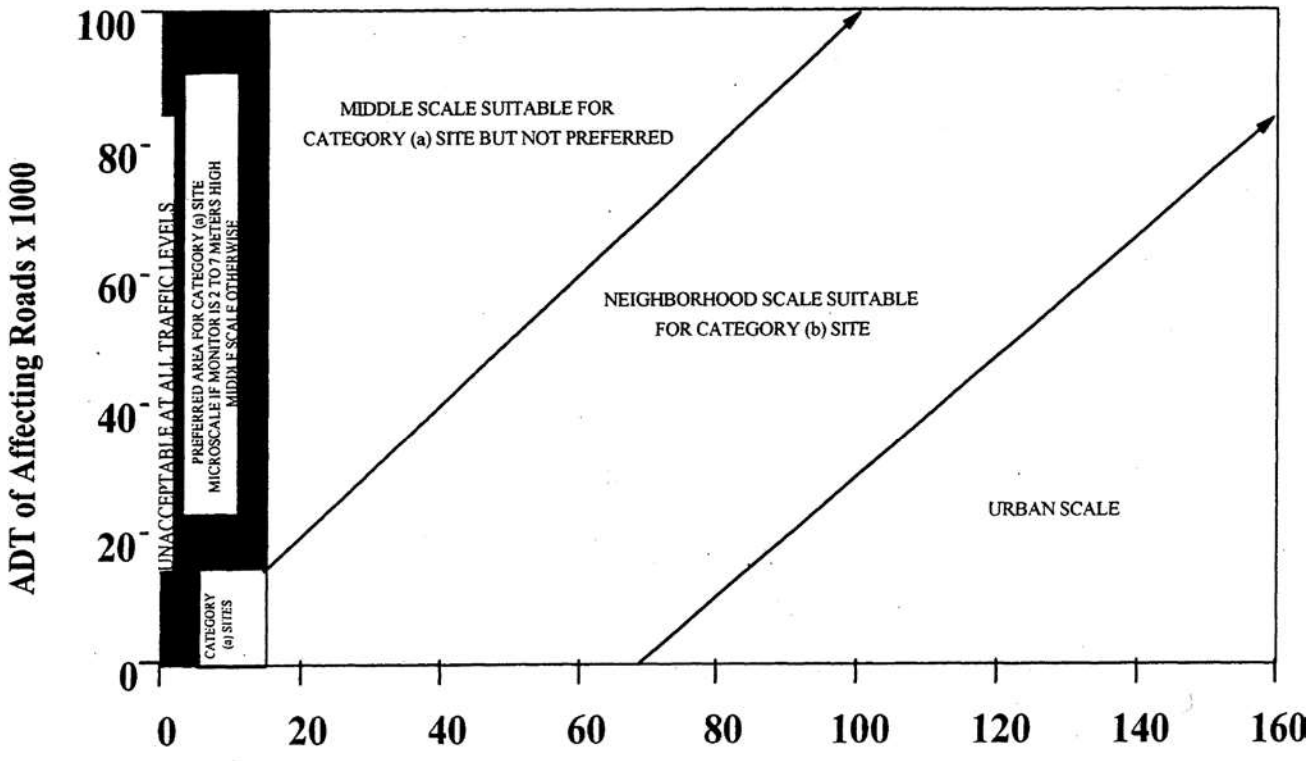


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/16/2023
AQS Number: 47-163-2002
Site Name: Blountville O3

Location: Kingsport, Tennessee
Pollutants: O3

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Shawnee Drive	13.0 m	N	Local St	NA	NA
Hill Road	174.4 m	E	Local St	NA	NA
Memorial Boulevard	254.5 m	N	Local St	6700	2022
Fall Creek Road	847.8 m	W	Local St	2307	2022

Electrical

Utilities Company: Appalachian Electric Power Meter #: 783638139

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. Shelter is located within gated park.
3. Shelter temperature was 72 degrees F (22.2 C).
4. The fire extinguisher is in good condition.
5. The shelter is bolted to cement pad.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 11:40 am **Departure Time:** 12:25 pm **Primary Operator:** Daniel Bowers

Observer(s): _____

SITE

[□ Yes ■ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.1 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel with Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[□ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

MONITOR(s): **Location:** Exterior Samplers [□ **Roof** / □**Ground** / ■ **Not Present**]

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	4514

CALIBRATOR(s): □ **Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	646	02/09/23	08/08/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: ■ **Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93740156011016	Modem	Main
Agilaire	8872	518	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 1339)

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

[□ Yes □ No] **Needs Service** **Last Service Date:** 02/13/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 02/13/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

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: 5.4 seconds (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	4.6	Side of Shelter			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

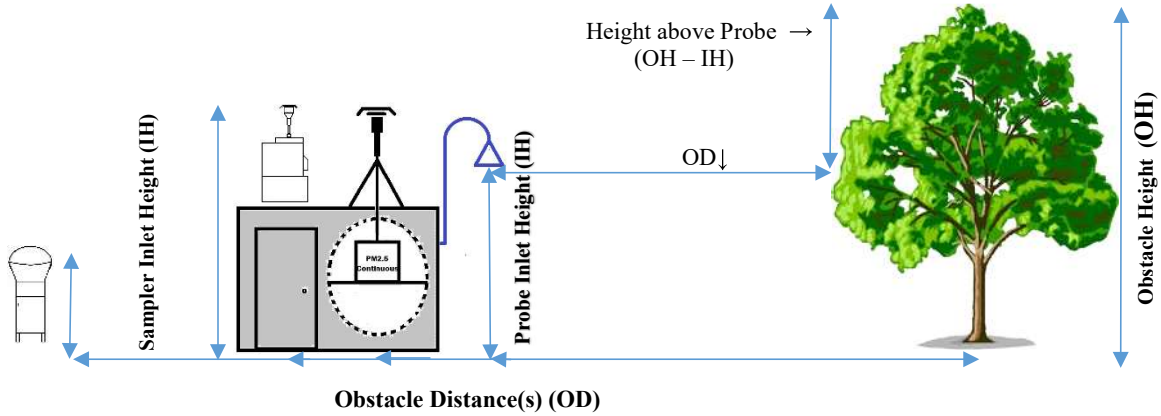
MSEF: Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/17/19

MSEF: Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Trees	13.6	4.6	18.0	32.0	☐	352
2	House	3.9	4.6	NA	35.7	☐	16
3	Trees	15.2	4.6	21.6	34.0	☐	84
4	Community Center	3.3	4.6	NA	13.4	☐	116
5	Trees	18.9	4.6	28.6	44.0	☐	299
6	Trees	20.0	4.6	30.8	52.0	☐	312
7	Trees	10.0	4.6	10.8	24.0	☐	344
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

TREE DRIPLINE(s): 24.0 **meters** (nearest inlet to dripline) □ **No Trees Present**
32.0 **meters** (nearest inlet to dripline) ☐ Not Present
34.0 **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 NO_2 or SO_2 analyzers

Issues: None

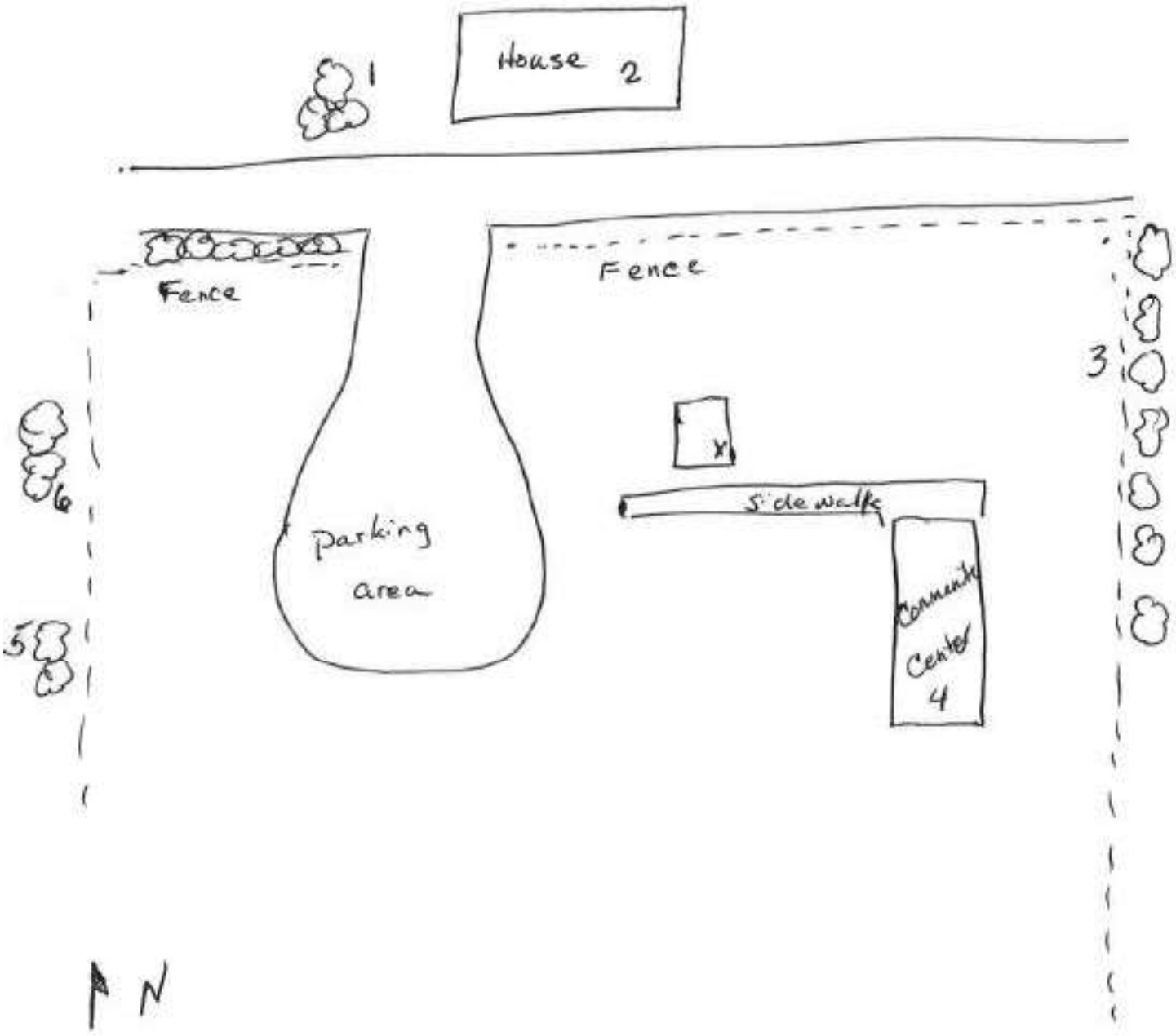
Additional Information:

The closest tree is greater than 20 meters from the probe; therefore there are no tree dripline issues.

MSEF : Local Site Name: Blountville O3 **Initials:** EMH **Date:** 03/16/23

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.

PHOTO LOG: **Local Site Name:** Blountville O3 **Initials:** EMH **Date:** 03/16/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minotla MN12Z

Photo: 001 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/16/23 **Time:** 12:10 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/16/23 Time: 12:10 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 03/16/23 **Time:** 12:10 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

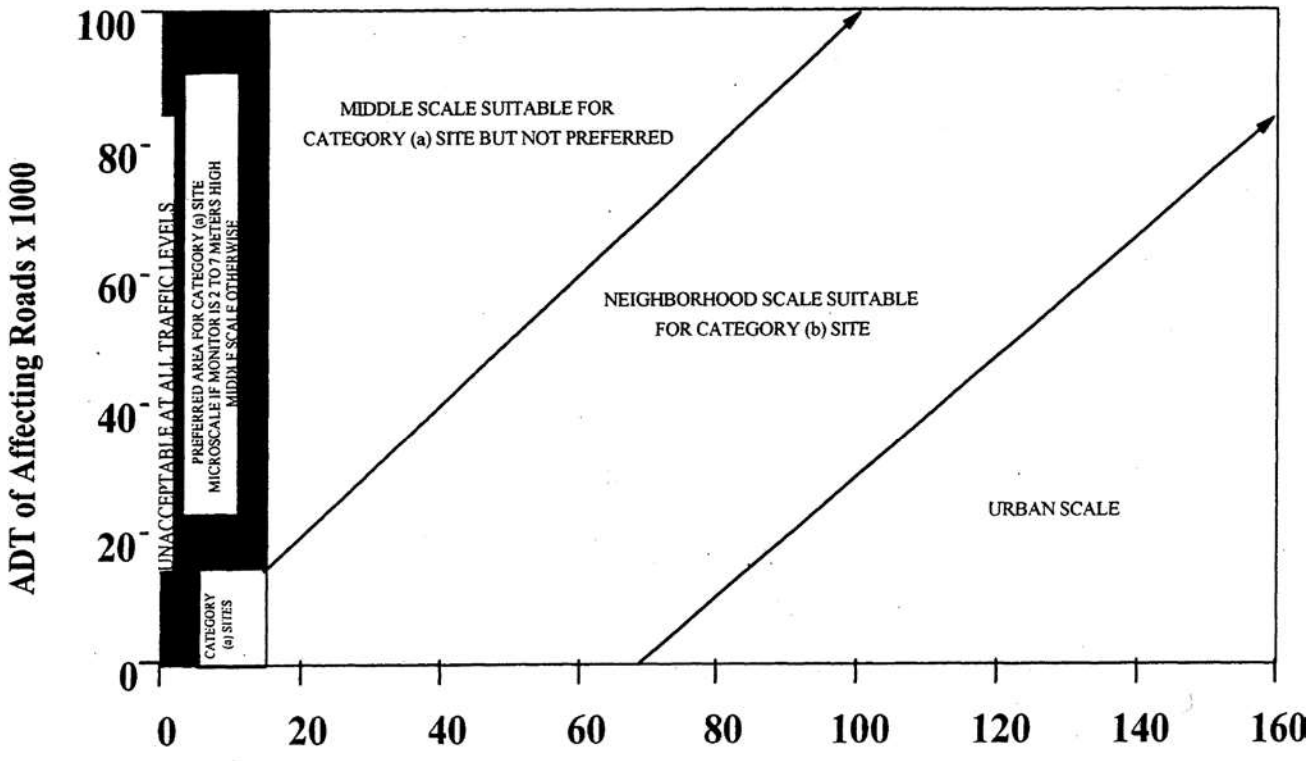


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/16/2023
AQS Number: 47-163-2003
Site Name: Kingsport O3

Location: Kingsport, Tennessee
Pollutants: O3

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Bloomingdale Road	240.0 m	N	Local St	2332	2022
Packing House Road	198.0 m	E	Local St	NA	NA
Kentron Drive	37.5 m	SE	Local St	NA	NA
New Beason Well Road	455.0 m	W	Local St	4673	2022

Electrical

Utilities Company: Appalachian Electric Power Meter #: 784207275

Additional Comments:

1. Arrival, departure and photo times are Eastern times.
2. Shelter temperature was 75 degrees F (23.9 C)
3. The fire extinguisher is in good condition.
4. The shelter is bolted down to cement pad.
5. Kingsport O3 is one of the sites with a weather station (located on roof of shelter).

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 3:15 pm **Departure Time:** 4:00 pm **Primary Operator:** Daniel Bowers

Observer(s): _____

SITE

[□ Yes ■ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.5 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel with Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

MONITOR(s): **Location:** Exterior Samplers [□ **Roof** / □**Ground** / ■ **Not Present**]

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	4513

CALIBRATOR(s): □ **Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	643	01/31/23	07/30/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: ■ **Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610116021016	Modem	Main
Agilaire	8872	514	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 1348)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/13/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 02/13/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

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: 5.8 seconds (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			Neighborhood	Neighborhood

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

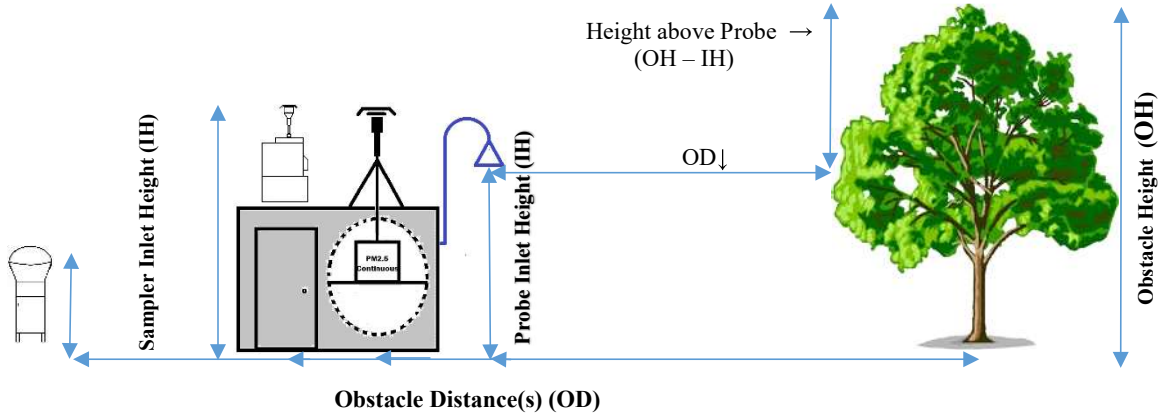
MSEF: Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/17/19

MSEF: Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	School	7.9	4.2	7.4	30.3		2.0
2	Shrubs	6.7	4.2	5.0	14.8		144
3	Shrubs	5.2	4.2	2.0	12.0		197
4	Tree	8.2	4.2	8.0	18.0		284
5	Trees	16.5	4.2	24.6	32.6		302
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

TREE DRIPLINE(s): 12.0 **meters** (nearest inlet to dripline) □ **No Trees Present**
14.8 **meters** (nearest inlet to dripline) ☐ Not Present
18.0 **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 NO_2 or SO_2 analyzers

Issues: None

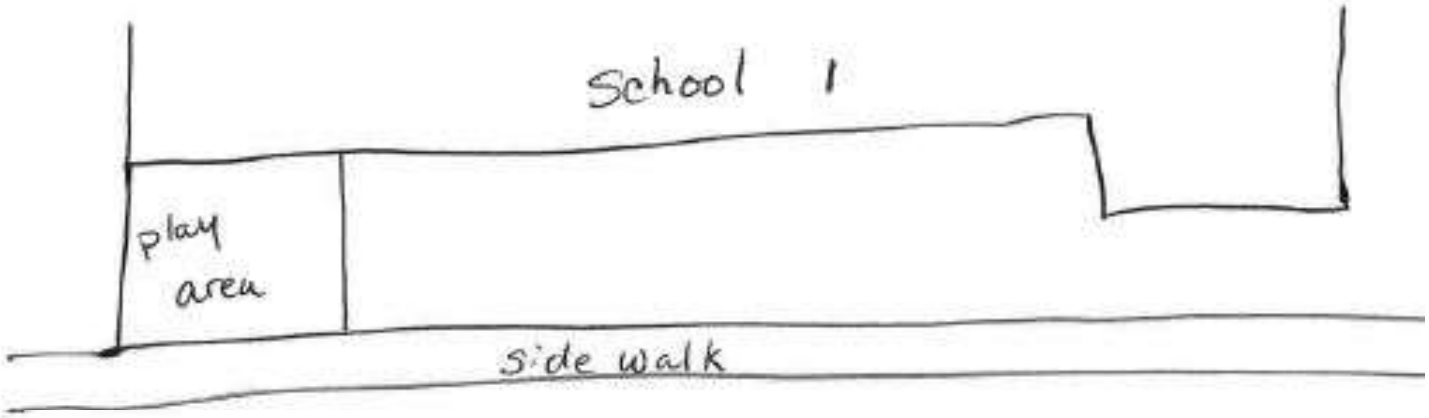
Additional Information:

The shrubs (Objects # 2 and 3) and tree (Object # 4) are not considered obstacles and the dripline is greater than 10 meters.

MSEF : Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 03/16/23

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.

PHOTO LOG: **Local Site Name:** Kingsport O3 **Initials:** EMH **Date:** 03/16/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/16/23 **Time:** 3:45 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/16/23 Time: 3:45 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 03/16/23 **Time:** 3:45 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

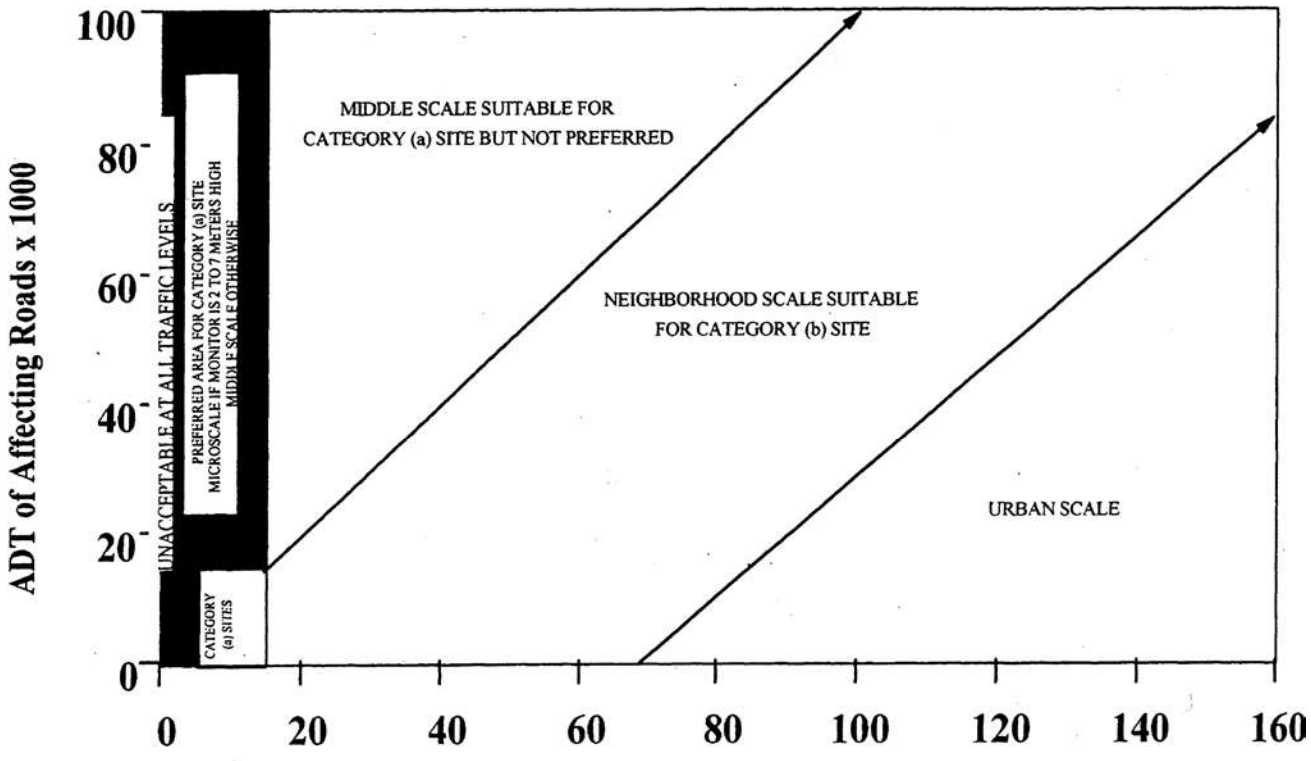


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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.

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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.

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Identify how the analyzers are connected the data logger.

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Does the operator know what it means?
Is the time-scale of the strip chart accurate with the actual or standard time?

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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.

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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.

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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 Evaluation
TDEC APC

Date: 03/16/23
AQS Number: 47-163-3004
Site Name: Exide Pb

Location: Bristol, Tennessee
Pollutants: Pb

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Exide Pb **Initials:** EMH **Date:** 03/16/23

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: See comment on page 7.

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Red Deer Road	122.4 m	SW	Local St	NA	NA
Exide Drive	212.8 m	S	Local St	5222	2022
Edison Circle	5.8 m	SW	Local St	NA	NA

Electrical

Utilities Company: Appalacian Electric Power Meter #: 45938

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. The platform is in fair condition. Platform decking consists of 21 boards (36"L x 6"W x 1"T) and one board (36"L x 2.5" W x 1"T). The steps consists a 3 - step metal frame (23" tall) and the three boards (36"L x 11" W x 1"T). The top step needs replacing.
3. Both Tish Hi-vol monitors do not have serial numbers.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Exide Pb **Initials:** EMH **Date:** 03/16/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 10:30 am **Departure Time:** 11:25 am **Primary Operator:** Mathew Hayes

Observer(s): _____

SITE

[□ Yes ■ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [□ Yes □ No ■ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Comments: _____

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / ■Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
Pb (1)	Tisch	Hi-Vol	NA
Pb (2)	Tisch	Hi-Vol	NA

MSEF: Local Site Name: Exide Pb **Initials:** EMH **Date:** 03/16/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
NA	NA	NA	NA	NA

OUTDOOR SAMPLERS □ **Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: NA **PM_{10} Head Clean Schedule:** NA

Issue(s): _____

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

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
Pb	Hi	2.3
Pb	Hi	2.3

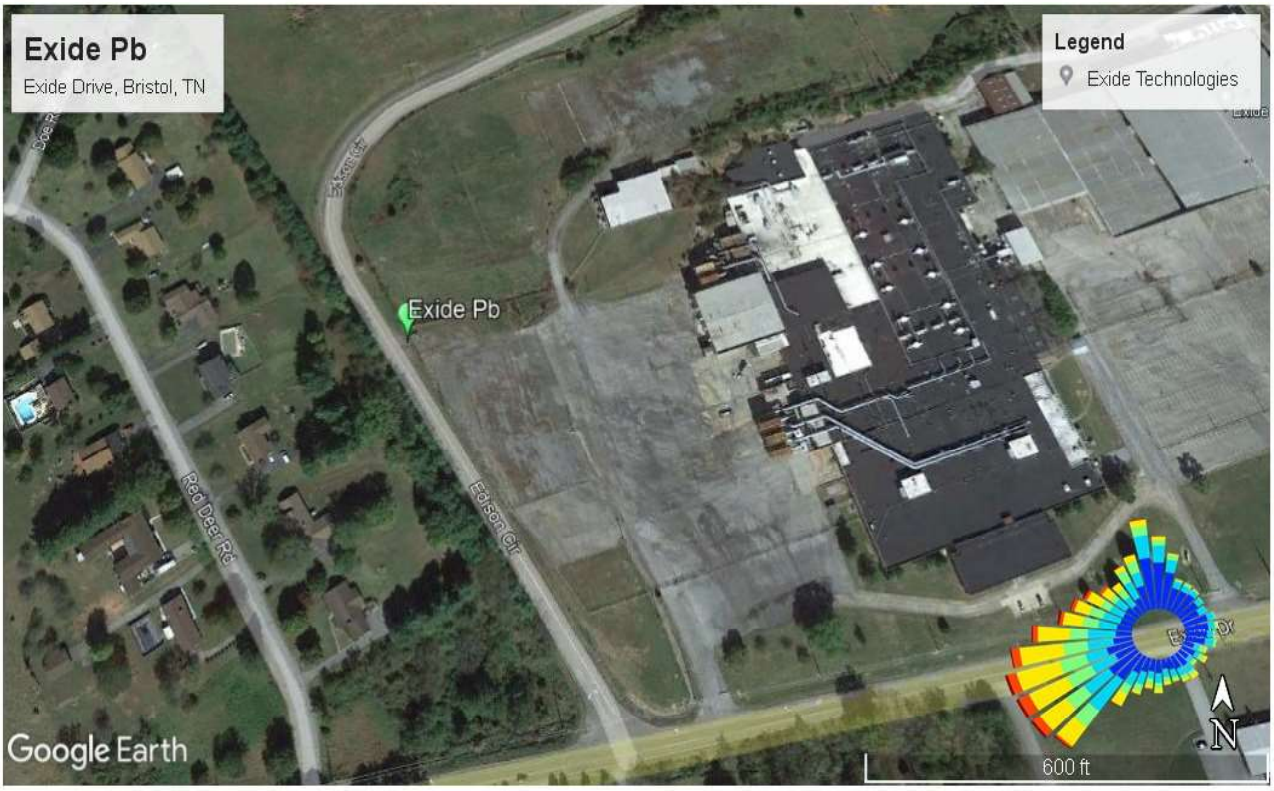
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved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

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	2.0	Ground	2.3		Urban	Urban
Pb	2.0	Ground	2.3		Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Exide Pb **Initials:** EMH **Date:** 03/16/23

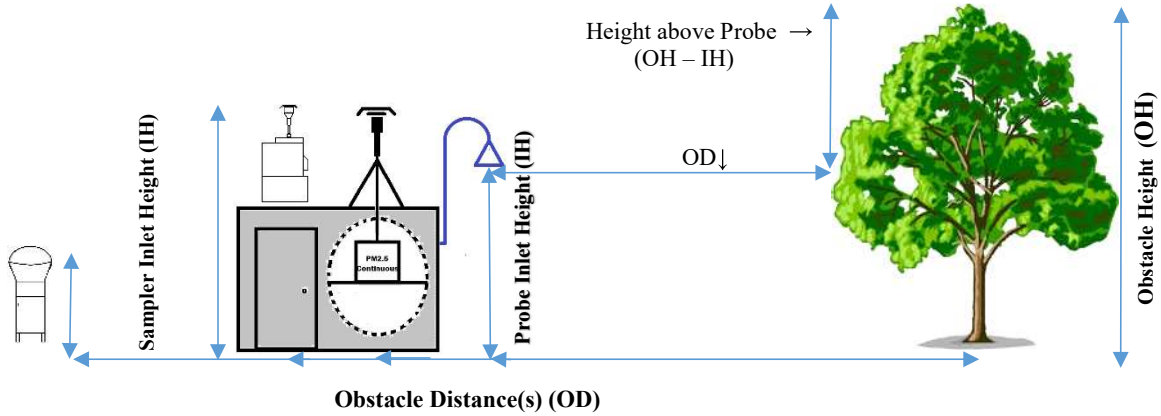
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 10/17/19

MSEF: Local Site Name: Exide Pb **Initials:** EMH **Date:** 03/16/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Tree	4.9	2.0	5.8	5.8	✓	351
2	Tree	6.0	2.0	8.0	50.1		340
3	Trees	14.4	2.0	24.8	44.0		318
4	Trees	13.4	2.0	22.8	33.0		308
5	Trees	17.3	2.0	30.6	20.5	✓	265
6	Trees	14.2	2.0	24.4	25.6	✓	203
7	Trees	13.5	2.0	23.0	25.0	✓	131
8	Old Exide Plant	14.4	2.0	24.8	156.0		79
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Exide Pb **Initials:** EMH **Date:** 03/16/23

TREE DRIPLINE(s): 5.8 **meters** (nearest inlet to dripline) □ **No Trees Present**
20.5 **meters** (nearest inlet to dripline) □ Not Present
25.0 **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 NO_2 or SO_2 analyzers

Issues: None

Additional Information:

Objects # 3 - 7 are trees (running NW-W-SW) are on the opposite of Edison Circle across the platform. Object # 3 are trees NW of the 4 shorter pines. Object # 4 are the four short pines within the tree row. Object #5 are the pine trees between the 4 shorter pines and hardwoods across from the platform. Object # 6 are the hardwood trees and Object # 7 are the pine trees SW of the hardwoods.

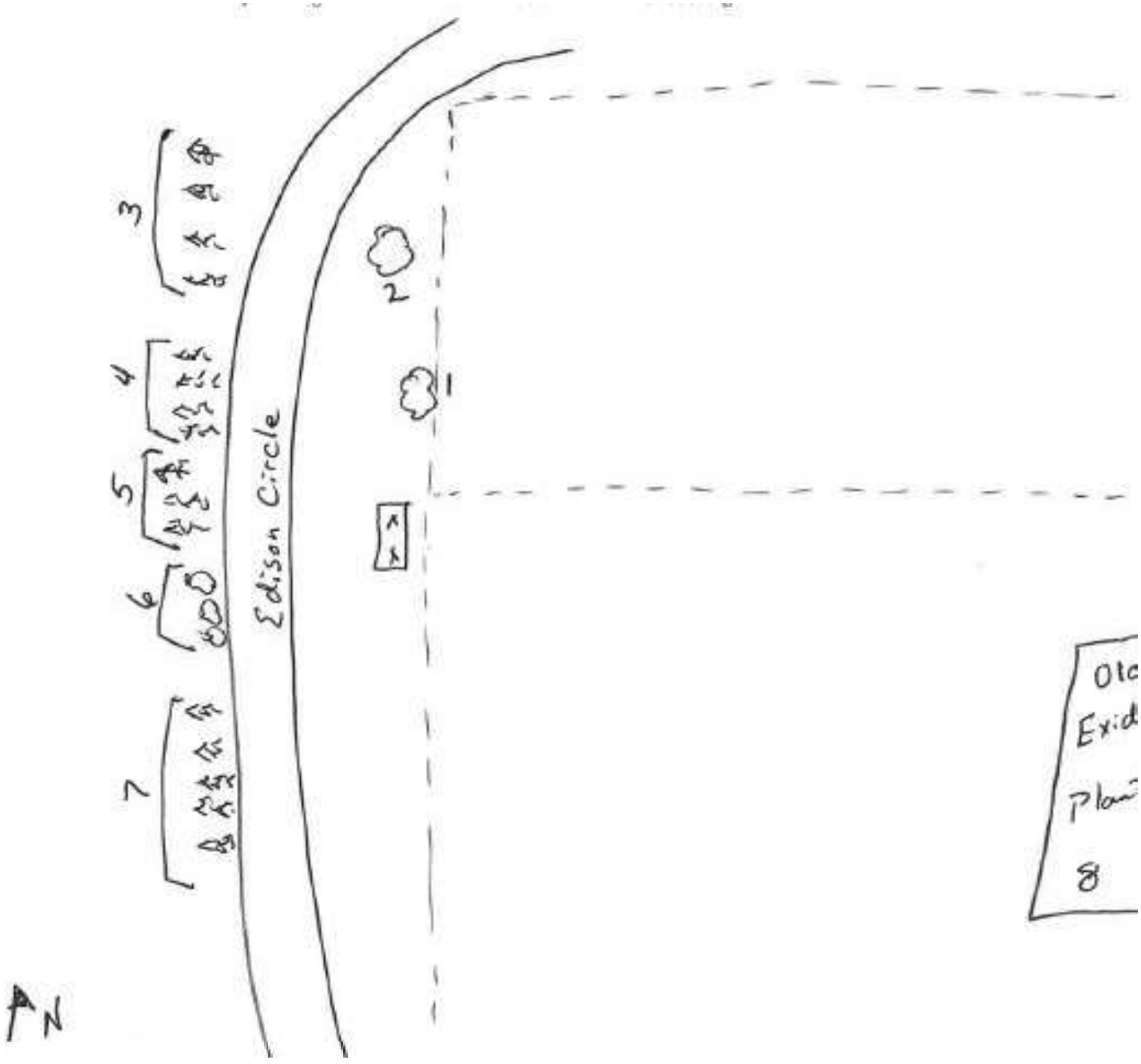
Objects # 1, 5, 6 and 7 are considered obstacles.

The Exide site is APC's only point-source oriented air monitoring site. The trees (Object # 5, 6, and 7) are within the treeline northwest-west of the monitors. These obstacles fall outside of the 180-degree arc between the former Exide plant and the lead monitors. Therefore the site meets EPA siting criteria.

MSEF : Local Site Name: Exide Pb **Initials:** EMH **Date:** 03/16/23

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: 260 ° **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.

PHOTO LOG: **Local Site Name:** Exide Pb **Initials:** EMH **Date:** 03/16/23

Camera [■ APC / □ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: North Directional

Photo: 002 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: East Directional

Photo: 004 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: South Diectional

Photo: 006 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: West Directional

Photo: 008 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/16/23 **Time:** 11:15 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/16/23 Time: 11:15 am Photographer: EMH Description: Monitors

Photo: 011 **Date:** 03/16/23 **Time:** 11:15 am **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

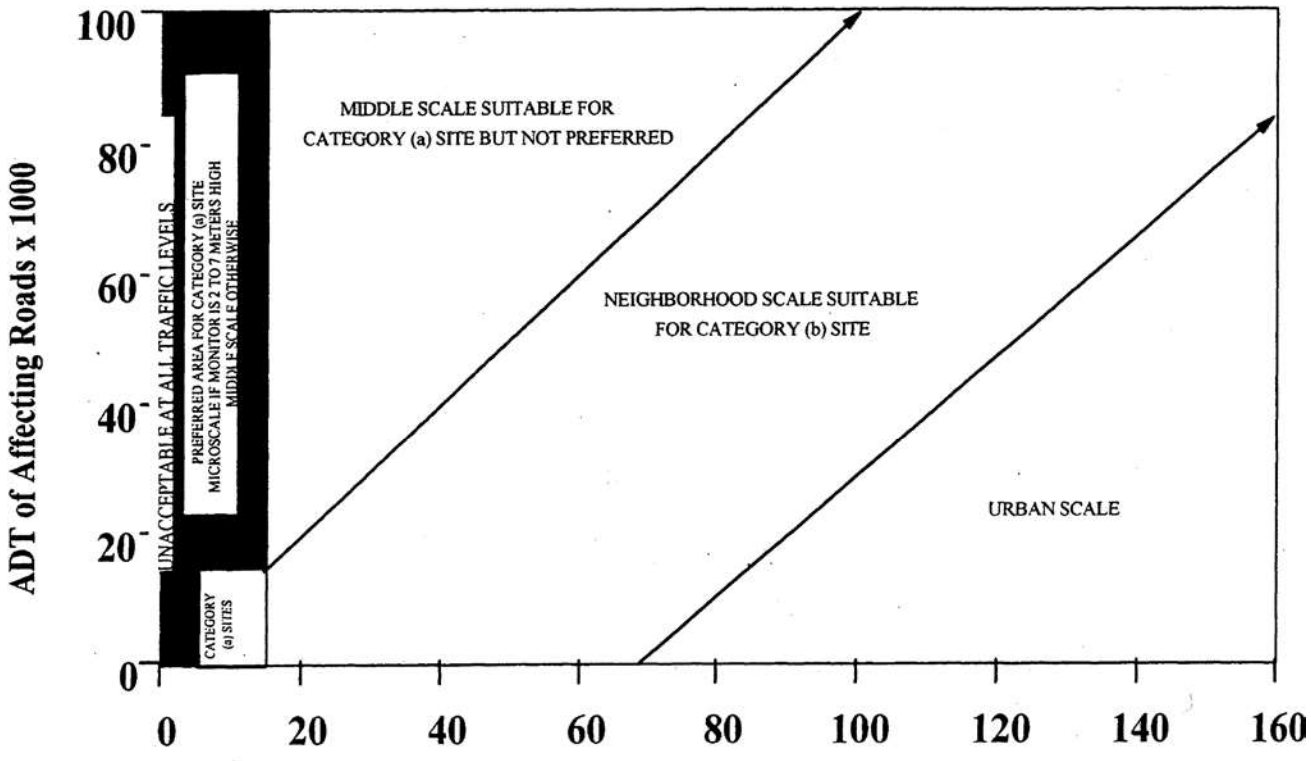


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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

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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 Evaluation
TDEC APC

Date: 03/15/2023
AQS Number: 47-163-6001
Site Name: Eastman RNR

Location: Kingsport, Tennessee
Pollutants: SO2

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Wilbrn Drive	37.5 m	S	Local St	NA	NA
East Center Street	91.0 m	E	Local St	12513	2022
Memorial Boulevard	160.8	S	Local St	6975	2022

Electrical

Utilities Company: Appalachian Electric Power Meter #: 789183326

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. Shelter temperature was 76 degrees F (24.4 C).
3. The vendor for the SO2 cylinder is Praxair.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 3:10 pm **Departure Time:** 3:45 pm **Primary Operator:** Ronnie Wilhoit

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [□ Yes □ No ■ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.5 **°C** (from data logger) **Operator Site Visits:** 1 per [☐ week |☐ month |☐ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[□ **Yes** ■ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 2.4 **meters** **Roofing Material**: Steel

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

MONITOR(s): **Location:** Exterior Samplers [□ **Roof** / □**Ground** / ■ **Not Present**]

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	T100	2262

CALIBRATOR(s): □ **Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T700	2597	11/29/22	05/29/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: □ **Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
QC	SO2	1650	02/26/24	14.96	JA01477

Issues: _____

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610043021016	Modem	Main
Agilaire	8872	515	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 557)

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

[□ Yes □ No] **Needs Service** **Last Service Date:** 06/05/22 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 06/05/22

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

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: 5.3 seconds (20 sec. max) (Refer to chart for maximum line lengths)

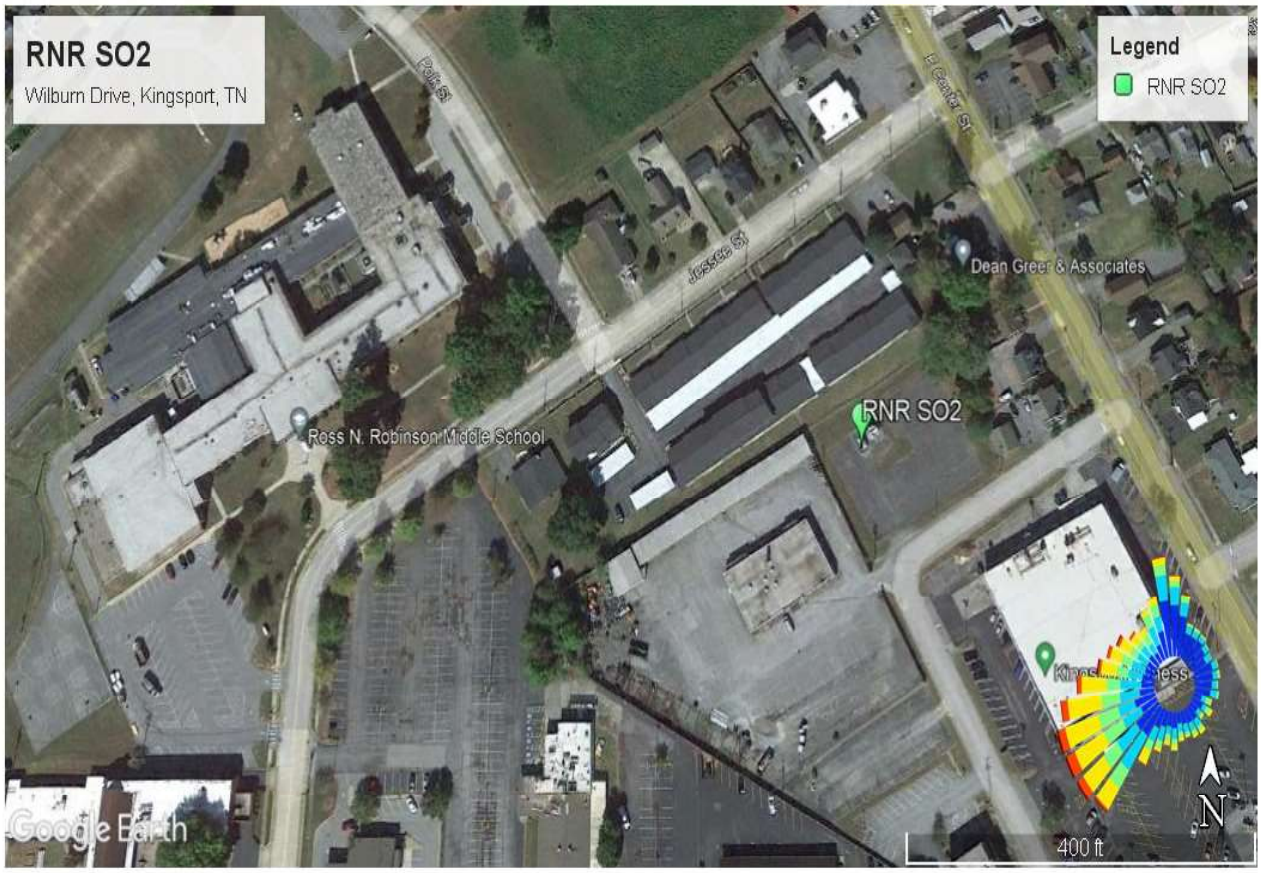
Issue(s): _____

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
SO2	3.2	Side of Shelter			Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

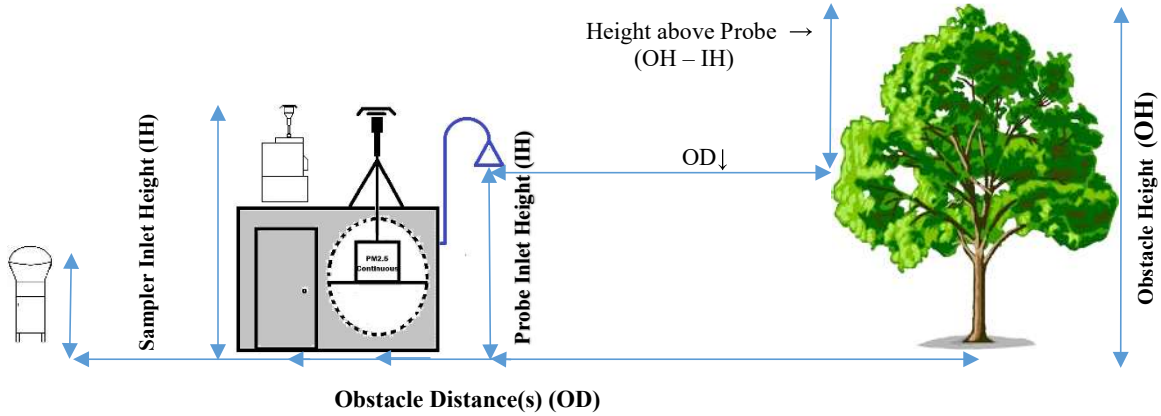
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 10/17/19

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Condos	4.0	3.2	1.6	24.8	☐	357
2	Tree	17.2	3.2	28.0	46.0	☐	53
3	Tree	18.0	3.2	29.6	56.0	☐	58
4	Tree	11.8	3.2	17.2	48.3	☐	69
5	Grey Building	6.8	3.2	7.2	63.0	☐	126
6	Shed	3.3	3.2	0.2	18.2	☐	310
7						☐	
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

TREE DRIPLINE(s): 46.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

48.3 **meters** (nearest inlet to dripline) ☐ Not Present

_____ **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 NO_2 or SO_2 analyzers

Issues: None

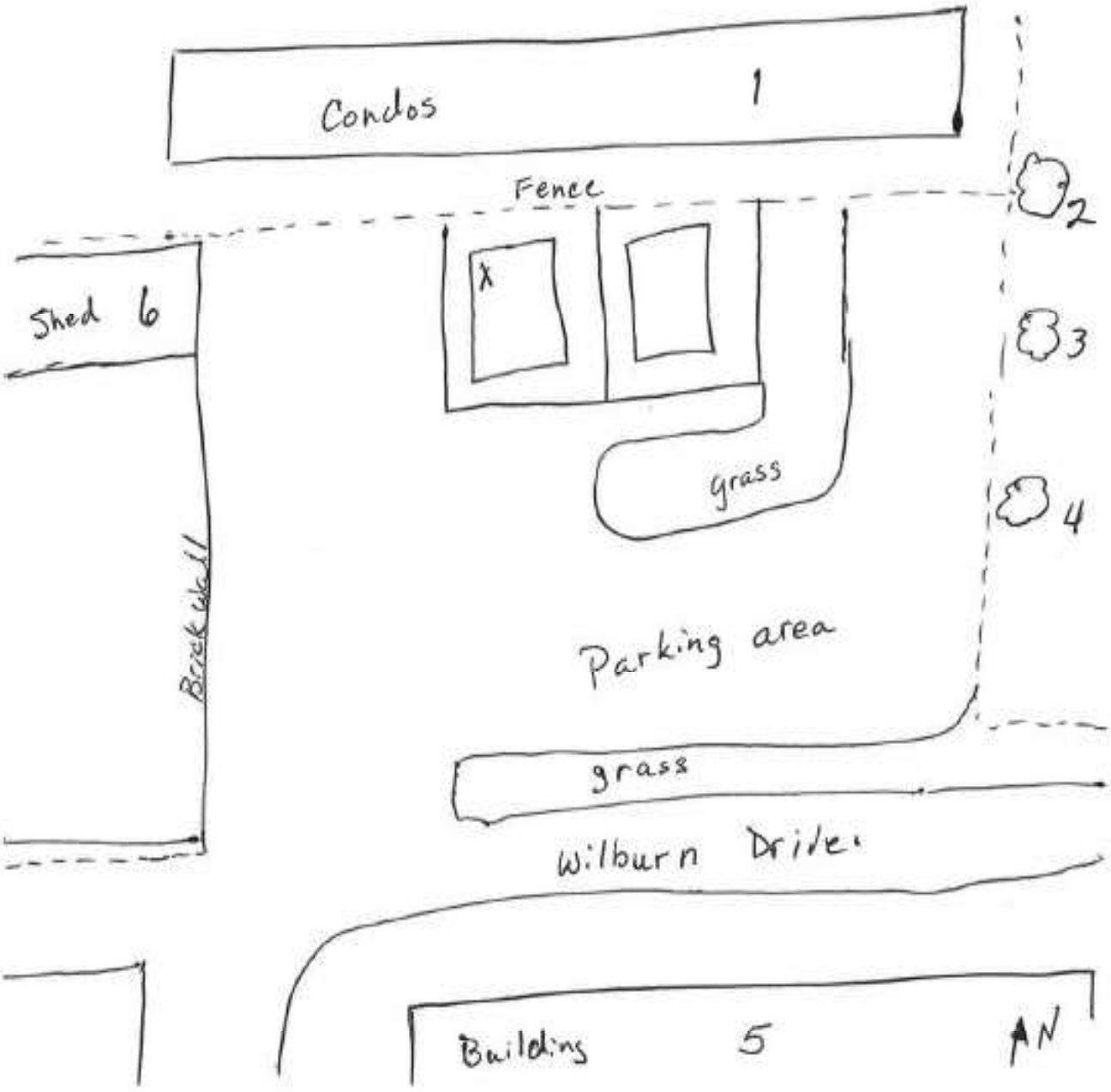
Additional Information:

The closest tree is greater than 20 meters from the probe; therefore there are no tree dripline issues.

MSEF : Local Site Name: Eastman RNR **Initials:** EMH **Date:** 03/15/23

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.

PHOTO LOG: **Local Site Name:** Eastman RNR **Initials:** EMH **Date:** 03/15/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/15/23 **Time:** 3:35 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/15/23 Time: 3:35 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 03/15/23 **Time:** 3:35 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

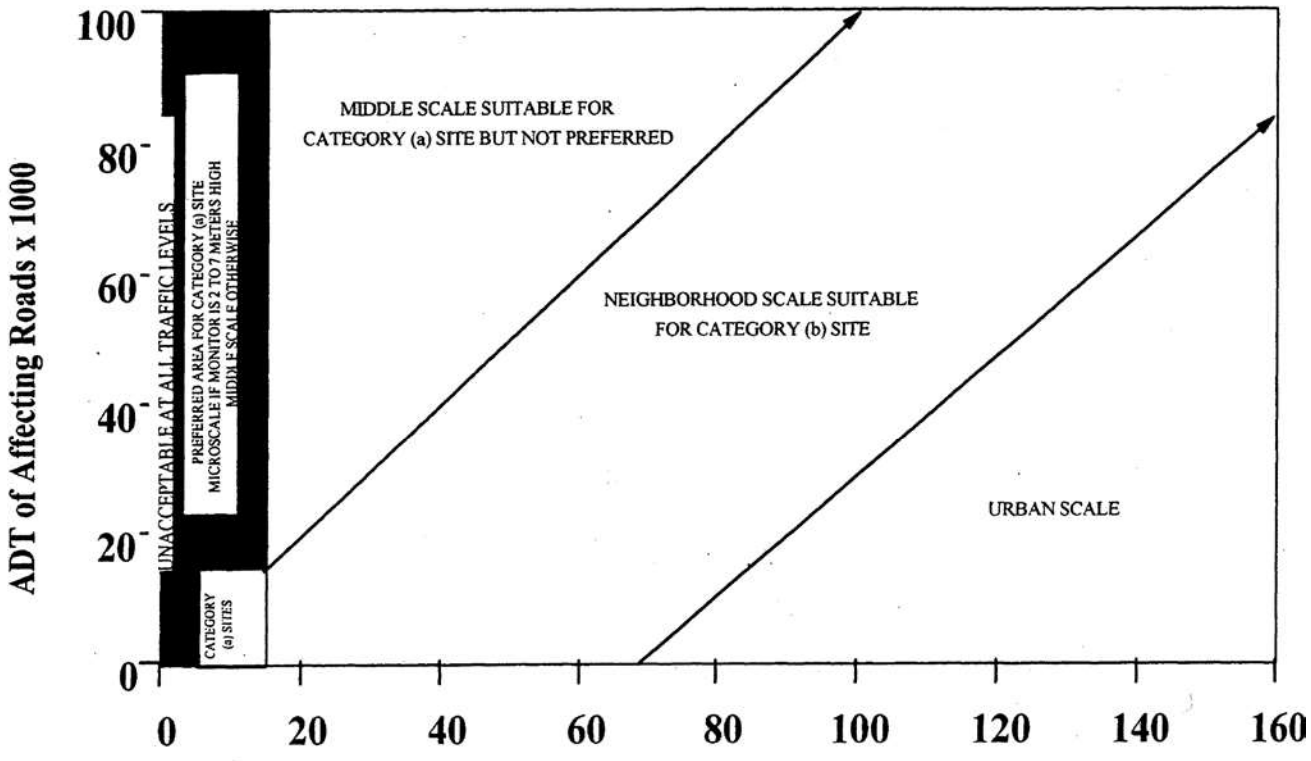


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/16/2023
Location: Kingsport, Tennessee
AQS Number: 47-163-6002
Site Name: Eastman Skyland SO2
Pollutants: SO2

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Skyland Drive	48.2 m	NW	Local St	NA	NA
Bagwell Street	25.1 m	S	Local St	NA	NA
Cooks Valley Road	577.6 m	N	Local St	64	2022
Memorial Boulevard	943.6 m	N	Local St	9090	2022
East Line Drive	512.0 m	W	Local St	729	2022

Electrical

Utilities Company: Appalachian Electric Power Meter #: 783191035

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. Shelter temperature was 72 degrees F (22.2 C).
3. Shelter is built on concrete base.
4. The vendor for the SO2 cylinder is NexAir.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 12:30 pm **Departure Time:** 1:25 pm **Primary Operator:** Ron Wilhoit

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [□ Yes □ No ■ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.3 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[□ **Yes** ■ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 2.6 **meters** **Roofing Material**: Steel

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[□ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Roof Railing**

Roof Access: [■ Stairs / □ Ladder / □ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / □Ground / ■ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	T100	4300

CALIBRATOR(s): **□ Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T700	3515	11/16/22	05/15/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: **□ Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
QC	SO2	700	12/27/26	15.5 ppm	EX0016443

Issues: _____

MSEF: Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R94120251011016	Modem	Main
Agilaire	8872	510	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 556)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 09/01/22 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 09/01/22

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

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: 16.3 seconds (20 sec. max) (Refer to chart for maximum line lengths)

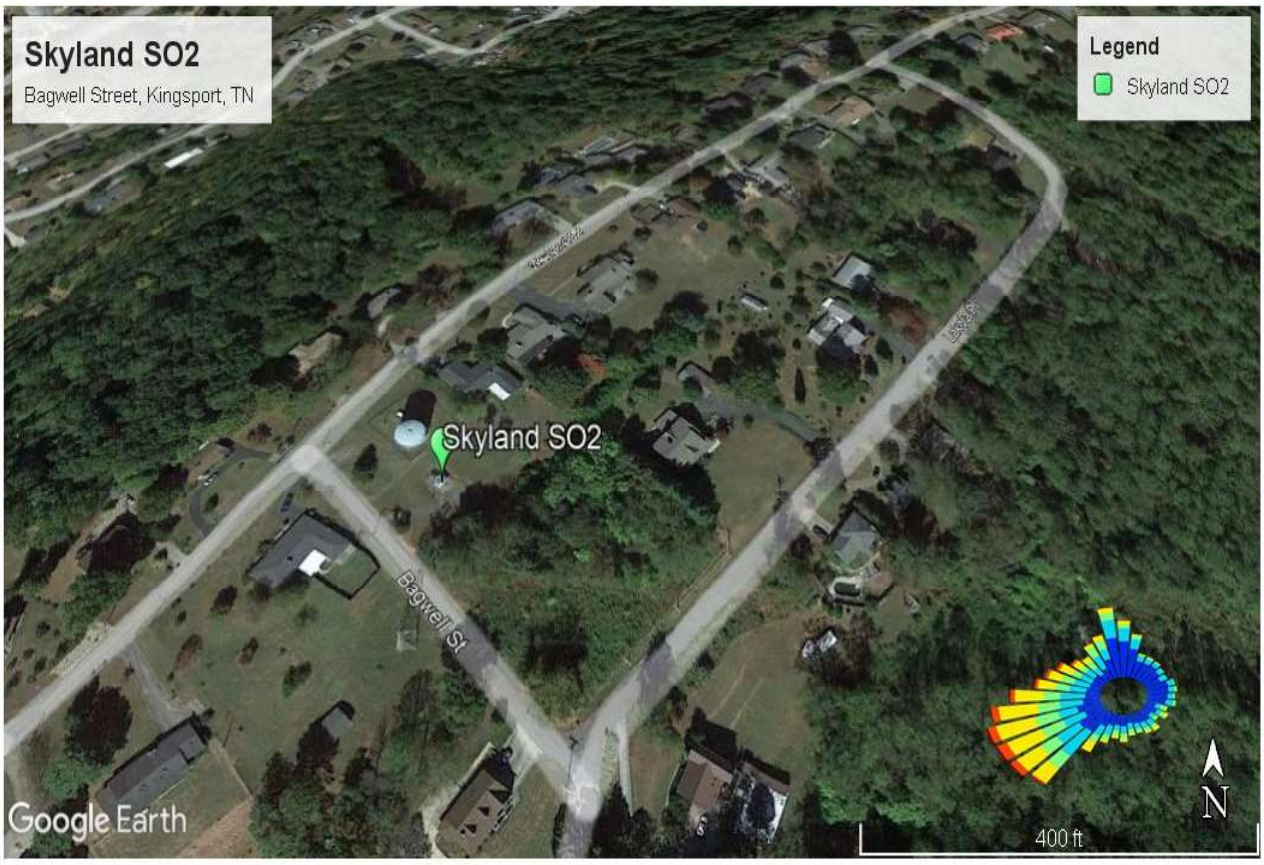
Issue(s): _____

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
SO2	12.0	Tower			Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

MSEF: Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

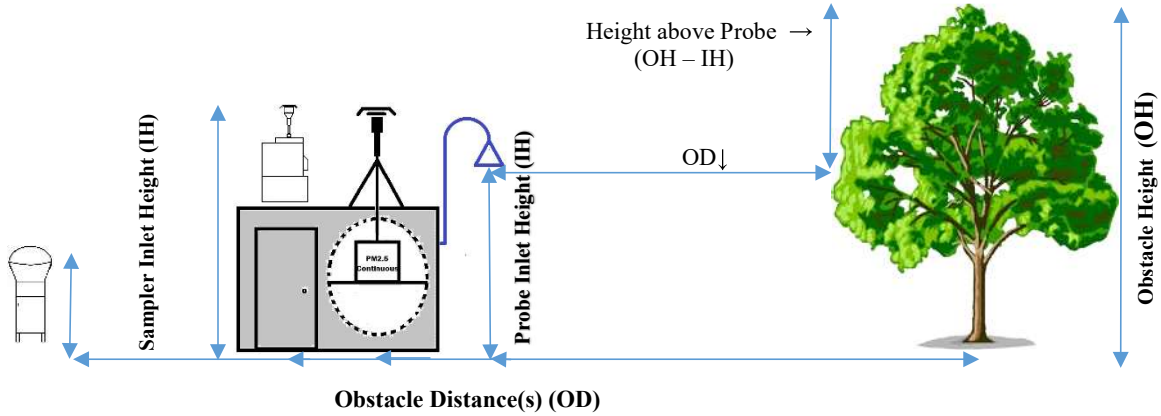
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 10/17/19

MSEF: Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Tree	12.1	12.0	0.2	24.6	☐	243
2	Water Tower	18.8	12.0	13.6	12.1	☑	321
3	Trees	12.0	12.0	NA	24.4	☐	11
4	Tree	8.6	12.0	NA	29.0	☐	30
5	Trees	18.6	12.0	13.2	51.0	☐	137
6	Tree	6.9	12.0	NA	23.4	☐	239
7						☐	
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

TREE DRIPLINE(s): 23.4 **meters** (nearest inlet to dripline) □ **No Trees Present**

24.4 **meters** (nearest inlet to dripline) □ Not Present

24.6 **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 NO_2 or SO_2 analyzers

Issues: None

Additional Information:

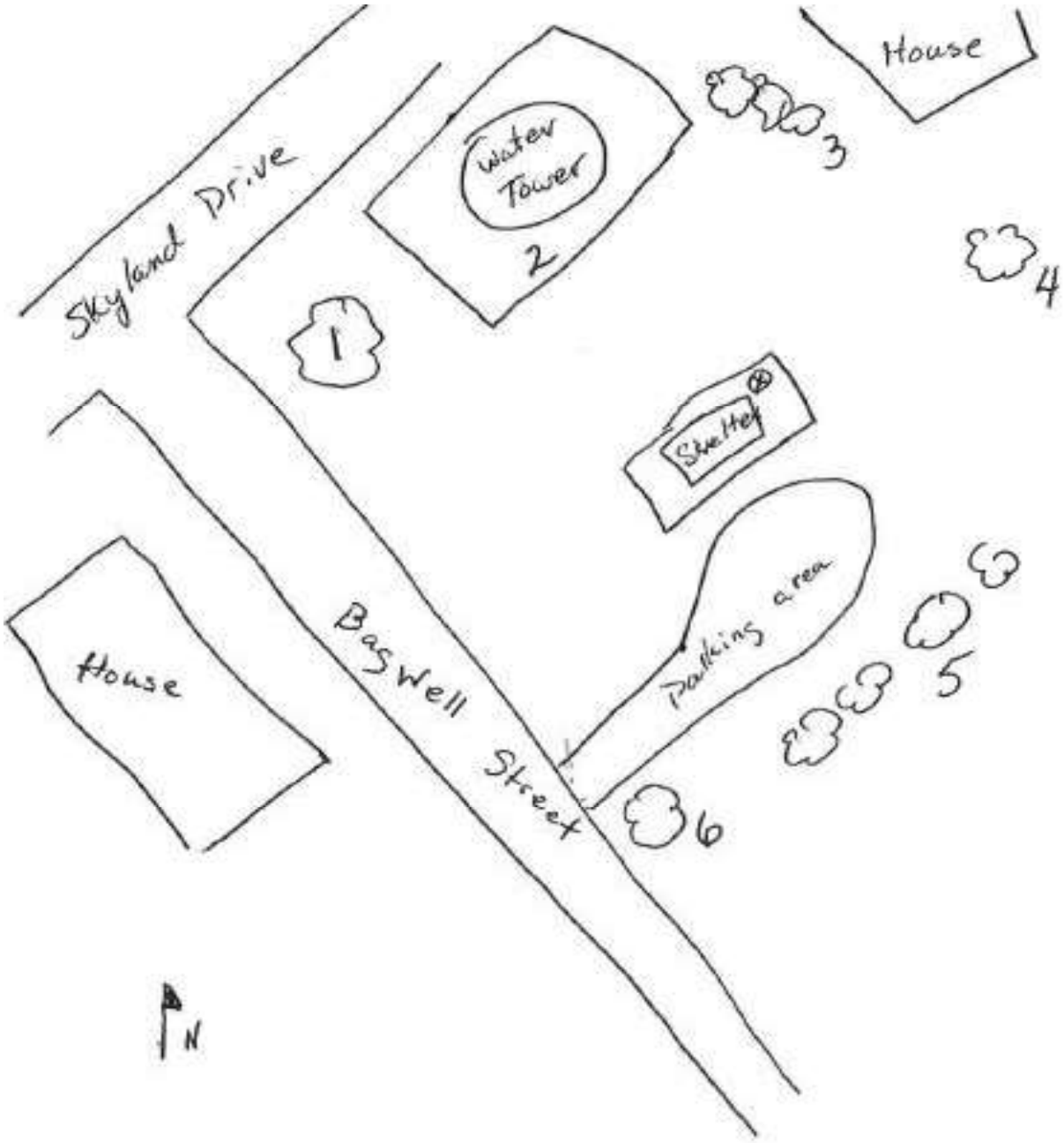
The closest tree is greater than 20 meters from the tower; therefore there are no tree dripline issues.

Object #2 (Water tower) is considered an obstacle. It falls within one 90-degree quadrant, allowing more than 270 degrees of unrestricted airflow around the probe.

MSEF : Local Site Name: Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

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.

PHOTO LOG: **Local Site Name:** Eastman Skyland SO2 **Initials:** EMH **Date:** 03/16/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: Northwest Directional

Photo: 009 Date: 03/16/23 **Time:** 1:30 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/16/23 Time: 1:30 pm Photographer: EMH Description: Tower

Photo: 011 **Date:** 03/16/23 **Time:** 1:30 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

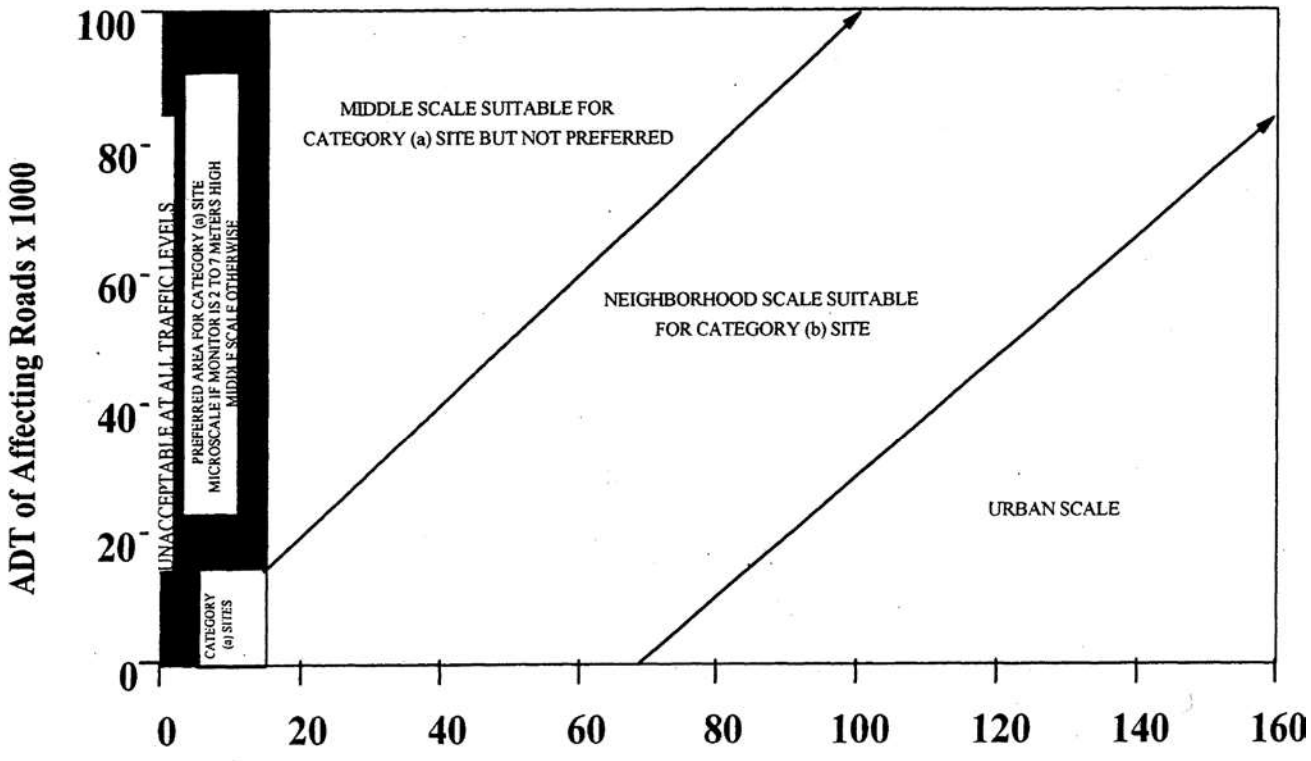


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/15/2023 **Location:** Kingsport, Tennessee

AQS Number: 47-163-6003

Site Name: Eastman Andrew Johnson SO2 **Pollutants:** SO2

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Ormond Drive	289.2 m	N	Local St	NA	NA
East Sevier Avenue	159.0 m	W	Local St	NA	NA
Montrose Street	21.0 m	E	Local St	NA	NA
Bruce Stree	9.0 m	E	Local St	NA	NA
Konnarock Road	388.0 m	S to SW	Local St	3634	2022
North Eastman Road	510.0 m	N	Local St	7521	2022
Sherwood Road	280.0 m	E	Local St	1158	2022

Electrical

Utilities Company: Appalachian Electric Power Meter #: 780269931

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. Shelter temperature was 72 degrees F (22.2 C).
3. The fire extinguisher is in good condition.
4. Shelter is bolted down to cement pad.
5. The vendor for the SO2 cylinder is Praxair.
6. A weather station is attached to roof of shelter.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 11:45 am **Departure Time:** 1:15 pm **Primary Operator:** Matthew Hayes

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.1 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel with Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Comments: _____

MSEF: Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / □Ground / □ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	T100	2261

CALIBRATOR(s): **□ Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T700	4153	03/06/23	09/07/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: **□ Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
QC	SO2	1450	11/05/23	15.3 ppm	JJ13668

Issues: _____

MSEF: Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610083011016	Modem	Main
Datalogger	Agilaire	8872	511	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 1349)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 06/06/22 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 06/06/22

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

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: 5.9 seconds (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
SO2	4.8	Side of Shelter			Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

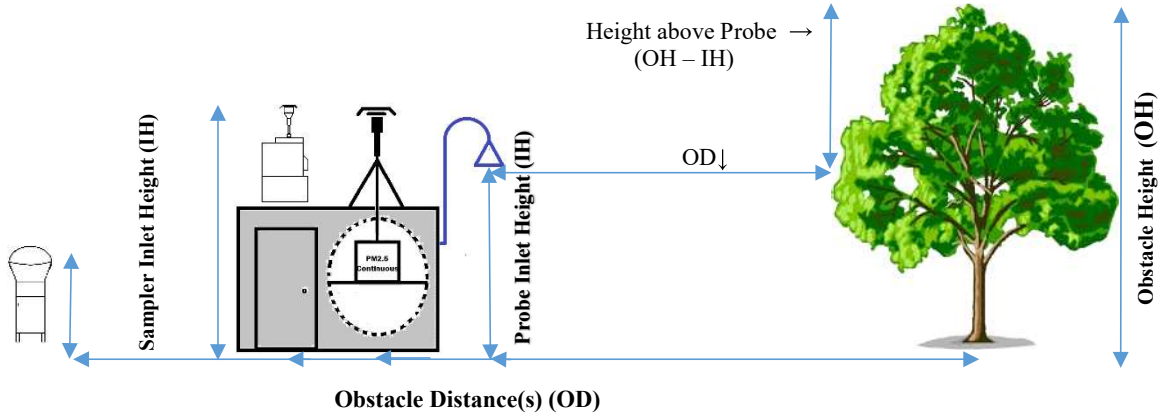
MSEF: Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/17/19

MSEF: Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	School	5.3	4.8	1.0	146.0	☐	343
2	Trees	25.6	4.8	41.6	145.0	☐	333
3	Tree	24.6	4.8	39.6	125.0	☐	335
4	Trees	24.8	4.8	40.0	125.0	☐	359
5	Trees	20.1	4.8	30.6	100.0	☐	5
6	Tree	20.4	4.8	31.2	59.6	☐	9
7	Tree	20.0	4.8	30.4	68.0	☐	49
8	Tree	20.0	4.8	30.4	26.3	✓	165
9	Tree	20.8	4.8	32.0	43.0	☐	187
10	Trees	22.8	4.8	36.0	52.0	☐	194
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

TREE DRIPLINE(s): 26.0 **meters** (nearest inlet to dripline) ☐ **No Trees Present**
43.0 **meters** (nearest inlet to dripline) ☐ Not Present
52.0 **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 NO_2 or SO_2 analyzers

Issues: None

Additional Information:

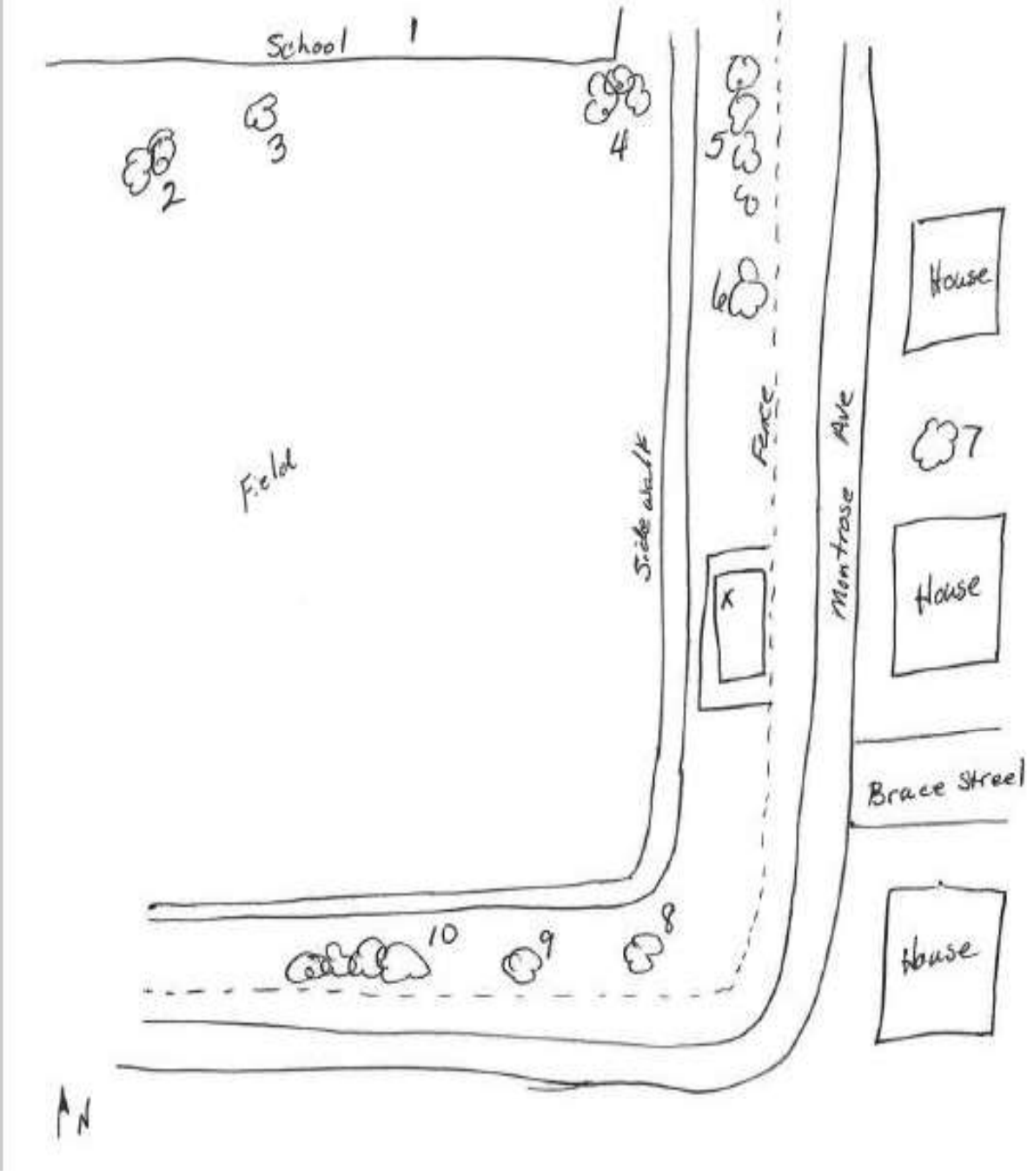
The closest tree is greater than 20 meters from probe; therefore there are no tree dripline issues.

Object # 8 (Tree) is considered an obstacle. The tree falls within one 90 degree quadrant, allowing more than 270 degrees of unrestricted airflow around the probe.

MSEF : Local Site Name: Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

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.

PHOTO LOG: **Local Site Name:** Eastman Andrew Johnson SO2 **Initials:** EMH **Date:** 03/15/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/15/23 **Time:** 1:05 pm **Photographer:** EMH **Description:** Site Directional

Photo: 010 Date: 03/15/23 Time: 1:05 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 03/15/23 **Time:** 1:05 pm **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

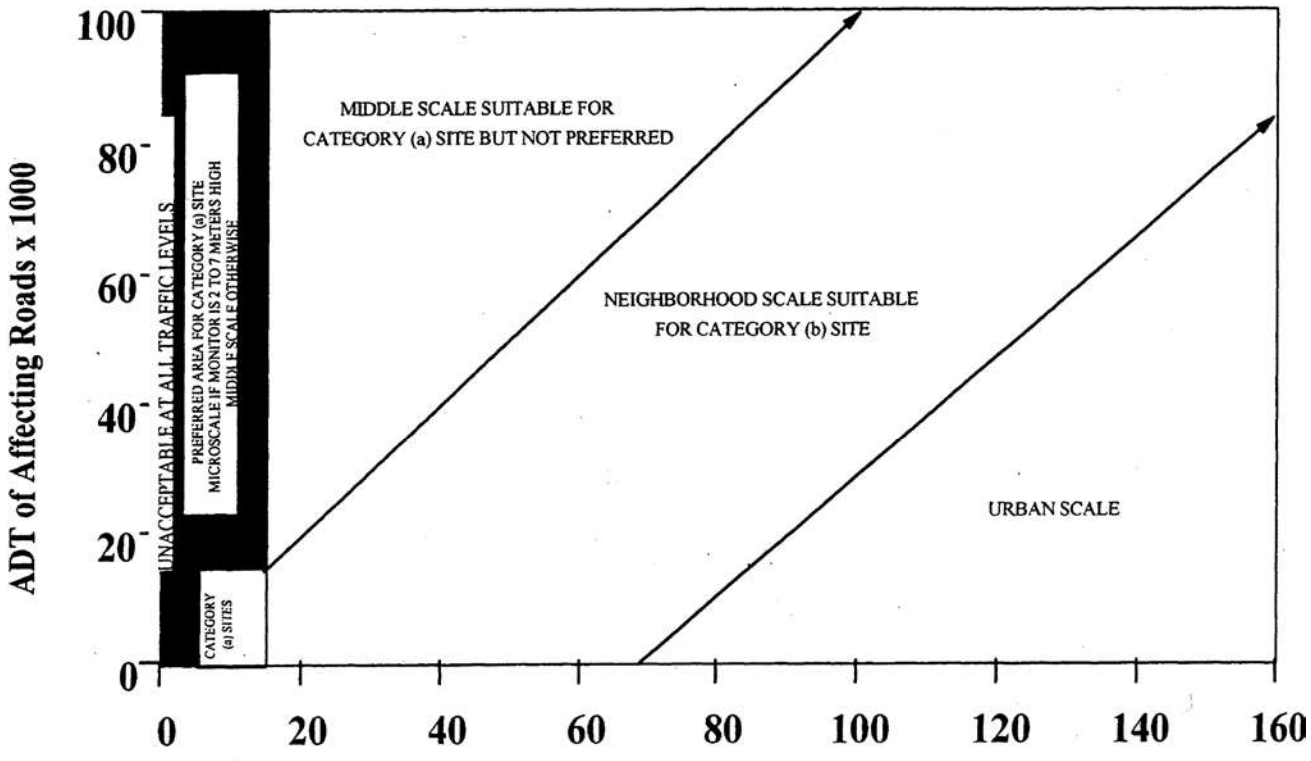


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 03/15/2023
Location: Kingsport, Tennessee
AQS Number: 47-163-6004
Site Name: Eastman Happy Hill SO2
Pollutants: SO2

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Happy Hill Road	22.6 m	NE	Local St	NA	NA
South Eastman Road	648.0 m	NW	Local St	525	2022
Mooreland Road	168.0 m	N	Local St	480	2022

Electrical

Utilities Company: Appalachian Electric Power Meter #: 783184544

Additional Comments:

1. Arrival, departure and photo times are Eastern time.
2. Shelter temperature was 71 degree F (21.3 C)
3. Fire extinguisher is in good condition.
4. Shelter is bolted to cement pad.
5. The vendor of the SO2 cylinder is Praxair.
6. A weather station is located on roof of shelter.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 10:45 am **Departure Time:** 11:40 am **Primary Operator:** Matthew Hayes

Observer(s): _____

SITE

[□ Yes ■ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 23.3 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: _____

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel with Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) _____

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

MONITOR(s): **Location:** Exterior Samplers [□ **Roof** / □**Ground** / ■ **Not Present**]

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	T100	3211

CALIBRATOR(s): □ **Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T700	3514	03/08/23	09/07/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: □ **Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number
QC	SO2	1550	02/26/24	14.88	JA01465

Issues: _____

MSEF: Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R9361026911016	Modem	Main
Agilaire	8872	494	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN 855)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 08/31/22 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 08/31/22

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

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: 15.0 seconds (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
SO2	11.0	Tower			Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

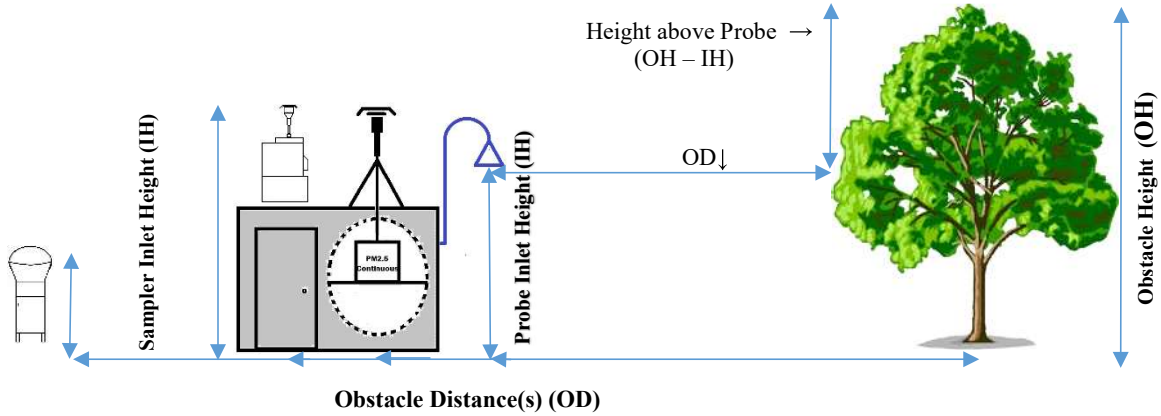
MSEF: Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/17/19

MSEF: Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	House	5.4	11.0	NA	49.0	☐	29
2	Trees	20.8	11.0	19.6	66.0	☐	33
3	Tree	20.8	11.0	19.6	71.4	☐	27
4	Tree	20.3	11.0	18.6	66.0	☐	21
5	Tree	11.7	11.0	1.4	49.8	☐	8
6	Tree	12.0	11.0	2.0	30.8	☐	11
7	Tree	12.2	11.0	2.4	20.8	☐	355
8	Tree	19.6	11.0	17.2	29.0	☐	340
9	Tree	19.6	11.0	17.2	24.0	☐	329
10	Barn	5.2	11.0	NA	12.0	☐	50
11	Trees	12.7	11.0	3.4	36.0	☐	66
12	Trees	15.0	11.0	8.0	37.0	☐	140
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

TREE DRIPLINE(s): 19.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

_____ **meters** (nearest inlet to dripline) ☐ Not Present

_____ **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 NO_2 or SO_2 analyzers

Issues: None

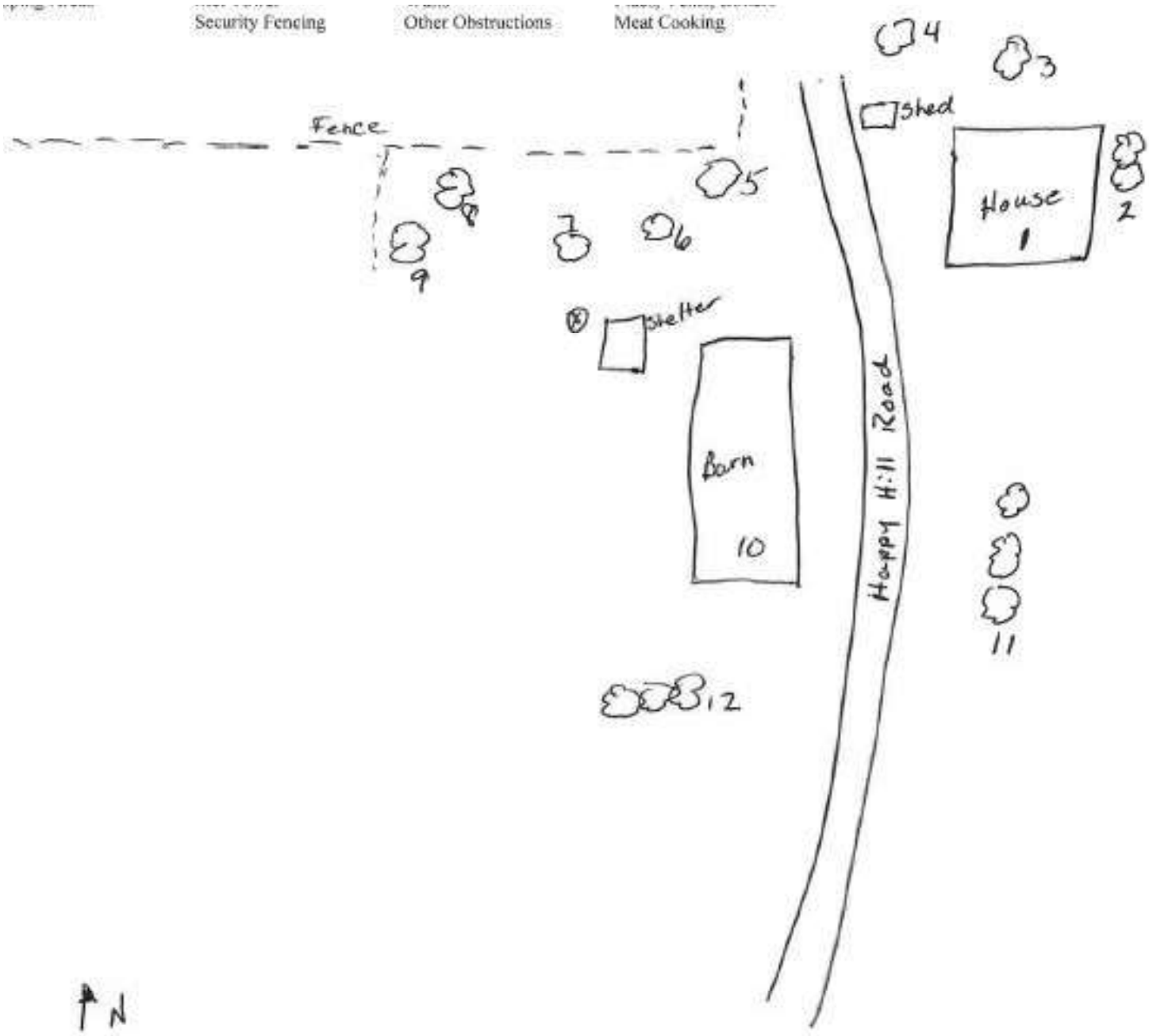
Additional Information:

The closest tree is 20.8 meters from tower with a tree dripline of 19.0 meters. The tree is not considered an obstacle.

MSEF : Local Site Name: Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

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.

PHOTO LOG: **Local Site Name:** Eastman Happy Hill SO2 **Initials:** EMH **Date:** 03/15/23

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta MN12Z

Photo: 001 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: North Directional

Photo: 002 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: East Directional

Photo: 004 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: South Directional

Photo: 006 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: West Directional

Photo: 008 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/15/23 **Time:** 11:30 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/15/23 Time: 11:30 am Photographer: EMH Description: Shelter and tower

Photo: 011 **Date:** 03/15/23 **Time:** 11:30 am **Photographer:** EMH **Description:** Electric meter

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

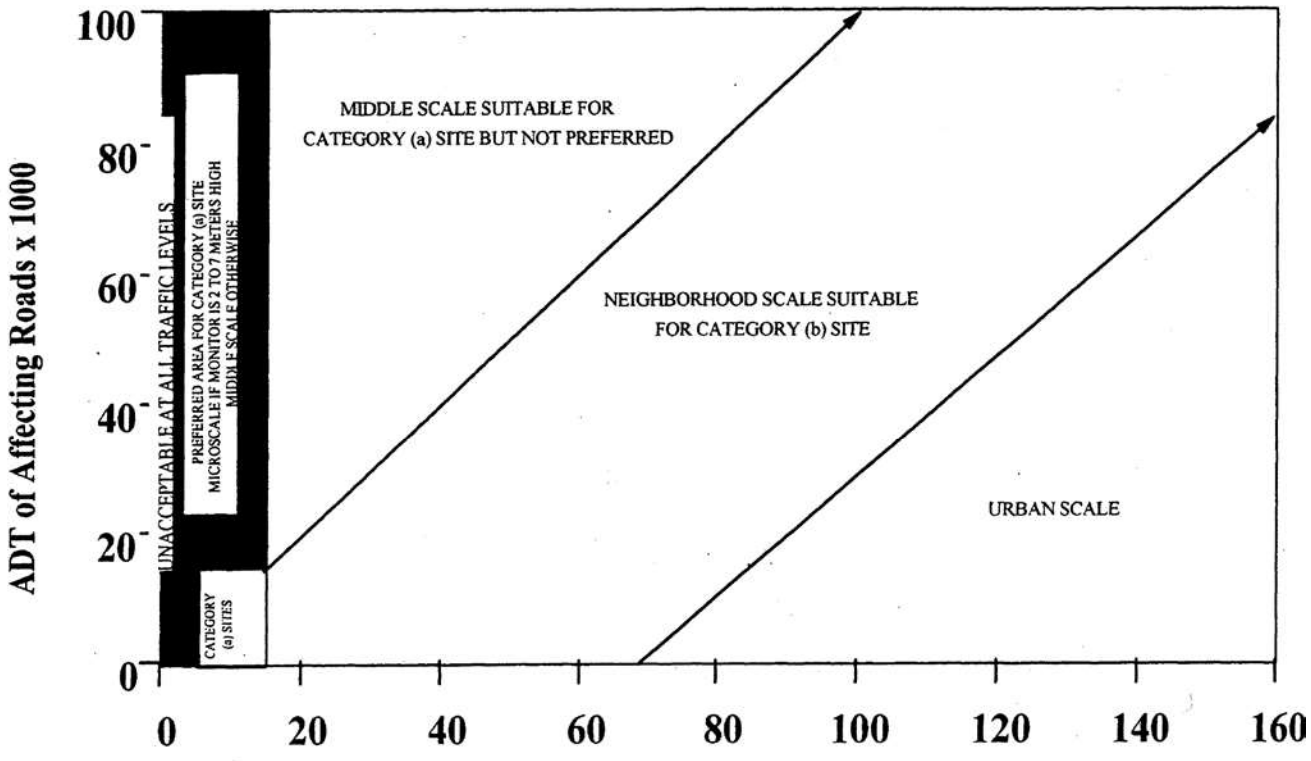


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 01/05/2023
AQS Number: 47-165-0007
Site Name: Hendersonville

Location: Hendersonville, Tennessee
Pollutants: O3, PM2.5

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Overlook Circle	68.5 m	N	Local St	NA	NA
Power Plant Road	255.0 m	NW	Local St	NA	NA
Rockland Road	607.5 m	N	Local St	9590	2022

Electrical

Utilities Company: Nashville Electric System Meter #: 334974

Additional Comments:

1. Arrival, departure and photo times are Central time.
2. Ken Cooper is the O3 operator and John Helton is the PM operator.
3. Fire extinguisher is in good condition (Nov 2018).
4. Site is located within the fenced-in area of the US Corp of Engineers.
5. Detached stairs are located on the east side of the shelter.
6. The site is one with a multi-pollutant experimental sensor tower and a weather station.
7. The inside shelter temperature was 74 degrees F (23.3 degrees C).
8. 1-5-23 site evaluation conducted prior to set-up for 2023 ozone season.
9. Site set up for O3 season on 2/15/23.
10. Platform - 14 boards (84' L x 6" W x 1" T); platform needs replacing.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 1:05 pm **Departure Time:** 2:15 pm **Primary Operator:** Ken Cooper/John Helton

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: Arrival temperature taken 2/15/23

SHELTER - □ **Not Present**

Interior

Arrival Temperature: 22.5 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged:** □**Ceiling** / □ **Floor** / □ **Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: Arrival temperature taken 2/15/23

Exterior

Type: [□**Freezer** / □**Wood Building** / □**Brick-Block** / ■**Steel]**

Height of Roof: 3.0 **meters** **Roofing Material**: Steel w/ Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) Bolted to cement pad

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [■ Stairs / □ **Ladder** / □ **Not Present]** [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: □ **Not Present**

Condition: [□ Yes ■ No] **Good** [■ Yes □ No] **Needs Maintenance**

Issues: Boards dried and cracked, need replacing

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: Hardcopy logbooks for PM monitors on site

MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

MONITOR(s): **Location:** Exterior Samplers [□ **Roof** / ■ **Ground** / □ **Not Present**]

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	4512
PM2.5 (BAM)	Met One	BAM 1022	T17005
PM 2.5 (2025-i)	Teledyne	2025-i	20251W212301708

CALIBRATOR(s): □ **Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	326	02/10/23	08/10/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: ■ **Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R94120103021016	Modem	Main
Agailaire	8872	534	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[□ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN : 1347)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/15/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/15/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **□ Not Present**

[□ Yes ■ No] **Locked** [■ Yes □ No] **Electrically Grounded** [■ Yes □ No] **Stabilized** [■ Yes □ No] **Clean Inside**

[■ Yes □ No] **Head/Separator Clean**

Operator / Log: VSCC/WINS Clean Schedule: 1/30 days **PM_{10} Head Clean Schedule:** 1/30 days

Issue(s): _____

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

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
PM 2.5	Lo	1.8
PM 2.5	Lo	1.8

*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.

MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

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: 6.0 secs (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	7.9		Urban	Urban
PM2.5 (BAM)	2.6	Ground	1.8		Urban	Urban
PM 2.5 (2025-i)	2.6	Ground	1.8		Urban	Urban

FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O_3, SO_2,) & (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.

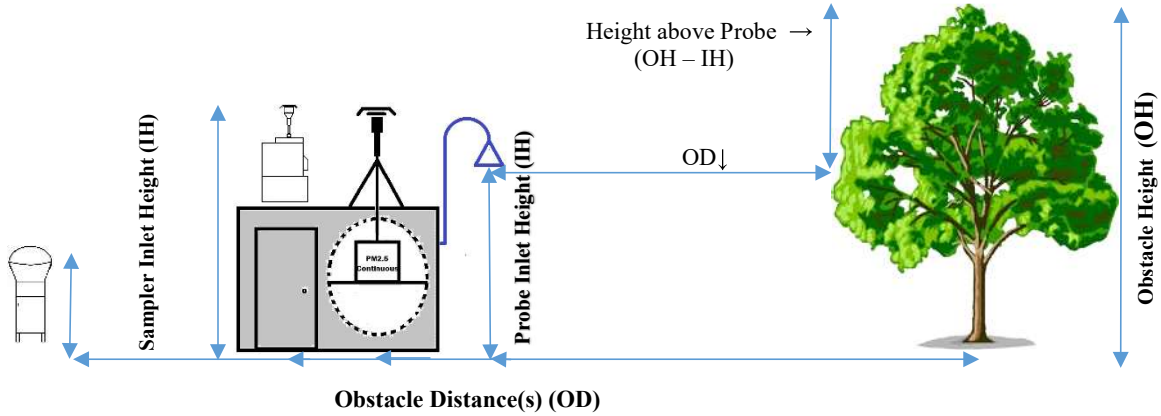
MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/01/21

MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Shed	4.2	2.6	3.2	16.8	☐	3
2	Building	10.8	4.2	13.2	36.8	☐	60
3	Building	4.2	4.2	0	42.6	☐	90
4	Trees	10.5	2.6	15.8	42.0	☐	195
5	Tree	15.4	2.6	25.6	42.5	☐	216
6	Trees	10.6	2.6	16.0	43.0	☐	227
7	Building	5.0	2.6	4.5	31.2	☐	272
8						☐	
9						☐	
10						☐	
11						☐	
12						☐	
13						☐	
14						☐	
15						☐	
16						☐	
17						☐	
18						☐	
19						☐	
20						☐	

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

TREE DRIPLINE(s): 42.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

42.5 **meters** (nearest inlet to dripline) ☐ Not Present

43.0 **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 NO_2 or SO_2 analyzers

Issues: None

Additional Information:

Closest tree is greater than 20 meters from the PM 2025-i inlet.

The distance to Object # 1 was measured from the BAM inlet.

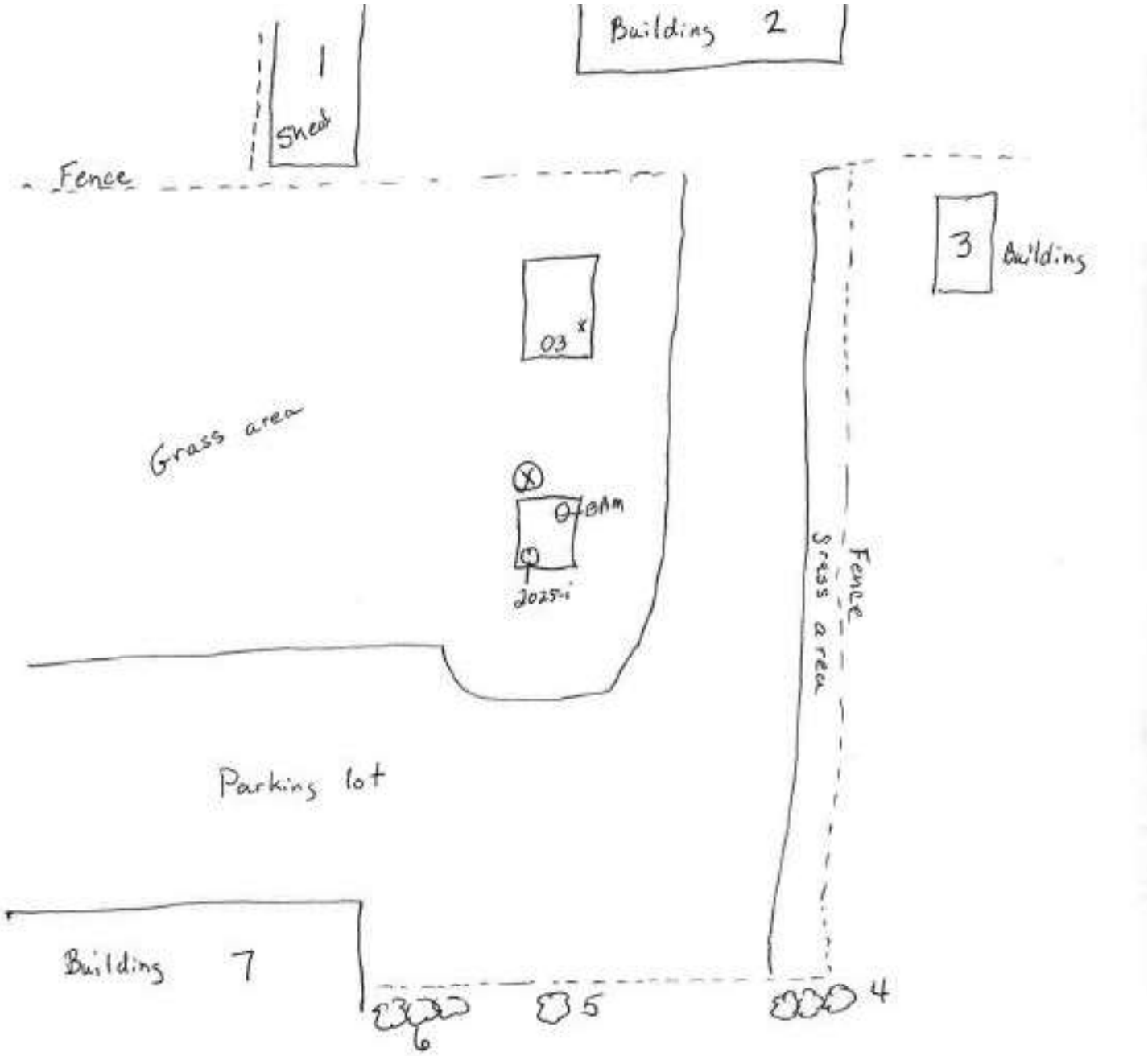
The distance to Object # 2 and #3 were measured from the O3 probe.

The distance to Object # 4 though #7 were measured from 2025-i inlet.

MSEF : Local Site Name: Hendersonville **Initials:** EMH **Date:** 01/05/23

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.

PHOTO LOG: **Local Site Name:** Hendersonville **Initials:** EMH **Date:** 01/05/23

Camera [□ APC / ☒ Personal – Owner: EMH **] Make/Model:** Moto cell phone

Photo: 001 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 01/05/23 **Time:** 2:00 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 01/05/23 Time: 2:00 pm Photographer: EMH Description: Electric meter

Photo: 011 Date: _____ Time: _____ Photographer: EMH **Description:_____**

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

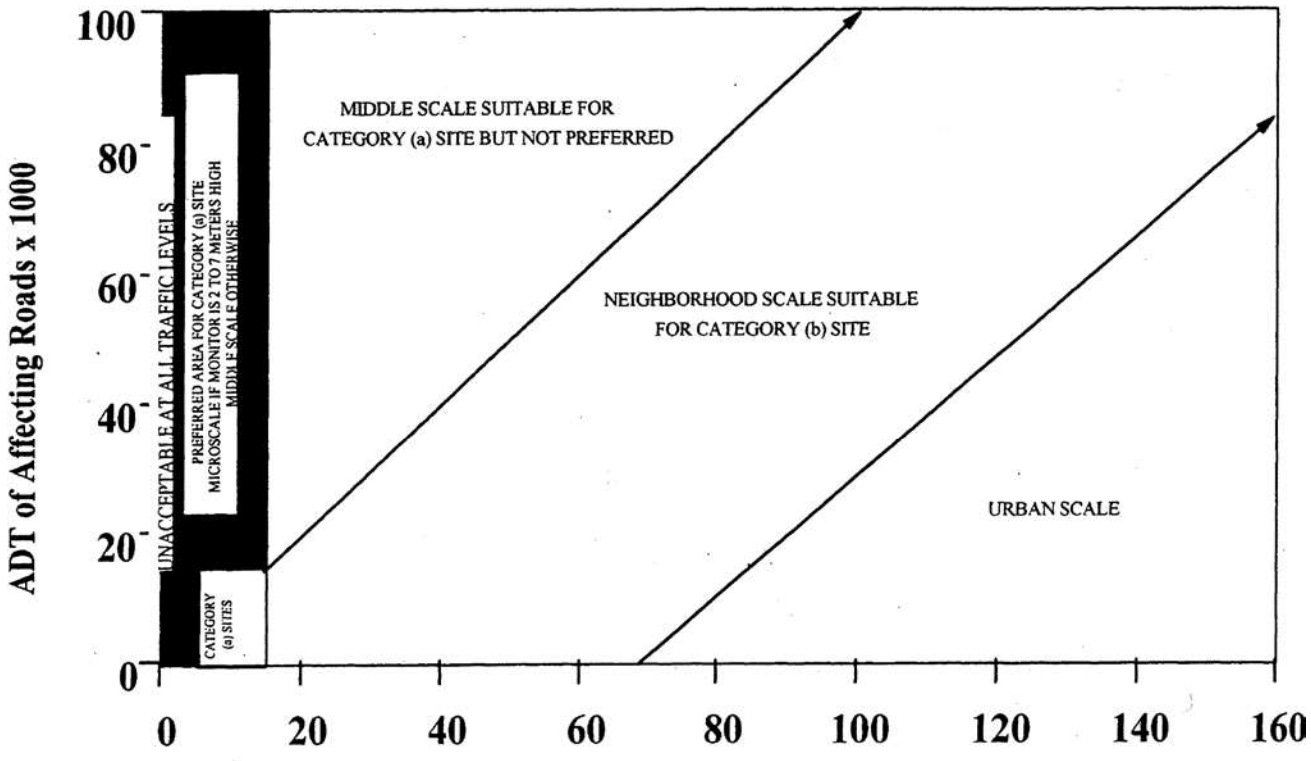


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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 Evaluation
TDEC APC

Date: 01/20/2023
AQS Number: 47-187-0106
Site Name: Fairview O3

Location: Fairview, Tennessee
Pollutants: O3

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Unknown Road	15.8 m	E	Thru st	NA	NA
Cumberland Drive	401.0 m	N	Local St	2242	2022
Highway 100	432.0 m	W	Local St	8417	2022

Electrical

Utilities Company: Middle Tennessee Electric Meter #: 539170

Additional Comments:

1. Arrival, departure and photo times are Central time.
2. The distance between unknown service road and the O3 probe is 13.0 meters (measured using laser range finder).
3. The distance between the probe and utility pole is 2.7 meters.
4. Fire extinguisher is in good condition. (Nov 2018)
5. QAPP, SOP and eSIMS (APC's electronic logbook) is available electronically via the Agilaire 8872 or the operator's computer.
6. The shelter temperature during the the 1/20/23 evaluation was 74 degrees F (23.3 degrees C).
7. Fairview is one of the sites with a multi-pollutant experimental sensor tower and a weather station.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 10:15 am **Departure Time:** 11:00 am **Primary Operator:** Ken Cooper

Observer(s): _____

SITE

[■ Yes □ No] **-Security Fence** [■ Yes □ No] **-Razor/Barb Wire** [■ Yes □ No □ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: Arrival temperature recorded on 2/22/23.

SHELTER - □ Not Present

Interior

Arrival Temperature: 25.0 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: Arrival temperature recorded on 2/22/23.

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel w/ Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) Shelter bolted down to cement pad

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: Hardcopy logbook at site in case operator does not have access to the internet

MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / □Ground / ■ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	4510

CALIBRATOR(s): **□ Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	327	02/06/23	08/06/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: **■ Not Present**

VENDOR: **(PSI Reading < 200, should not be in service and should be replaced)**

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93330185011016	Modem	Main
Agilaire	8872	517	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[■ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN: 1345)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/21/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/21/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS **■ Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

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

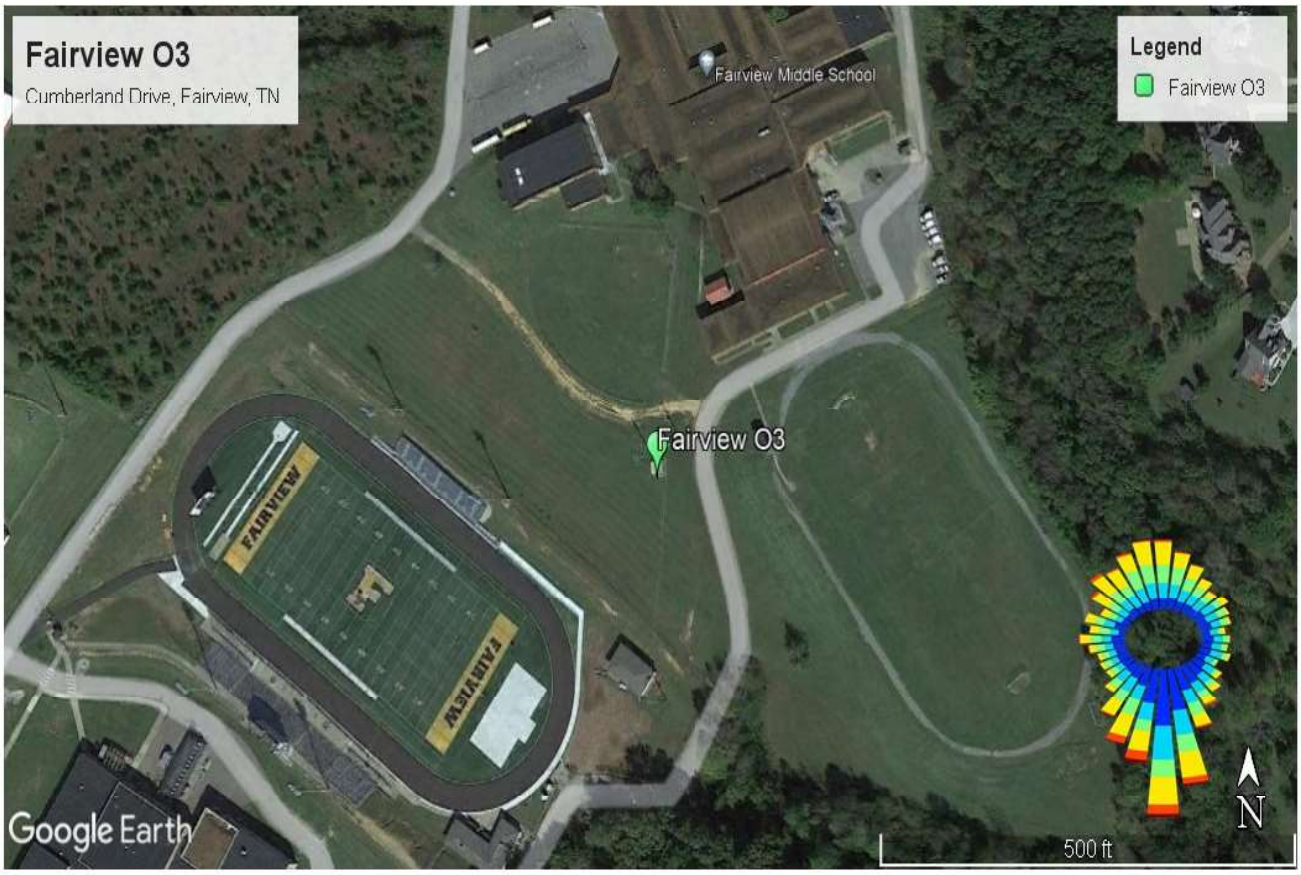
Issue(s): _____

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 O_3, SO_2,) & (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.

MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

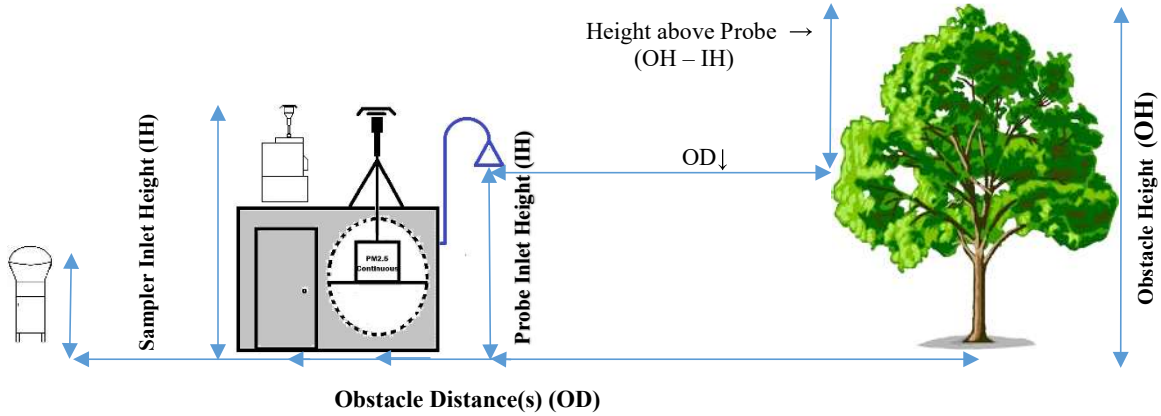
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 10/01/21

MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	School	6.0	4.2	3.6	42.4		38
2	Shed	4.6	4.2	0.8	41.8		73
3	Tree	10.0	4.2	9.4	82.0		115
4	Trees	12.2	4.2	12.6	82.0		135
5	Building	3.2	4.2	NA	60.0		181
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

TREE DRIPLINE(s): 82.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

82.0 **meters** (nearest inlet to dripline) ☐ Not Present

_____ **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 NO_2 or SO_2 analyzers

Issues: None

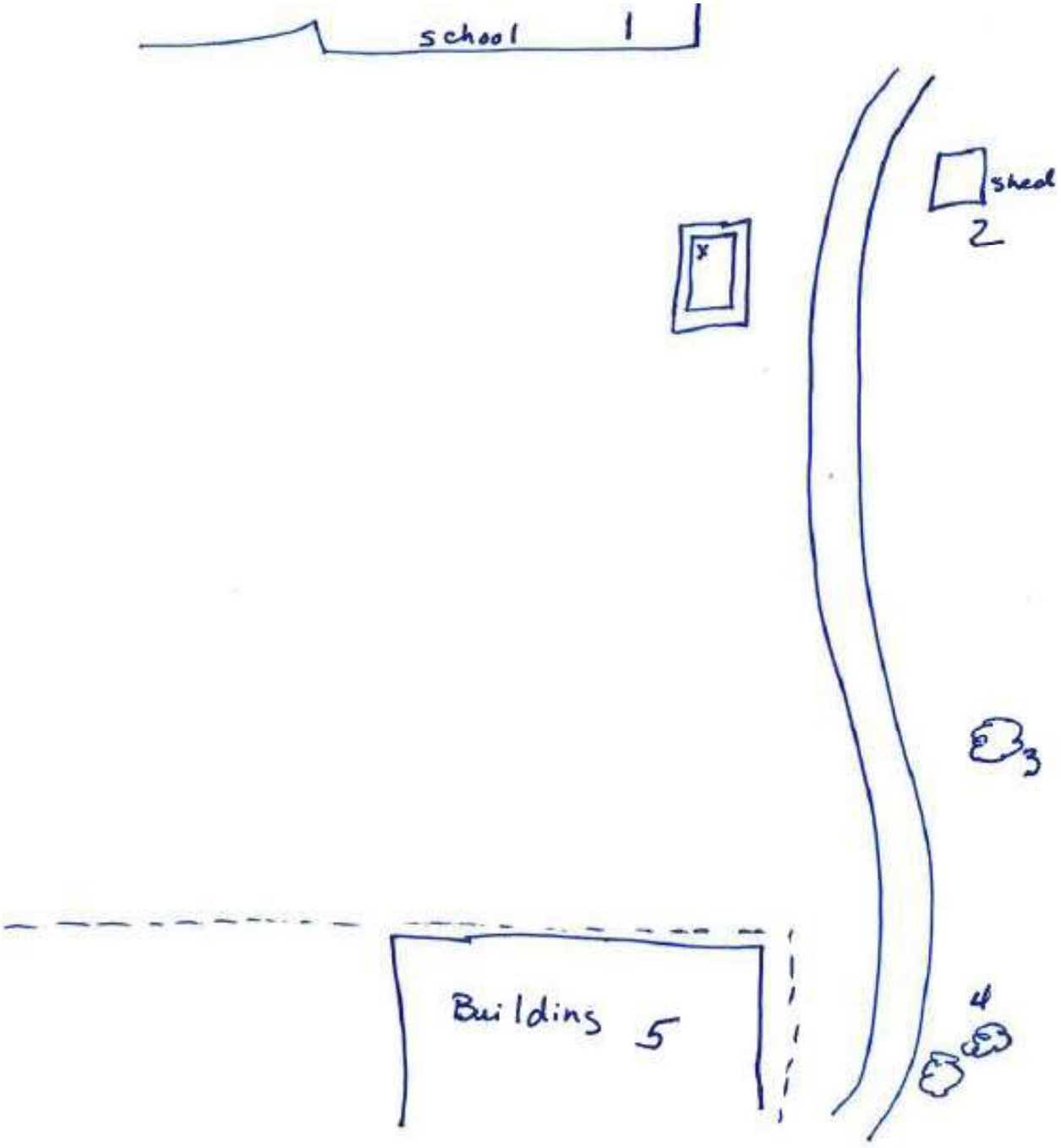
Additional Information:

Closest trees are greater than 20 meters from O3 probe; therefore there are no tree dripline issues.

MSEF : Local Site Name: Fairview O3 **Initials:** EMH **Date:** 01/20/23

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.

PHOTO LOG: **Local Site Name:** Fairview O3 **Initials:** EMH **Date:** 01/20/23

Camera [☒ APC / ☐ Personal – Owner: APC **] Make/Model:** Minolta 12Z

Photo: 001 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: North directional

Photo: 002 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: Northeast directional

Photo: 003 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: East directional

Photo: 004 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: Southeast directional

Photo: 005 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: South directional

Photo: 006 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: Southwest directional

Photo: 007 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: West directional

Photo: 008 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: Northwest directional

Photo: 009 **Date:** 01/20/23 **Time:** 10:45 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 01/20/23 Time: 10:45 am Photographer: EMH Description: Electric meter

Photo: 011 Date: _____ Time: _____ Photographer: EMH **Description:_____**

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

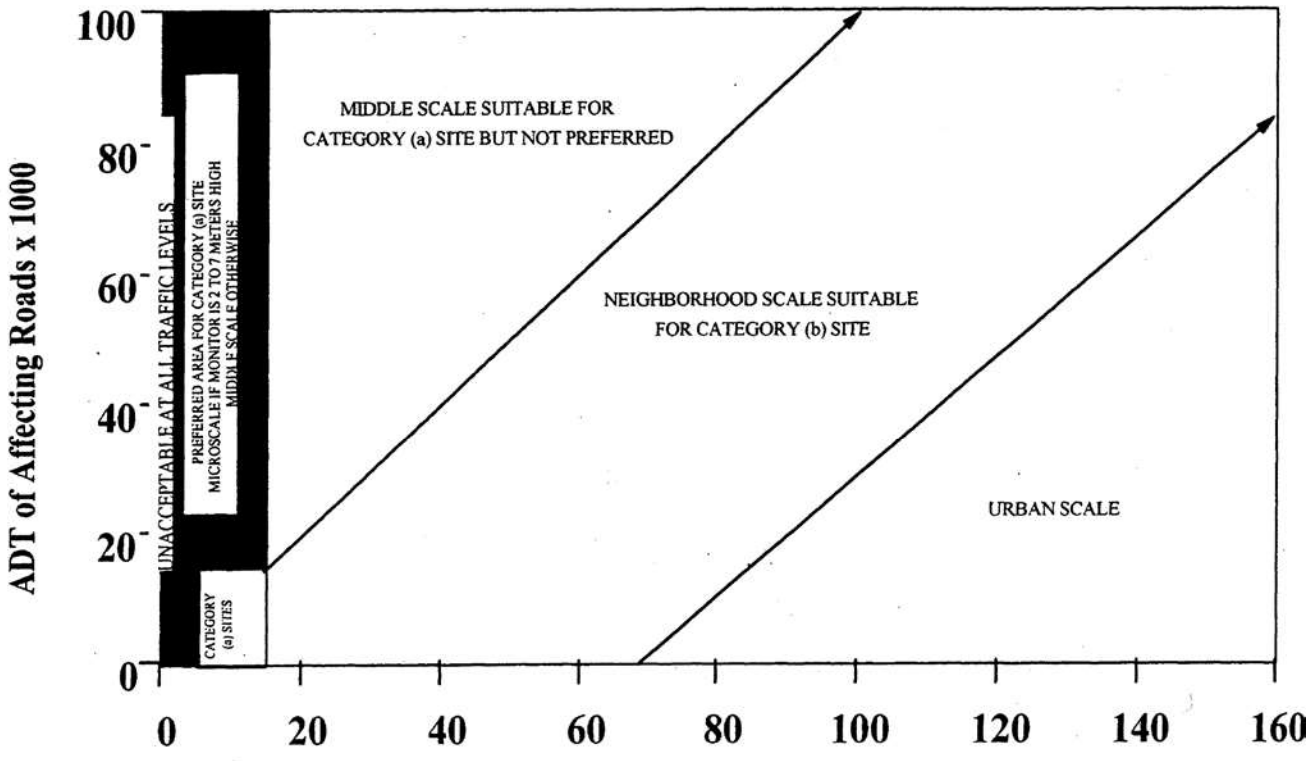


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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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?

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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 Evaluation
TDEC APC

Date: 01/06/2023
Location: Lebanon, Tennessee
AQS Number: 47-189-0103
Site Name: Cedars O3
Pollutants: O3

Print Name / Signature / Initials / Duties

1: (Team Lead) Evelyn Haskin *Evelyn Haskin* EMH Site Specialist

2: EMH

Air Monitoring Site Evaluation Summary

Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/2023

Site meets EPA siting criteria: ■ **Yes** □ **No**

If No, explain: _____

Tangent Roads

Road Name	Distance from Probe/Inlet	Direction	Road Type	Traffic Count	Traffic Year
Cedar Forest Road	72.0 m	N	Local St	109	2022

Electrical

Utilities Company: Middle Tennessee Electric Meter #: 403615

Additional Comments:

1. Arrival, departure and photo times are Central time.
2. Shelter temperature was 70 degrees F on 1/6/23.
3. Fire extinguisher is good condition (May 2018).

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

APC auditor should document in Site Log – time / date / weather conditions/purpose of visit / APC staff present [■ Yes □ No] **Completed**

Arrival Time: 12:15 pm **Departure Time:** 1:15 pm **Primary Operator:** Ken Cooper

Observer(s): _____

SITE

[□ Yes ■ No] **-Security Fence** [□ Yes ■ No] **-Razor/Barb Wire** [□ Yes □ No ■ NA] **Grass/Shrubs Cut**

[□ Yes □ No ■ NA] **Bare Soil Area** [□ Yes □ No ■ NA] **Vandalism** – [□ **Inside** / □ **Outside**]

Date: _____ [□ Yes □ **No**] **Police Report Filed**

Issues: Arrival temperature taken on 2/16/23.

SHELTER - □ Not Present

Interior

Arrival Temperature: 25.0 **°C** (from data logger) **Operator Site Visits:** 1 per [■ week |□ month |□ _____]

[□ **Yes** ■ **No**] **Leaking Roof** [**Damaged: □Ceiling / □ Floor / □ Walls**] [■ **Yes** □ **No**] **Clean / Neat**

[■ **Yes** □ **No**] **Fire Extinguisher** [□ **Yes** ■ **No**] **Insect / Wildlife Issues** [□ **Yes** ■ **No**] **Gasoline** (inside shelter)

Issues: Arrival temperature taken on 2/16/23.

Exterior

Type: [□Freezer / □Wood Building / □Brick-Block / ■Steel]

Height of Roof: 3.0 **meters** **Roofing Material**: Steel w/ Duro-last single ply membrane

[□ Yes ■ No] **Needs Maintenance** (specify) _____

[□ Yes☑ No] **Tied Down** (type) Bolted down to cement pad

[■ Yes □ No] **Electrically Grounded** [□ Yes ■ No] **Roof Railing**

Roof Access: [□ Stairs / □ Ladder / ■ Not Present] [□ **Yes** ■ **No**] **Loose Decking** (Trip Hazard)

Issues: _____

PLATFORMS: ■ Not Present

Condition: [□ Yes □ No] **Good** [□ Yes □ No] **Needs Maintenance**

Issues: _____

RECORDS AT SITE:

Documents available (QAPPs, SOPs) [■ Yes □ No] ■ Electronic/□ Hardcopy/□Both

Logbooks at site [■ Yes □ No] □ Electronic/□ Hardcopy/■Both

Comments: _____

MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

MONITOR(s): **Location:** Exterior Samplers **[□ Roof / □Ground / ■ Not Present]**

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2283

CALIBRATOR(s): **□ Not Present** [■ Yes □ No] **Are QC Check Gases Vented Outside Shelter?**

QC	Make	Model	Serial Number	Certification Date	Expiration Date
QC	Teledyne	T703	328	02/06/23	07/06/23

Is any analyzer sampling shelter air through its calibration line? [□ Yes ■ No] If yes, photo, document and notify agency mgr.

All Gas Standards Pass thru all Filters during: [■ Yes □ No] **Calibrations** (Not Required) [■ Yes □ No] **Precision Checks** (Required) [■ Yes □ No] **Audits** (Required)

Issues: _____

CYLINDER GAS STANDARDS: **■ Not Present**

VENDOR:

(PSI Reading < 200, should not be in service and should be replaced)

QC	Gas Standard	PSI Reading	Expiration Date	Standard Concentration	Serial Number

Issues: _____

MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R9333016711016	Modem	Main
Agilaire	8872	1048	Datalogger	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

[□ Yes □ No] **Temperature Sensor** [□ Yes ■ No] **Uninterruptable Power Supply**

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 (SN: 1343)

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/15/23 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/15/23

[■ Yes □ No] **Clean** [■ Yes □ No] **Heated** [□ Yes ■ No] **Insulated** [□ Yes ■ No] **Moisture** [□ Yes ■ No] **Retractable**

[□ Yes ■ No] **Old / Unused Lines** [□ Yes ■ No] **Lo Flo Manifold**

[□ Yes ■ No] **Any Open Ports? –> How many analyzers using manifold?** _____

Issues: _____

OUTDOOR SAMPLERS ■ **Not Present**

[□ Yes □ No] **Locked** [□ Yes □ No] **Electrically Grounded** [□ Yes □ No] **Stabilized** [□ Yes □ No] **Clean Inside**

[□ Yes □ No] **Head/Separator Clean**

Operator / Log: **VSCC/WINS Clean Schedule:** _____ **PM_{10} 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.

MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

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

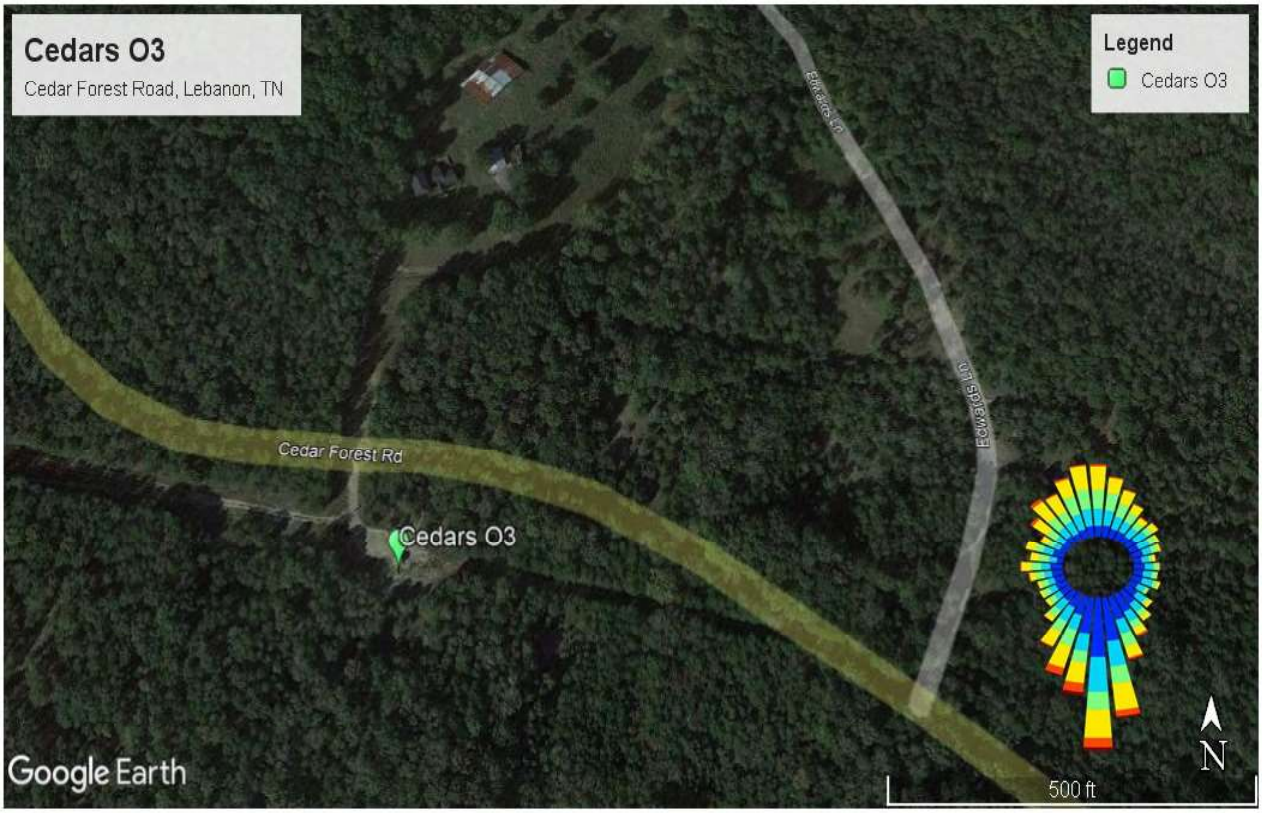
Issue(s): _____

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 O_3, SO_2,) & (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.

MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

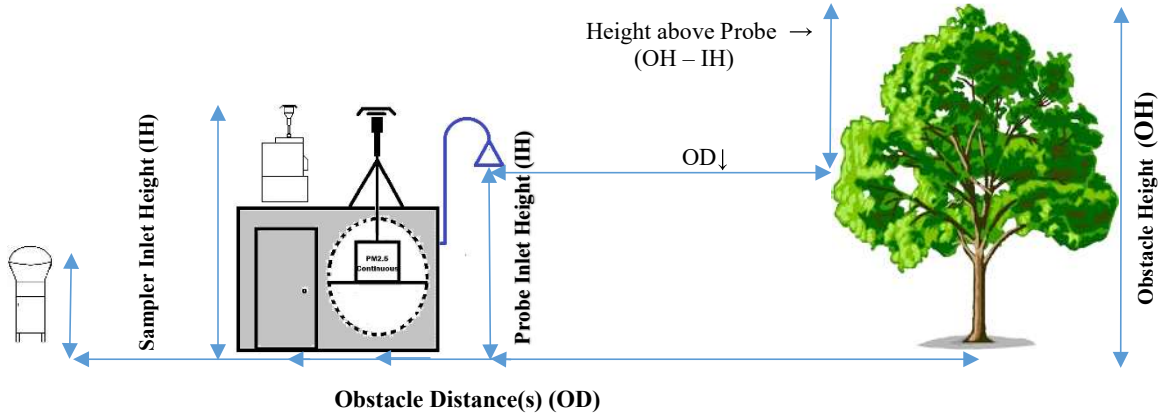
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 10/01/21

MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

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 ≥ [2*(OH-IH)]**

No.	Object(s)	Object/Obstacle Height (OH)	Sampler/Probe Inlet Height (IH)	[2*(OH-IH)]	Object/Obstacle Distance (OD)	Obstacle	AZ
1	Tree	6.8	4.2	5.2	22.7		18
2	Tree	5.8	4.2	3.2	16.5		24
3	Tree	5.8	4.2	3.2	15.8		26
4	Tree	9.4	4.2	10.4	20.4		38
5	Tree	7.8	4.2	7.2	23.5		55
6	Tree	8.3	4.2	8.2	16.5		60
7	Trees	7.8	4.2	7.2	20.0		75
8	Trees	11.3	4.2	14.2	30.0		101
9	Tree	7.4	4.2	6.4	21.0		116
10	Tree	7.1	4.2	5.8	18.2		126
11	Tree	7.1	4.2	5.8	16.8		134
12	Tree	7.4	4.2	6.4	19.0		146
13	Tree	11.3	4.2	14.2	20.5		150
14	Trees	7.8	4.2	7.2	18.8		163
15	Trees	6.6	4.2	4.8	14.4		215
16							
17							
18							
19							
20							

AZ (Azimuth reading). Please identify each of these objects/obstacles in the SITE DRAWING (page 10)

MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

TREE DRIPLINE(s): 14.4 **meters** (nearest inlet to dripline) □ **No Trees Present**
15.8 **meters** (nearest inlet to dripline) □ Not Present
16.5 **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 NO_2 or SO_2 analyzers

Issues: None

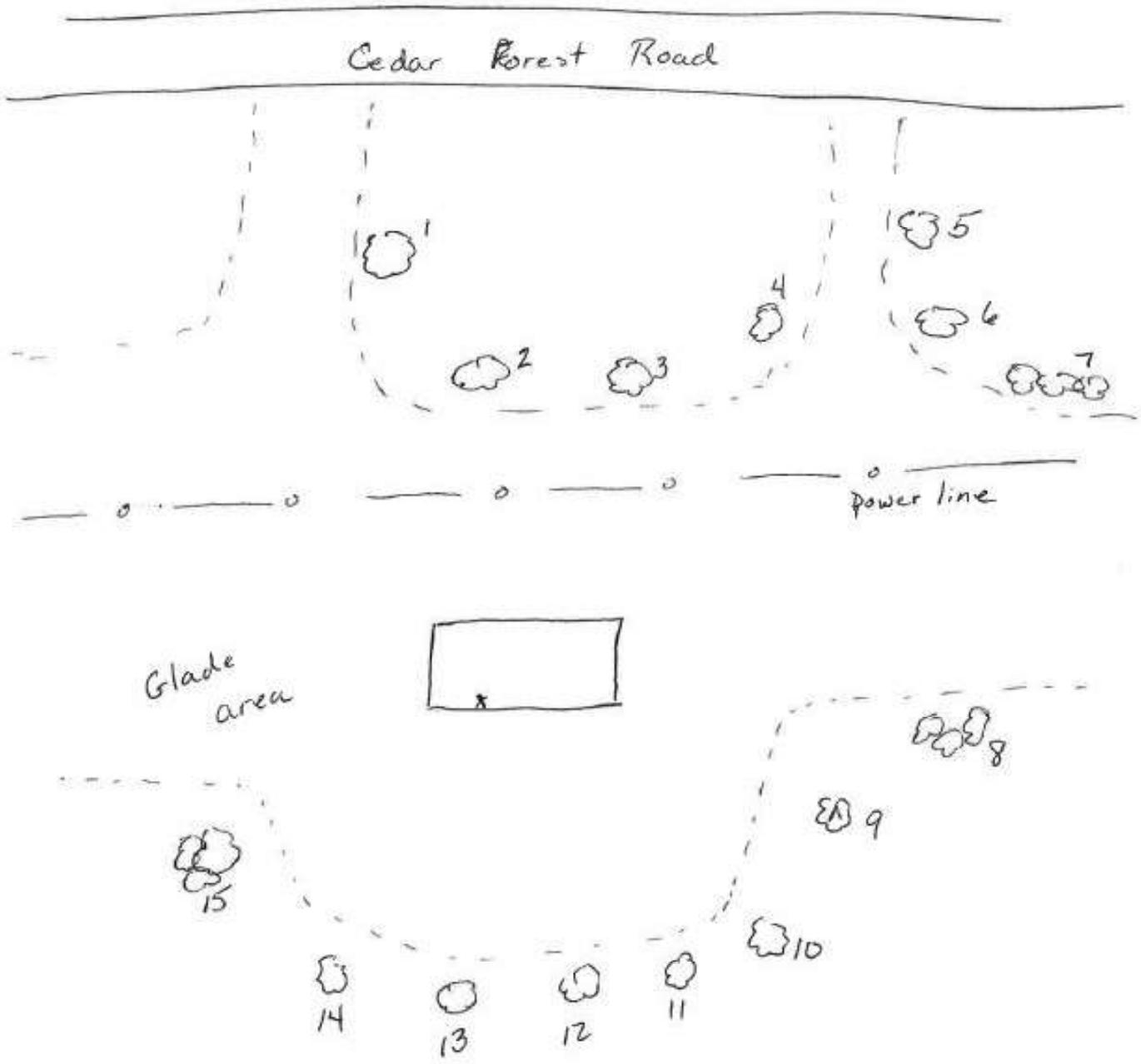
Additional Information:

The closest tree is 14.4 meters from the probe. None of the trees are considered obstacles and are greater than 10 meters from the probe. There are no tree dripline issues.

MSEF : Local Site Name: Cedars O3 **Initials:** EMH **Date:** 01/06/23

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.

PHOTO LOG: **Local Site Name:** Cedars O3 **Initials:** EMH **Date:** 01/06/23

Camera [□ APC / ☒ Personal – Owner: EMH **] Make/Model:** Moto Cell Phone

Photo: 001 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 01/06/23 Time: 12:15 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 01/06/23 **Time:** 1:10 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 01/06/23 Time: 1:10 pm Photographer: EMH Description: Electric meter

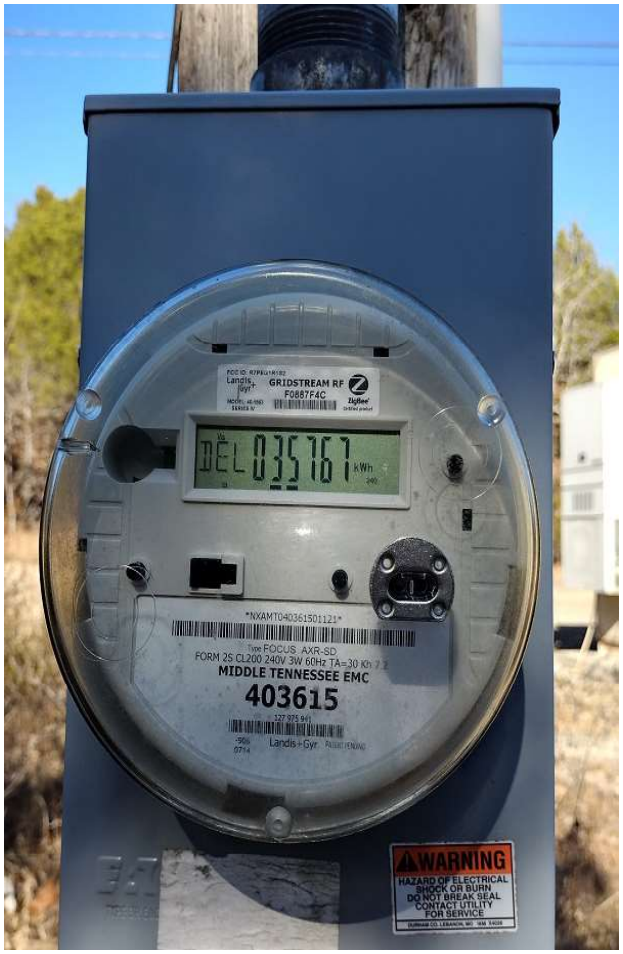


Photo: 011 Date: _____ Time: _____ Photographer: EMH **Description:_____**

Photo: 012 Date: _____ Time: _____ Photographer: _____ Description:_____

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 (O_3)**

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

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

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

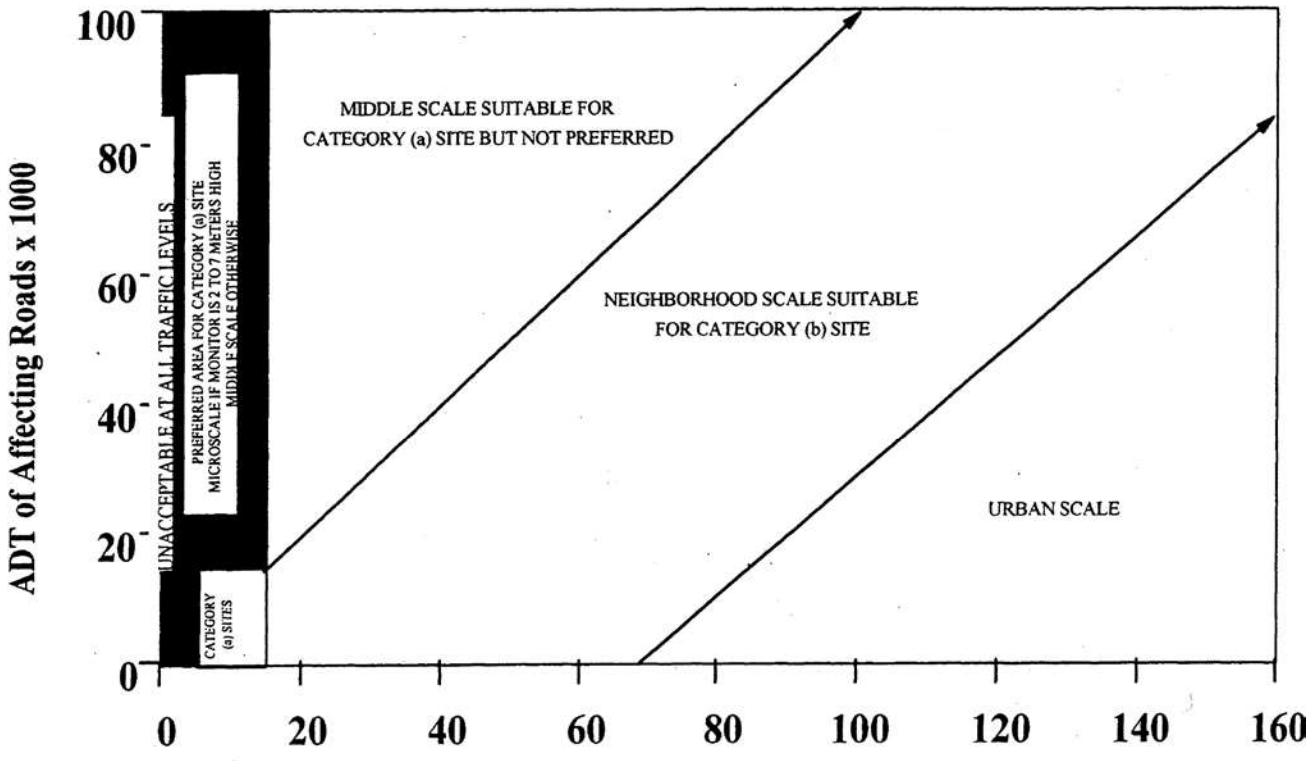


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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.

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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.