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: 04/06/2021
AQS Number: 47-001-0101
Site Name: Freels 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: Freels O3 **Initials:** EMH **Date:** 04/06/2021

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	West	Thru Street	NA	NA
Bull Run Road	700.0 m	North	Local Street	NA	NA
Pumphouse Road	1492.6 m	Northeast	Local Street	NA	NA
Bethel Valley Road	1849.5 m	North	Local Street	7608	2020

Electrical

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

Additional Comments:

1. SO2 is no longer sampled.
2. Arrival, departure and photo times are Eastern Standard time.
3. Temperature shelter inside shelter was 73 degrees F.
4. Shelter is bolted down to cement pad.
5. QAPP and SOPs are available electronically via the operator's tablet or the Agilaire 8872.

eSIMS (APC's electronic logbook) is available electronically the same ways as the QAPP and SOPs.

A hard copy logbook is available on site in case the operator loses access to eSIMS.

6. Fire extinguisher is in good condition.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Freels O3 **Initials:** EMH **Date:** 04/06/21

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:** 1:20 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: 23.9 **°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: Freels O3 **Initials:** EMH **Date:** 04/06/21

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	646	02/02/21	08/03/21

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: Freels O3 **Initials:** EMH **Date:** 04/06/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610268021016	Modem	Main
Agilaire	8872	532	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:** 02/09/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/09/21

[■ 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: Freels O3 **Initials:** EMH **Date:** 04/06/21

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: 6.2 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			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.

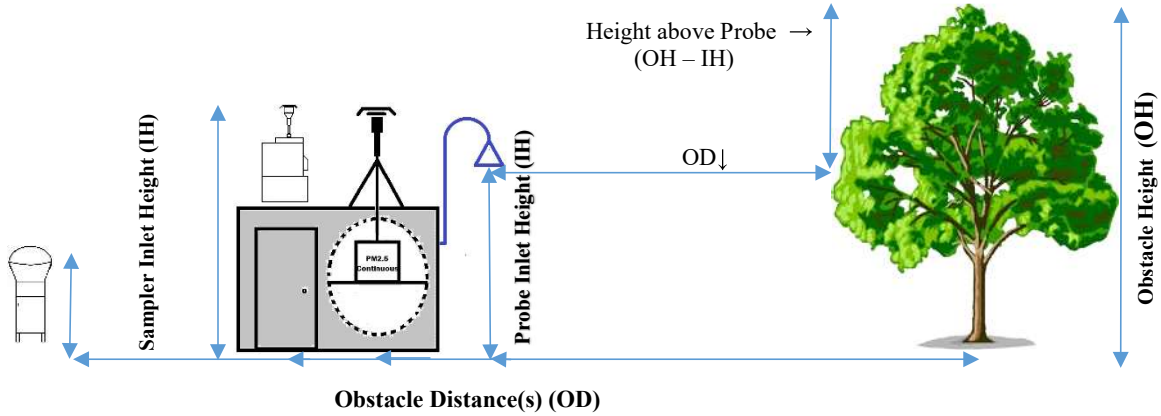
MSEF: Local Site Name: Freels O3 **Initials:** EMH **Date:** 04/06/21

Aerial Photo with Wind Rose

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

MSEF: Local Site Name: Freels O3 **Initials:** EMH **Date:** 04/06/21

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	11.0	4.0	14.0	60.0	☐	223
2	Trees	7.5	4.0	6.4	44.0	☐	82
3	Tree	13.6	4.0	19.2	35.2	☐	73
4	Tree	15.6	4.0	23.2	32.2	☐	64
5	Trees	16.0	4.0	24.0	32.0	☐	55
6	Trees	13.6	4.0	19.2	54.0	☐	3
7	Tree	9.2	4.0	10.4	59.0	☐	338
8	Tree	4.7	4.0	1.4	58.0	☐	317
9	Tree	10.3	4.0	12.6	67.0	☐	383
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: Freels O3 **Initials:** EMH **Date:** 04/06/21

TREE DRIPLINE(s): 32.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

32.2 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

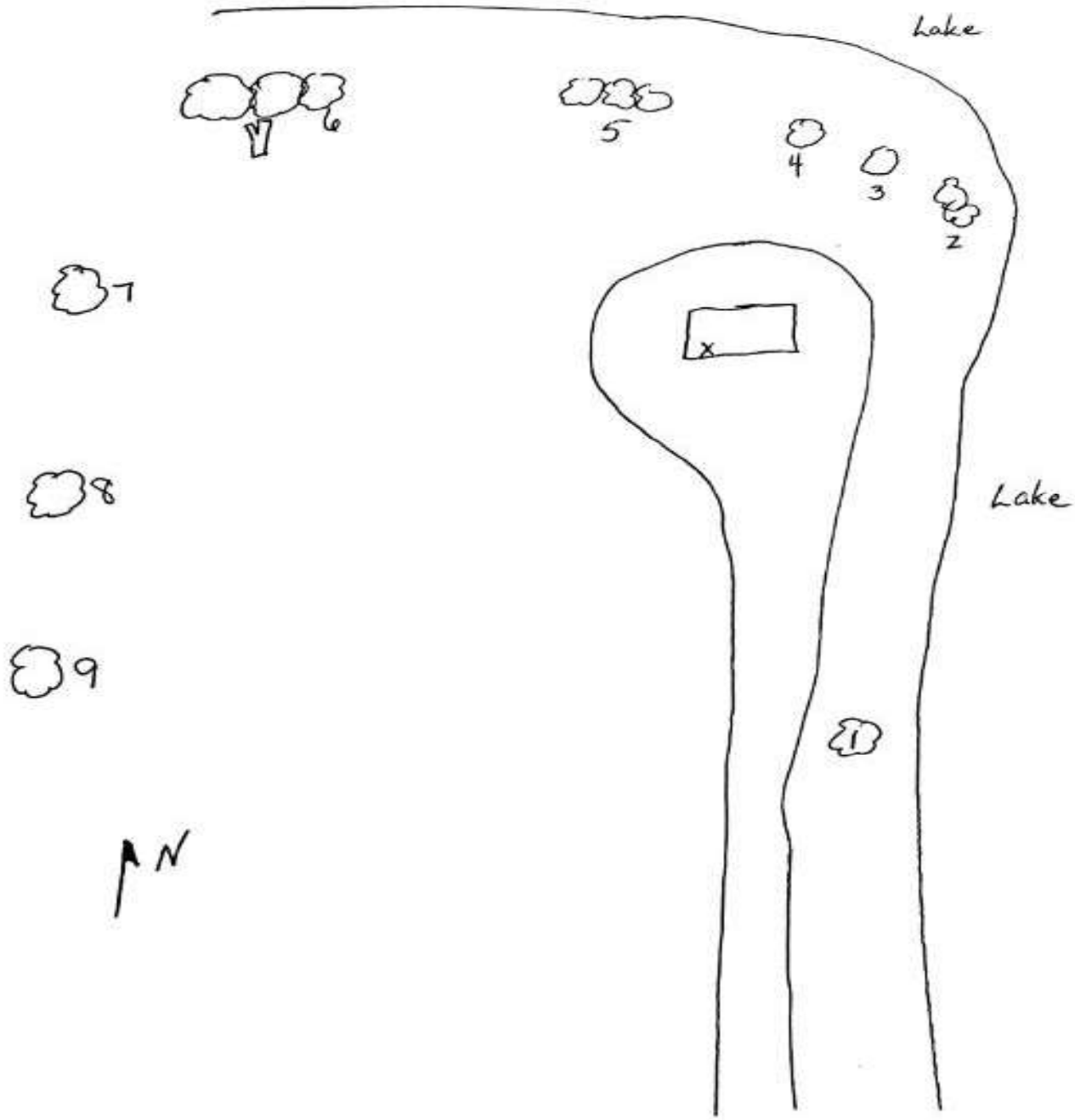
Additional Information:

Closest tree is > 20 meters away from probe; no dripline issues.

MSEF : Local Site Name: Freels O3 **Initials:** EMH **Date:** 04/06/21

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:** Freels O3 **Initials:** EMH **Date:** 04/06/21

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

Photo: 001 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 04/06/21 **Time:** 1:05 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 04/06/21 Time: 1:05 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 04/06/21 **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

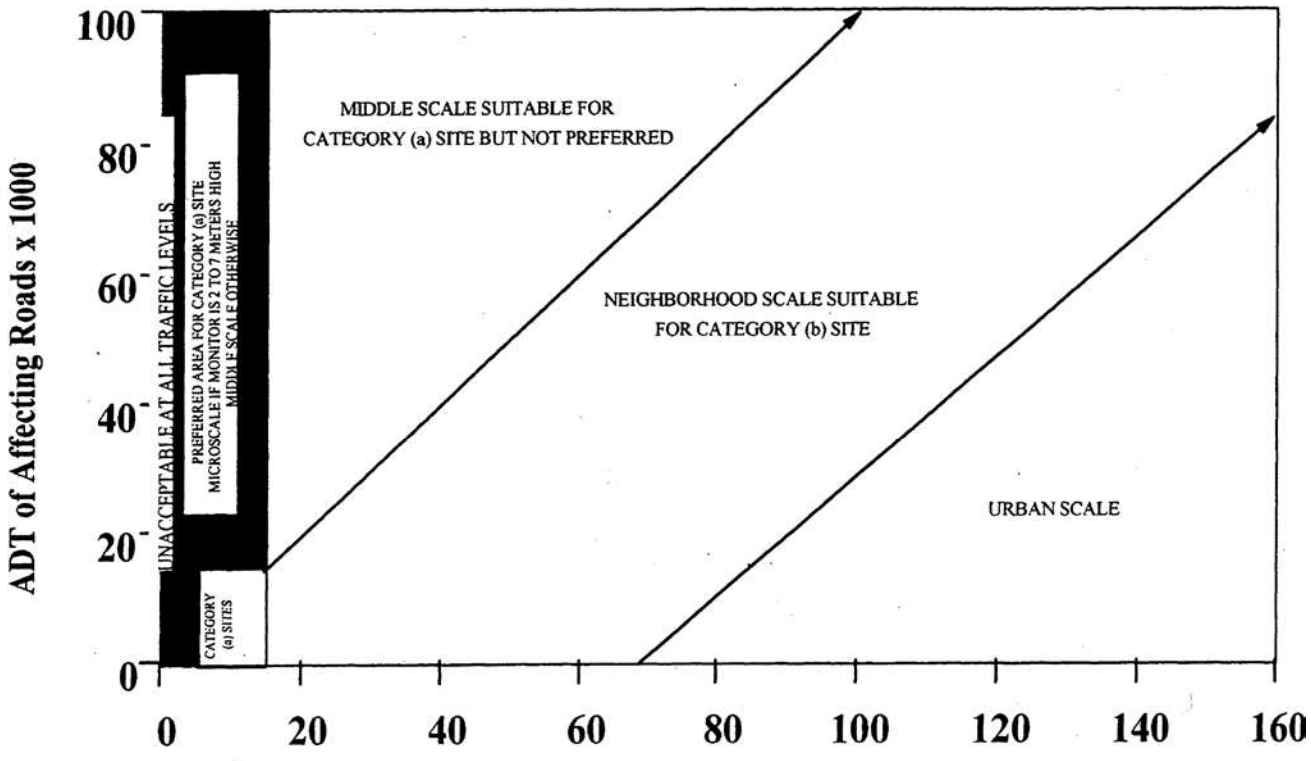


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 10/06/20
Location: Maryville, Tennessee
AQS Number: 47-009-0011
Site Name: Maryville 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: Maryville PM **Initials:** EMH **Date:** 10/06/20

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	South	Local Street	NA	NA
Brown School Road	606.0 m	Northeast	Local Street	4592	2020
Gensis Street	607.0 m	Southwest	Local Street	1611	2020
Cheltenham RRoad	563.0 m	Northwest	Local Street	564	2020

Electrical

Utilities Company: Maryville Electric Department Meter #: 63109

Additional Comments:

1. Arrival, Departure, and Photo times are in Eastern Standard time.
2. The distance from inlet to the utility pole is 1.4 meters.
3. QAPP and SOP are available electronically via the operator's tablet.
4. eSIMs (APC's electronic logbook) is available electronically via the operator's tablet. A hardcopy logbook is located on site in case operator cannot access eSIMs.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Maryville PM **Initials:** EMH **Date:** 10/06/20

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

Arrival Time: 12:00 pm **Departure Time:** 12:51 pm **Primary Operator:** Justin E. 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:** 10/06/20

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven R55	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
PM2.5	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.

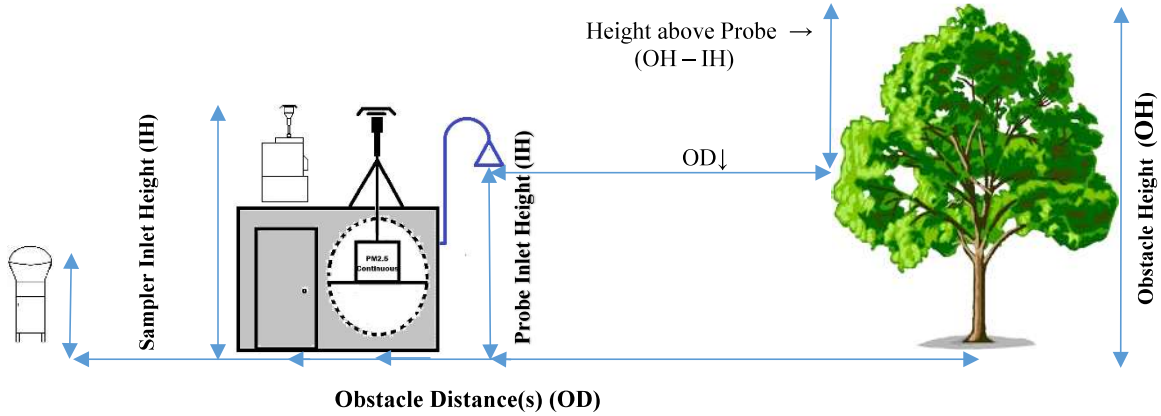
MSEF: Local Site Name: Maryville PM **Initials:** EMH **Date:** 10/06/20

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 06/13/19

MSEF: Local Site Name: Maryville PM **Initials:** EMH **Date:** 10/06/20

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	27.5	2.6	49.8	34.0	✓	42
2	Building	6.5	2.6	7.8	56.0		337
3	Building	4.0	2.6	2.8	28.0		330
4	Tree	14.5	2.6	23.8	44.0		302
5	Tree	12.4	2.6	19.6	34.0		284
6	Tree	6.8	2.6	8.4	22.0		244
7	Tree	4.4	2.6	3.6	23.0		226
8	Tree	3.8	2.6	2.4	18.0		187
9	Tree	8.2	2.6	11.2	25.5		159
10	Tree	16.4	2.6	27.6	52.0		140
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:** 10/06/20

TREE DRIPLINE(s): 18.1 **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: One tree is < 20.0 meters but > 10.0 meters from the inlet

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

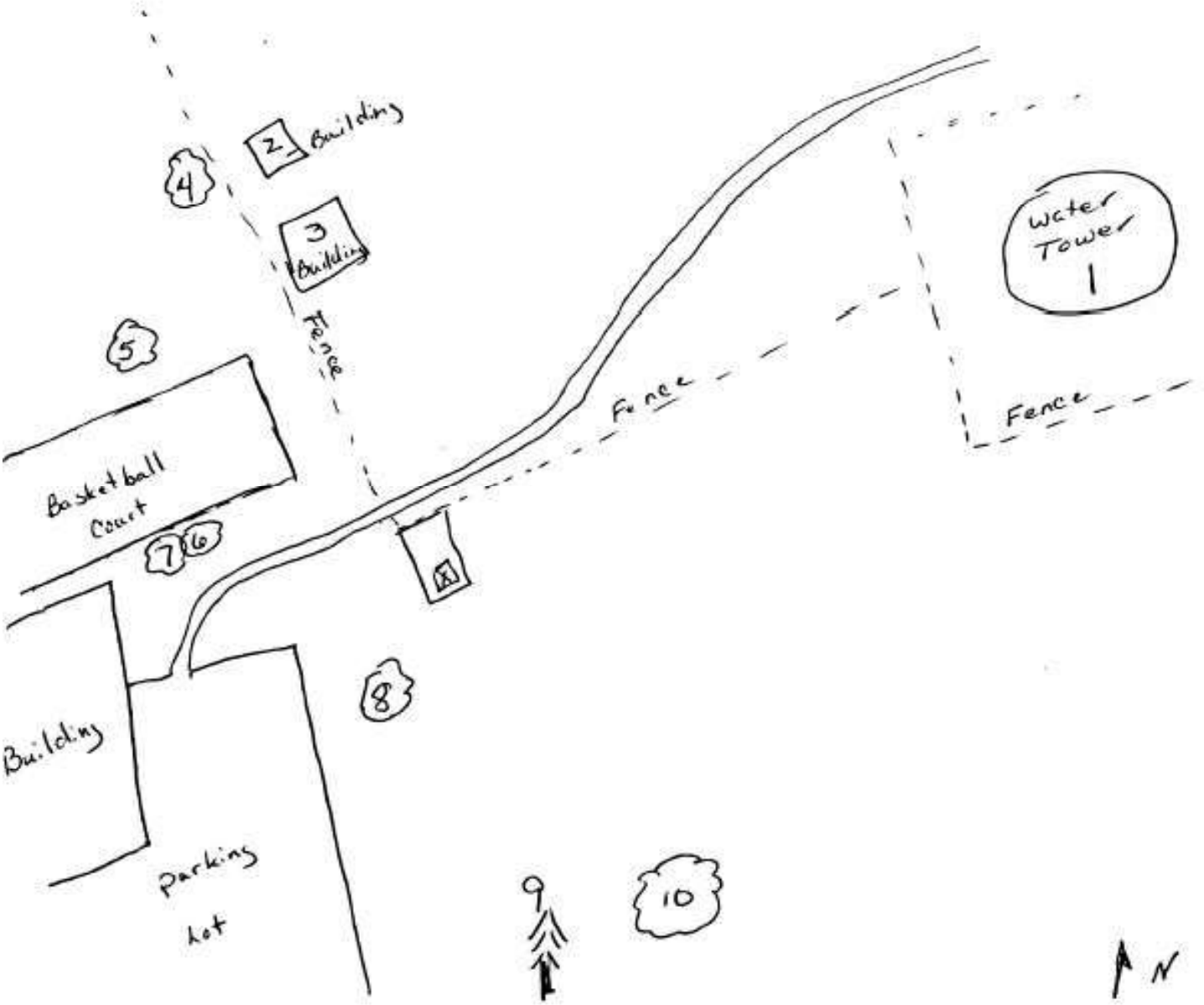
Additional Information:

The water tower (NE of the monitor) is the only obstacle near the site. The prominent wind is from the southwest direction.

MSEF : Local Site Name: Maryville **Initials:** EMH **Date:** 10/06/20

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:** 10/06/20

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

Photo: 001 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 10/06/20 **Time:** 12:40 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 10/06/20 Time: 12:40 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 10/06/20 **Time:** 12:40 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

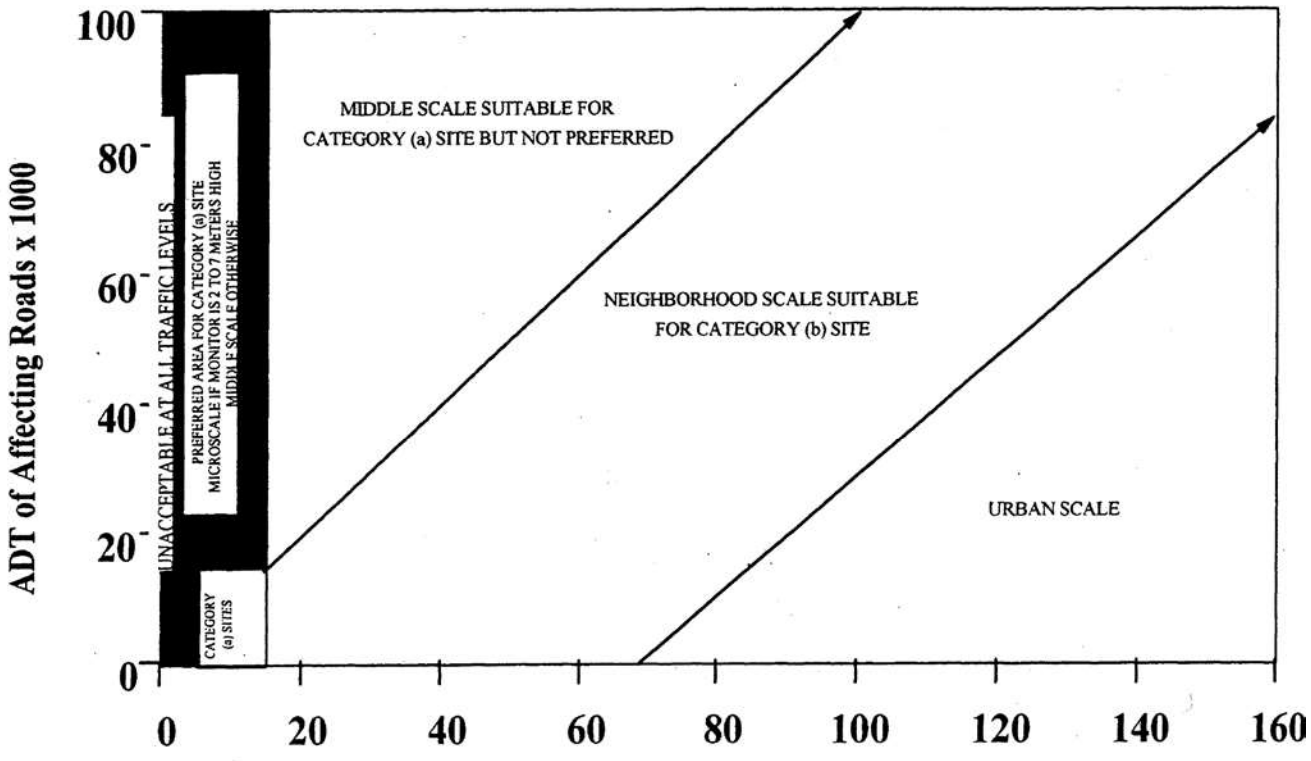


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 01/14/21
AQS Number: 47-107-1002
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:** 01/14/21

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	North	Local Street	NA	NA
Parr Avenue	104.5	East	Local Street	8270	2020

Electrical

Utilities Company: Dyersburg Electric System Meter #: 141 259 421

Additional Comments:

1. Distance between the inlet and utility pole is 2.6 meters.
2. QAPP and SOPs are available electronically via the operator's tablet.
3. eSIMS (APC's electronic logbook) is also available electronically via the operator's tablet.

A hardcopy logbook is on site in case the operator cannot access eSims while on site.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 01/14/21

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

Arrival Time: 12:05 pm **Departure Time:** 12:45 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
PM 2.5	Met One	BAM 1022	T21582

MSEF: Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 01/14/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven RV55	2R9111067021009	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
PM2.5	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.

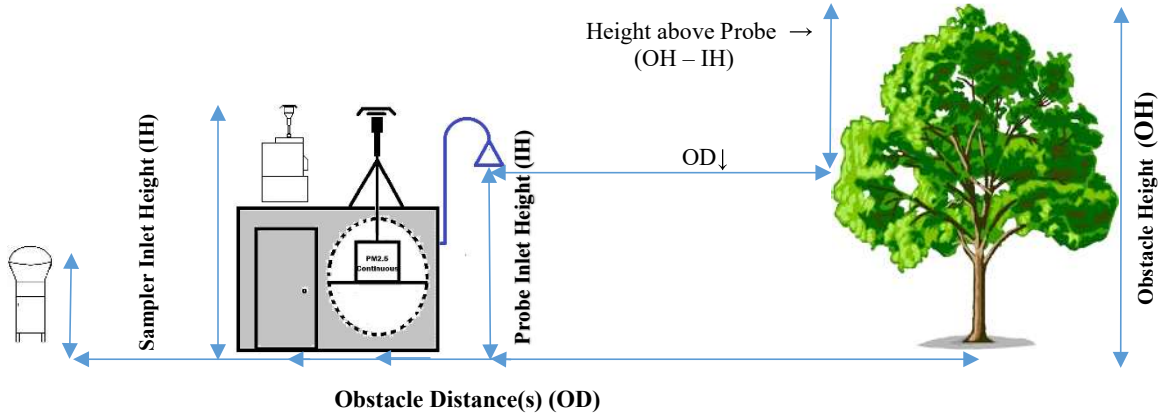
MSEF: Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 01/14/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 03/09/19

MSEF: Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 01/14/21

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	11.3	2.5	17.6	23.2		99
2	Tree	10.6	2.5	16.2	27.0		99
3	Building	4.0	2.5	3.0	28.1		71
4	Trees (Pine)	12.3	2.5	19.6	42.6		70
5	Trees	9.9	2.5	14.8	48.0		57
6	Power substation	4.0	2.5	3.0	91.0		19
7	Apartment	5.4	2.5	5.8	34.0		345
8	Apartment	5.4	2.5	5.8	24.4		323
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: Dyersburg PM **Initials:** EMH **Date:** 01/14/21

TREE DRIPLINE(s): 23.2 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

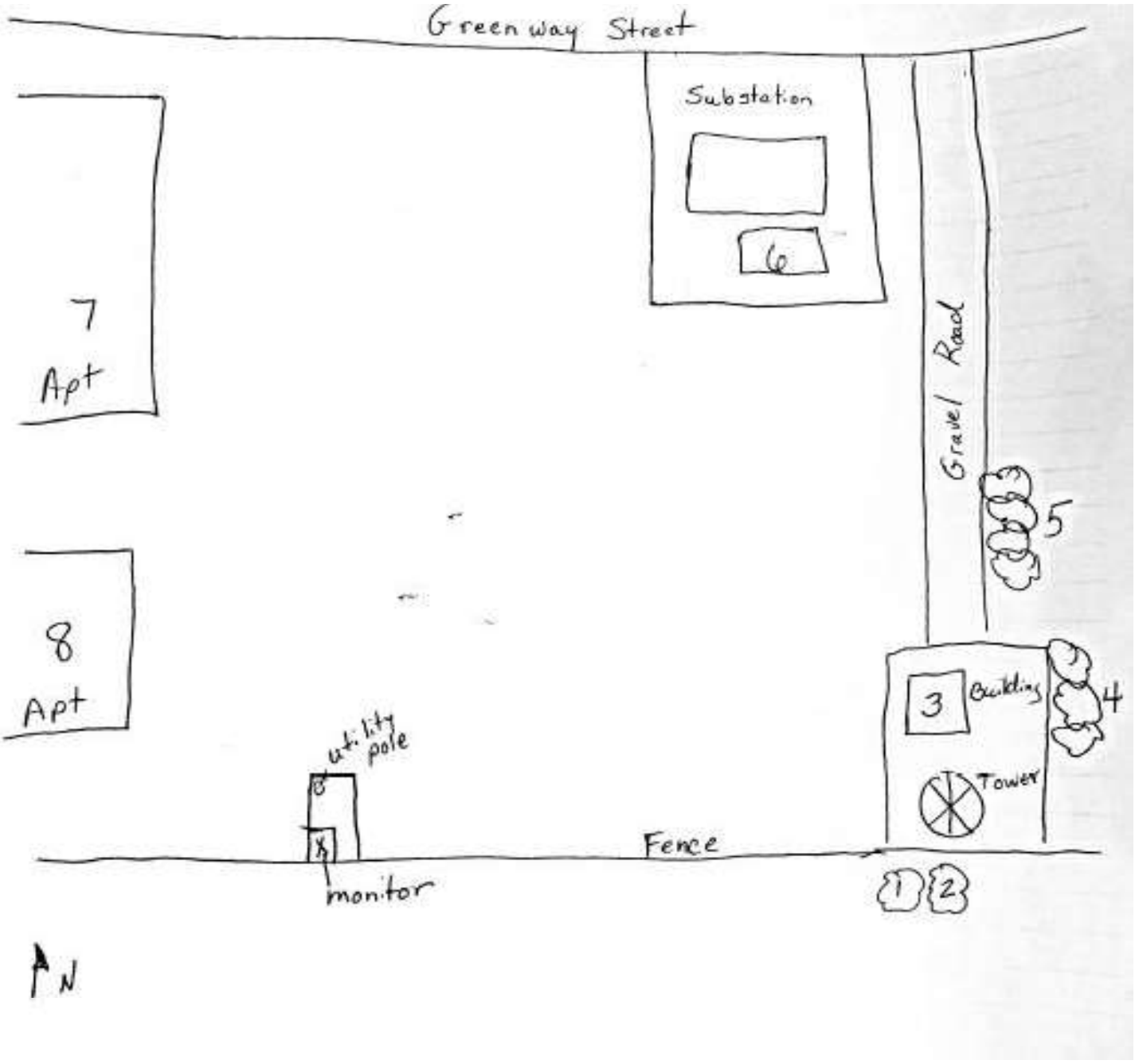
Additional Information:

During the CY 19 - 20 site evaluation, the trees, located east of the monitor on the Dyersburg Community College property, were covered with foliage. The foliage made it difficult to distinguish the individual trees within the tree row. The trees were measured as a group, with the distance of the closest tree and the height of the tallest tree measured. With the foliage absent during this site evaluation, the heights and distances of two closest trees were easy to be measured.

MSEF : Local Site Name: Dyersburg PM **Initials:** EMH **Date:** 01/14/21

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:** 01/14/21

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

Photo: 001 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 01/14/21 Time: 12:25 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 01/14/21 **Time:** 12:35 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 01/14/21 Time: 12:35 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 01/14/21 **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

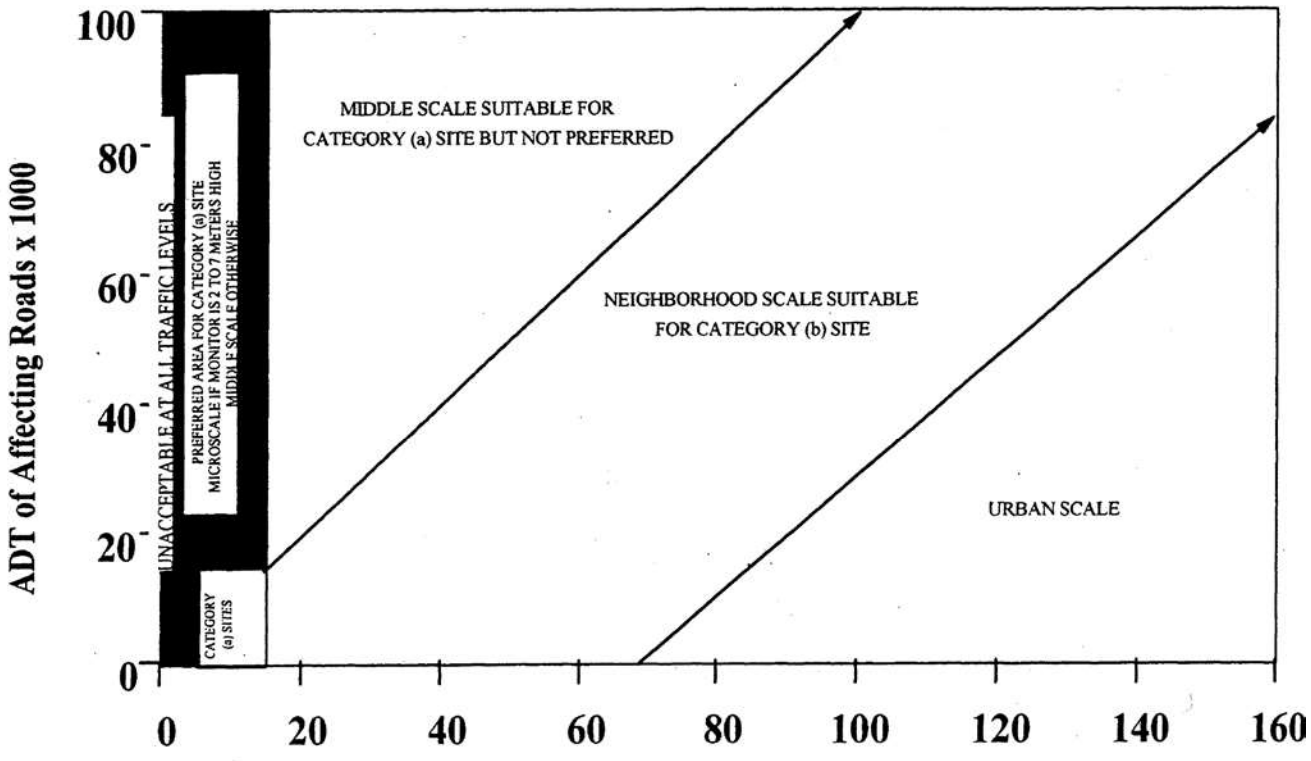


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
0.6	82.9	53.0	36.8
0.7	96.7	61.9	43.0
0.8	110.5	70.7	49.1
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1.2	165.8	106.1	73.7
1.3	179.6	114.9	79.8
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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: 03/11/2021
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:** 03/11/2021

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
Forrester Road	10.0 m	North	Local Street	NA	NA
Lost Creek Road	696.0 m	West	Local Street	7460	2020

Electrical

Utilities Company: Appalachian Electric Power Meter #: 78024996

Additional Comments:

1. Distance from Forester Road to probe measured using laser rangefinder.
2. Temperature inside shelter was 75 degrees F.
3. QAPP and SOPs are available electronically via the operator's tablet or Agilaire 8872.
4. eSIMS (APC's electronic logbook) is available electronically the same way as the QAPP and SOPs.

A hard copy logbook is on site in case the operator cannot access eSIMS.

5. Fire extinguisher is in good condition.
6. Shelter bolted down to cement pad.
7. New manufactured home is being installed east of shelter.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/11/21

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

Arrival Time: 12:45 pm **Departure Time:** 1:35 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: 25.1 **°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: New Market O3 **Initials:** EMH **Date:** 03/11/21

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	649	01/06/21	07/06/21

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:** 03/11/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R936102456021016	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:** 02/04/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 02/04/21

[■ 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:** 03/11/21

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: 6.2 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.

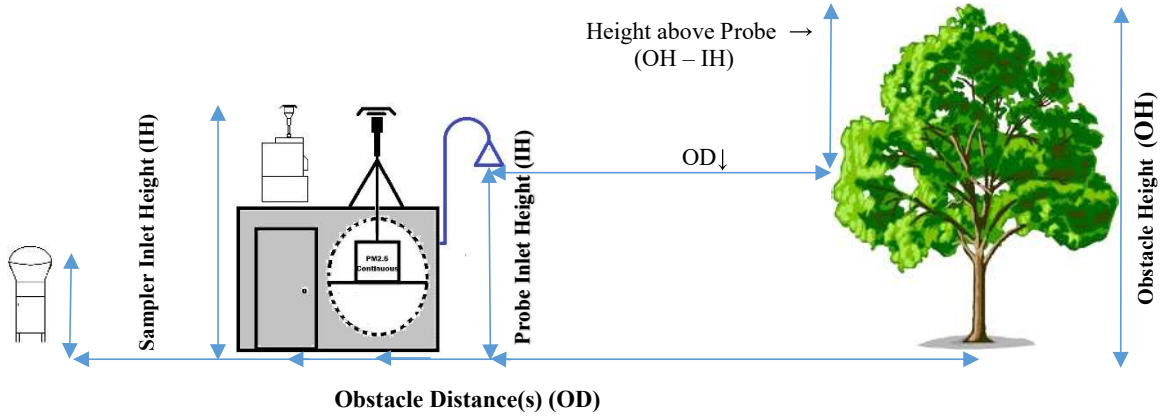
MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/11/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 06/13/19

MSEF: Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/11/21

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	4.0	2.8	33.0	☐	4
2	Temporary Camper	2.6	4	NA	4.8	☐	99
3	Tree	13.5	4.0	19.0	22.0	☐	78
4	House	5.4	4.0	2.8	38.8	☐	96
5	Tree	10.0	4.0	12.0	100.0	☐	261
6	Tree	12.2	4.0	16.4	134.0	☐	201
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:** 03/11/21

TREE DRIPLINE(s): 15.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

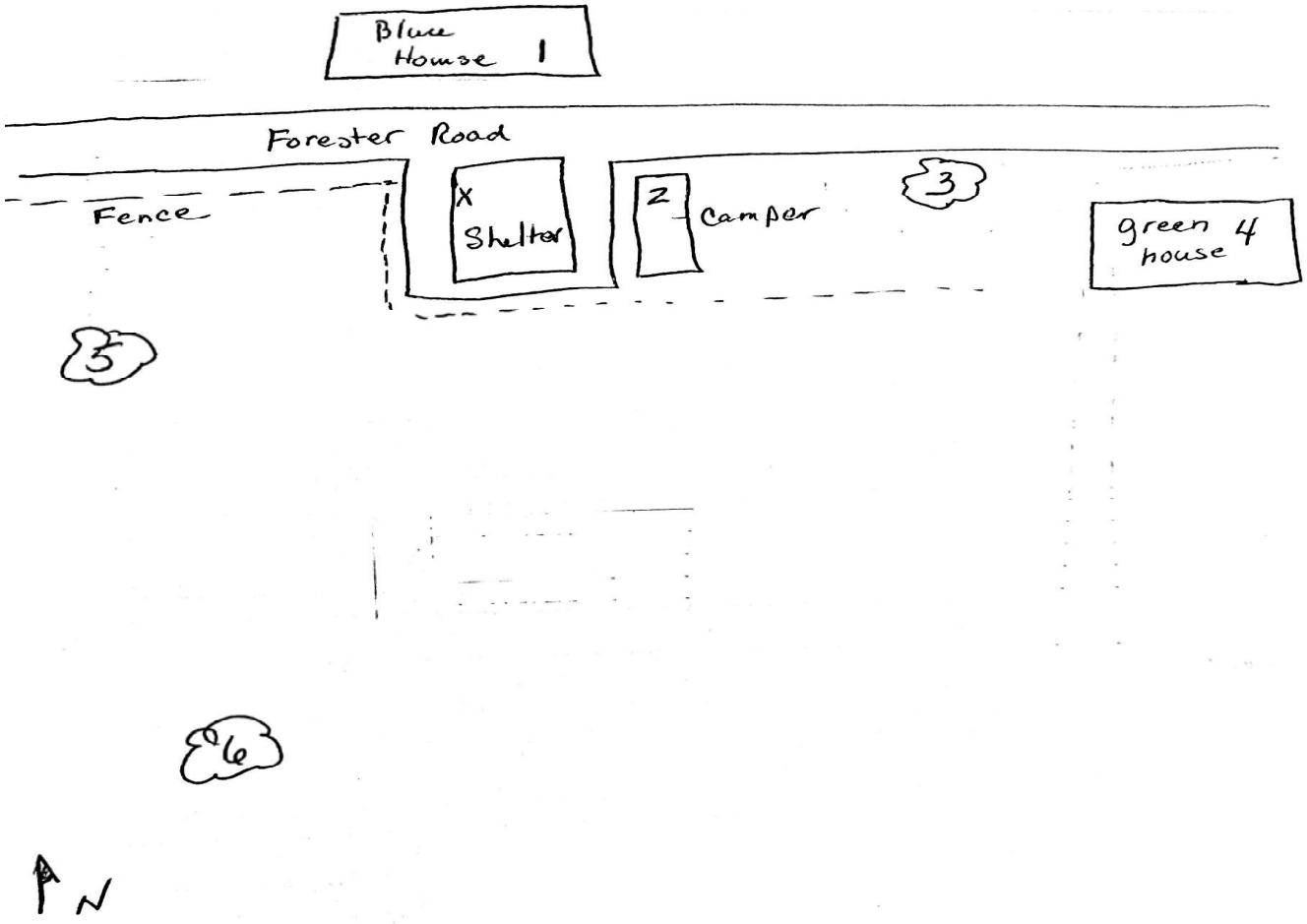
Additional Information:

The dripline of the closest tree (Object # 3) is 15.0 meters.

MSEF : Local Site Name: New Market O3 **Initials:** EMH **Date:** 03/11/21

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:** 03/11/21

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

Photo: 001 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/11/21 **Time:** 1:25 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/11/21 Time: 1:25 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 03/11/21 **Time:** 1:25 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

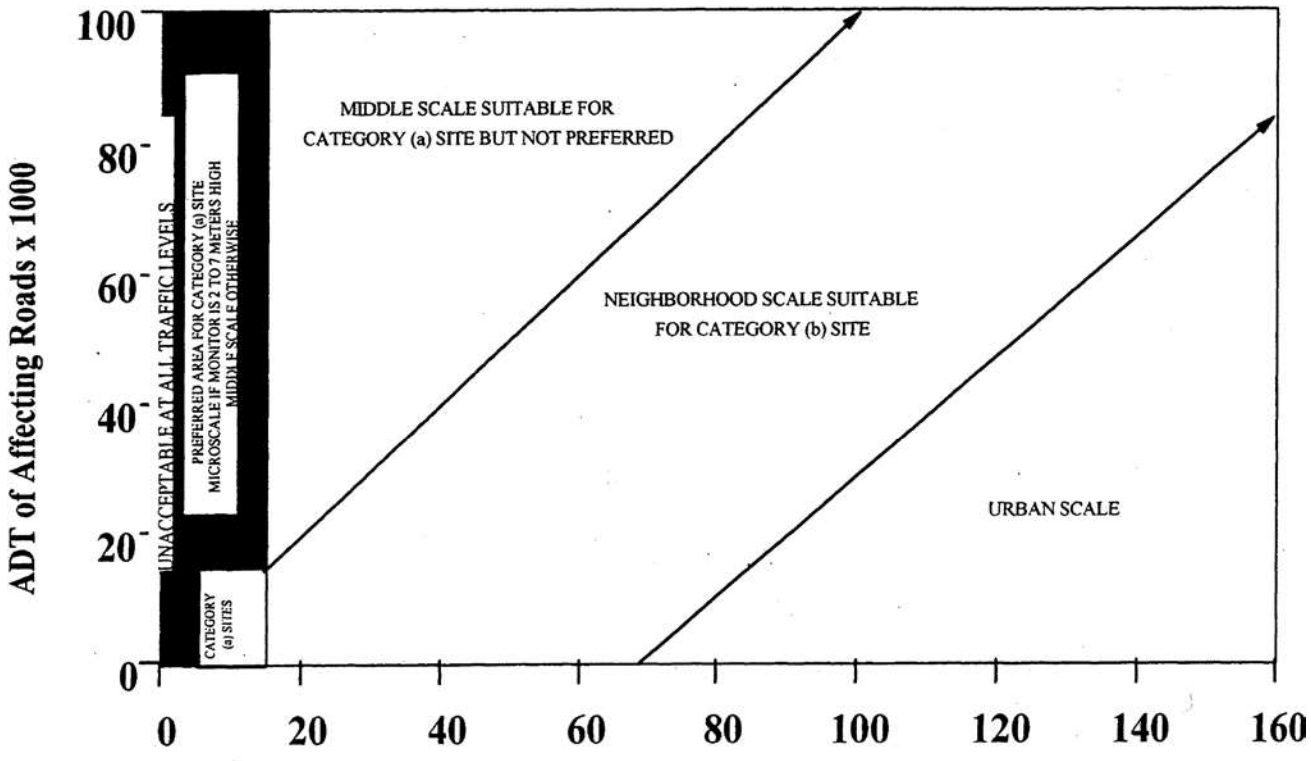


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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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.

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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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Arrival Time: time auditors arrive at site

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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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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: 10/30/20
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:** 10/30/20

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	South	Local Street	1476	2020

Electrical

Utilities Company: NA Meter #: _____

Additional Comments:

1. Electric power supplied by the City of Loretta Wastewater Treatment plant.
2. Arrival, departure and photo time are Central Standard time.
3. Platform needs some boards replaced. 4 boards on south side of platform need replacement. Boards measure 60" long x 5' wide x 1' thick.
4. Records: QAPP and SOPs are available electronically via the operator's tablet. eSIMS (APC's electronic logbook) is also available electronically via the operator's tablet. A hardcopy logbook is located on site in case the operator cannot access eSIMs.
5. Loretto is one of the sites used for the multi pollutant experimental sensor tower.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Loretto PM **Initials:** EMH **Date:** 10/30/20

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

Arrival Time: 10:40 am **Departure Time:** 11:45 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
PM2.2	Met One	BAM 1022	T17015
Multi - pollutant			

MSEF: Local Site Name: Loretto PM **Initials:** EMH **Date:** 10/30/20

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven R55	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
PM2.5	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.

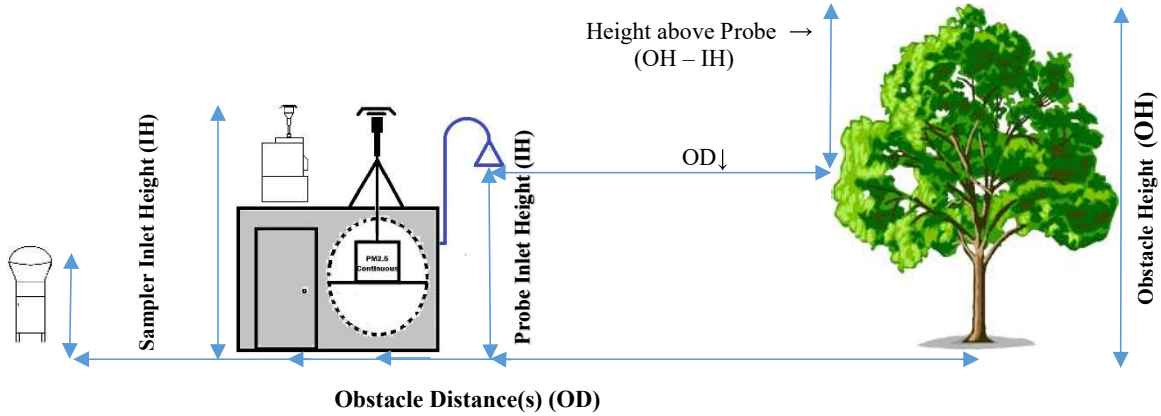
MSEF: Local Site Name: Loretto PM **Initials:** EMH **Date:** 10/30/20

Aerial Photo with Wind Rose

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

MSEF: Local Site Name: Loretto PM **Initials:** EMH **Date:** 10/30/20

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	18.8	☐	347
2	Tree	24.0	2.6	42.8	63.5	☐	3
3	Trees	20.8	2.6	36.4	60.0	☐	36
4	Trees	18.1	2.6	31.0	66.5	☐	58
5	Trees	14.4	2.6	23.6	41.0	☐	166
6	Tree	11.2	2.6	17.2	44.6	☐	191
7	Tree	7.1	2.6	9.0	59.0	☐	205
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:** 10/30/20

TREE DRIPLINE(s): 41.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

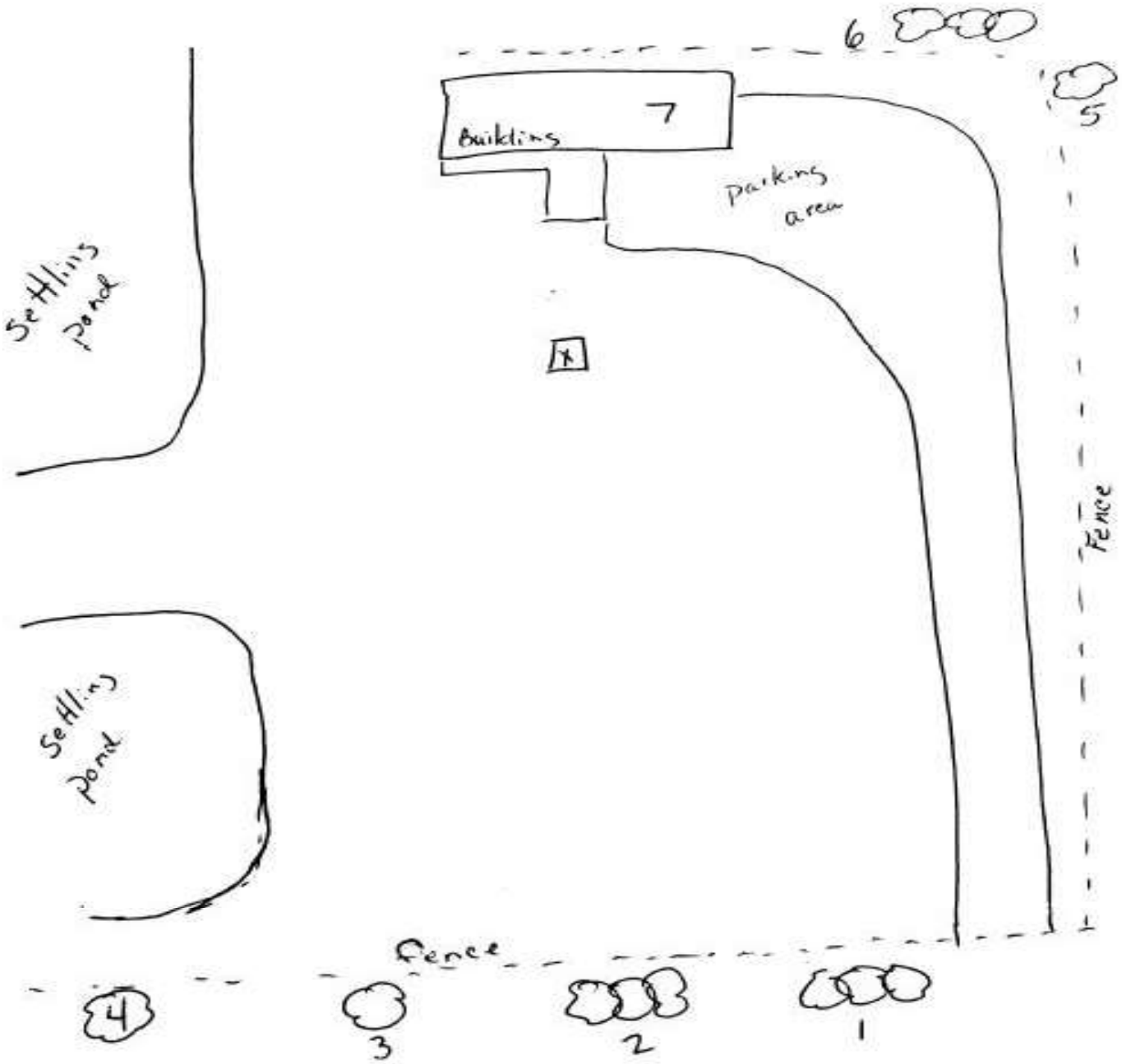
Additional Information:

Closest tree is greater than 20 meters away from inlet. No dripline issues.

MSEF : Local Site Name: Loretto PM **Initials:** EMH **Date:** 10/30/20

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:** 10/30/20

Camera [□ APC / ■ Personal – Owner: EMH **] Make/Model:** Samsung LG

Photo: 001 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: North Directional

Photo: 002 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: East Directional

Photo: 004 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: South Directional

Photo: 006 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: West Directional

Photo: 008 Date: 10/30/20 Time: 11:30 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 10/30/20 **Time:** 11:30 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 10/30/20 Time: 11:30 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

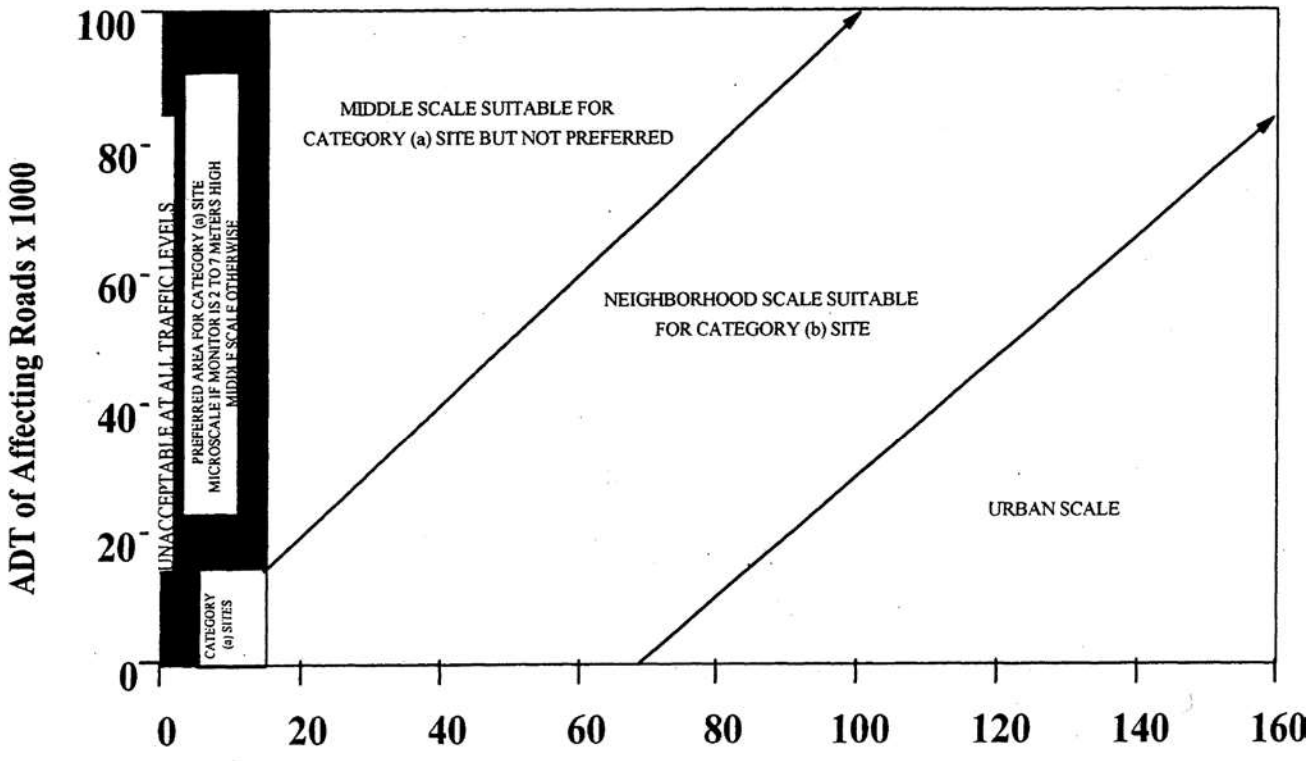


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 03/15/2021
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:** 03/15/2021

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	North	Major Highway	8894	2020
Roberts Road	176.0 M	South	Local Street	NA	NA

Electrical

Utilities Company: Loudon Utilities Meter #: 36726580

Additional Comments:

1. Arrival, departure, and photo times are Eastern Standard time.
2. Sam Barnett is the operator for the O3 monitor and Justin Long is the operator for the PM monitors.
3. The temperature inside of the shelter was 72 degrees F.
4. The fire extinguisher inside the shelter is in good condition.
5. The shelter is bolted down to the cement pad.
6. QAPP and SOPs are available electronically via the operator's tablet and Agilaire 8872. eSIMS (APC's electronic logbook) is available electronically the same way as the QAPP and SOPs. A hard copy logbook is located inside each BAM in case the operator cannot access eSIMS.
7. A weather station is located on the shelter.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Loudon **Initials:** EMH **Date:** 03/15/21

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

Arrival Time: 12:25 pm **Departure Time:** 1:25 pm **Primary Operator:** See Additional Comments on page 2

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: 23.6 **°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: 3.2 **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:** 03/15/21

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

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2325
PM2.5 (1)	Met One	BAM 1022	W17126
PM2.5	Met One	BAM 1022	W19946

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	01/12/21	07/12/21

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:** 03/15/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610095011016	Modem	Main
Agilaire	8872	519	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:** 02/09/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/ year **Last Service Date:** 02/09/21

[■ 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:** _____

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:** 03/15/21

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: 6.2 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	4.8	Side of shelter			Neighborhood	Neighborhood
PM2.5 (1)	2.6	Ground	1.9		Neighborhood	Neighborhood
PM2.5 (2)	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.

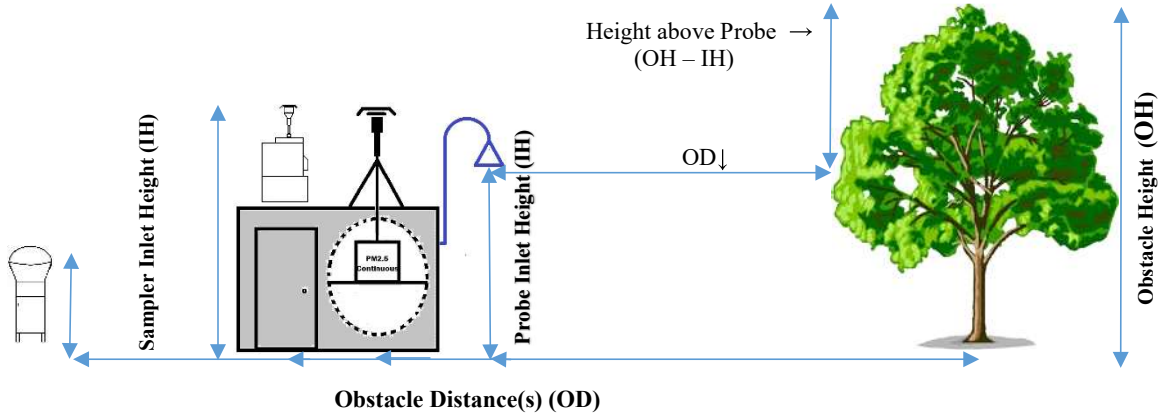
MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/15/21

Aerial Photo with Wind Rose

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

MSEF: Local Site Name: Loudon **Initials:** EMH **Date:** 03/15/21

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	5.4	2.6	5.6	102.0	☐	91
2	Tree	17.6	2.6	30.0	74.4	☐	123
3	Tree	18.8	2.6	32.4	112.0	☐	141
4	Trees	17.2	2.6	29.2	50.0	☐	264
5	Trees	17.2	2.6	29.2	48.0	☐	295
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:** 03/15/21

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

50.0 **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: Non

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, and 3 were measured from BAM (Poc 2) inlet. Objects 4 and 5 were measured from BAM (Poc 1) inlet.

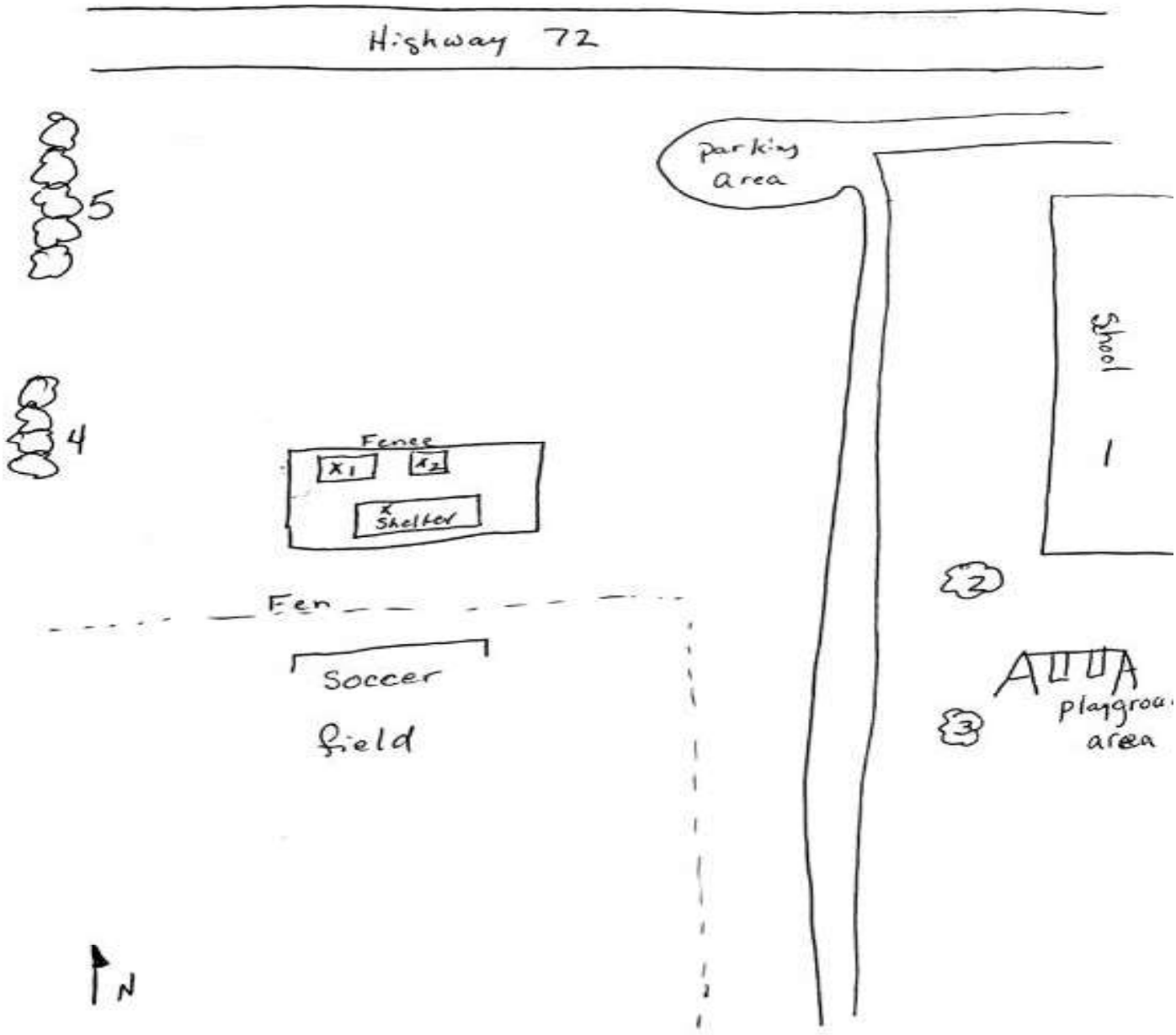
The closest tree from the inlet probe is > 20 meters; no dripline issues.

Distance from O3 probe to the BAM (Poc 1) inlet is 4.6 meters and the distance between O3 probe and BAM (Poc 2) inlet is 3.7 meters.

MSEF : Local Site Name: Loudon **Initials:** EMH **Date:** 03/15/21

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:** 03/15/21

Camera [☒ APC / ☐ Personal – Owner: _____] Make/Model: Minolta M12Z

Photo: 001 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/15/21 **Time:** 1:10 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/15/21 Time: 1:10 pm Photographer: EMH Description: Monitors

Photo: 011 **Date:** 03/15/21 **Time:** 1:10 pm **Photographer:** EMH **Description:** Shelter with probes

Photo: 012 Date: 03/15/21 Time: 1:10 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

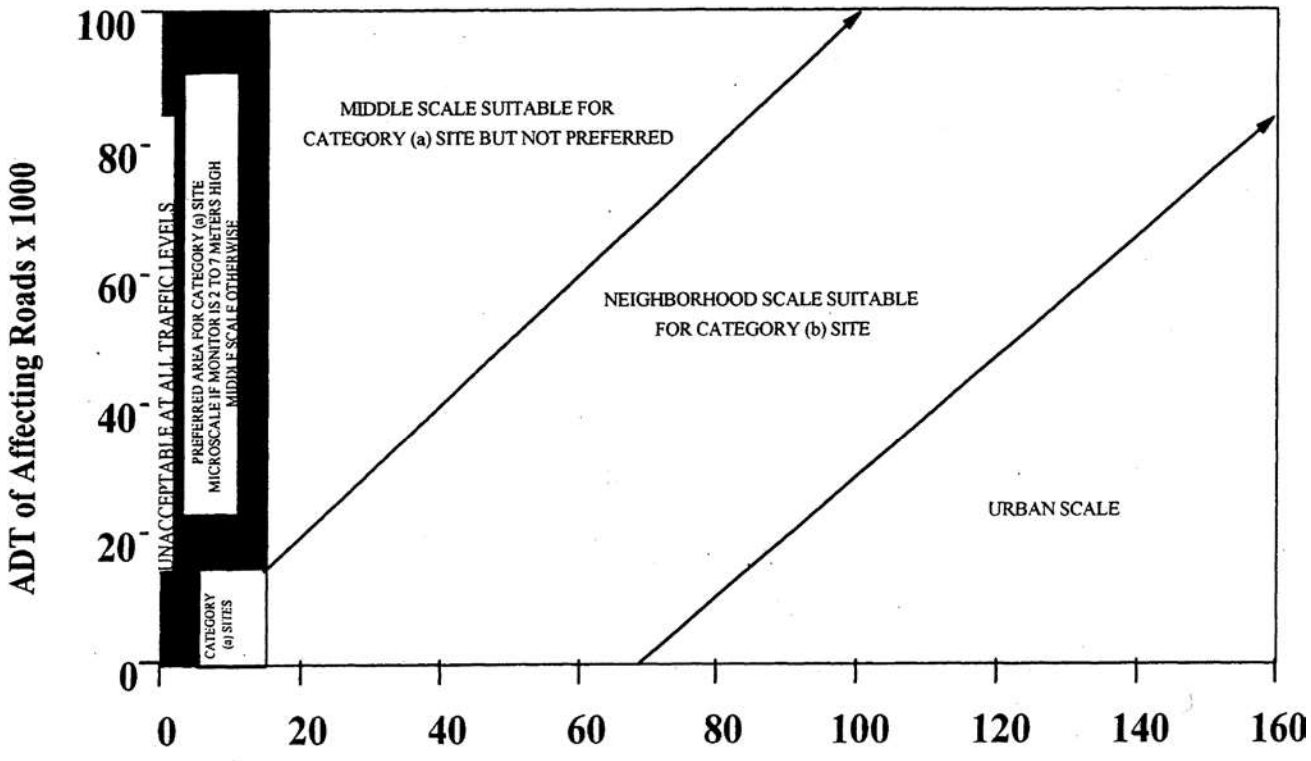


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 10/15/20
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

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Athens PM **Initials:** EMH **Date:** 10/15/20

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	North	Local Street	NA	NA
North Jackson Road	104.5 m	West	Local Street	6510	2020

Electrical

Utilities Company: Athens Power Meter #: AP11223

Additional Comments:

1. Arrival, departure and photo times are in Eastern Standard time.

2. Records: QAPP and SOPs are available via the operator's tablet. eSIMs (APC electronic logbook) is available via the operator's tablet. A hardcopy logbook is at site in case the operator cannot access eSIMs.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Athens PM **Initials:** EMH **Date:** 10/15/20

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:** 1:15 pm **Primary Operator:** Amelia Poe/ 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	T21579

MSEF: Local Site Name: Athens PM **Initials:** EMH **Date:** 10/15/20

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven R55	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
PM2.5	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.

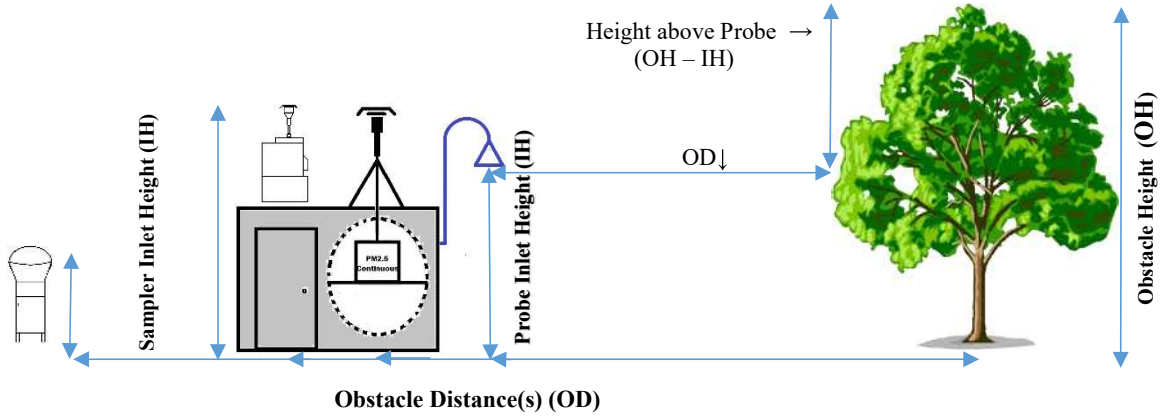
MSEF: Local Site Name: Athens PM **Initials:** EMH **Date:** 10/15/20

Aerial Photo with Wind Rose

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

MSEF: Local Site Name: Athens PM **Initials:** EMH **Date:** 10/15/20

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	9.5	2.6	13.8	52.8		5
2	Tree	19.4	2.6	33.6	67.0		37
3	Tree	19.2	2.6	33.2	83.0		55
4	Green Building	6.4	2.6	7.6	31.2		170
5	Shed	3.6	2.6	2.0	22.7		259
6	Carport	3.6	2.6	2.0	25.0		294
7	Church	6.8	2.6	8.4	36.5		307
8	Tree	18.6	2.6	32.0	112.0		337
9	Tree	20.0	2.6	34.8	112.2		347
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:** 10/15/20

TREE DRIPLINE(s): 67.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

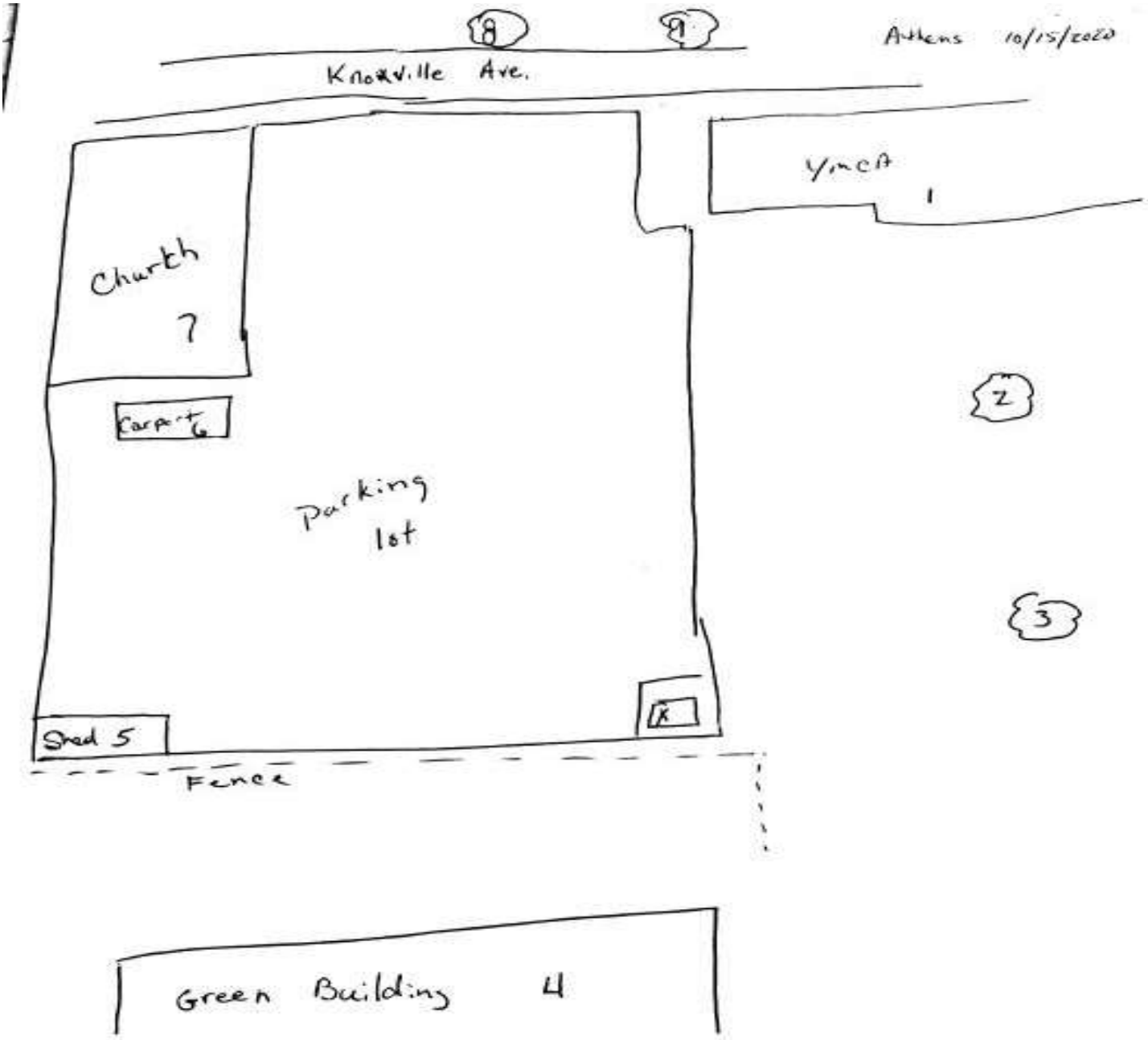
Additional Information:

Distance from inlet to utility pole is 3.2 meters.

MSEF : Local Site Name: Athens PM **Initials:** EMH **Date:** 10/15/20

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:** 10/15/20

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

Photo: 001 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 10/15/20 **Time:** 1:00 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 10/15/20 Time: 1:00 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 10/15/20 **Time:** 1:00 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

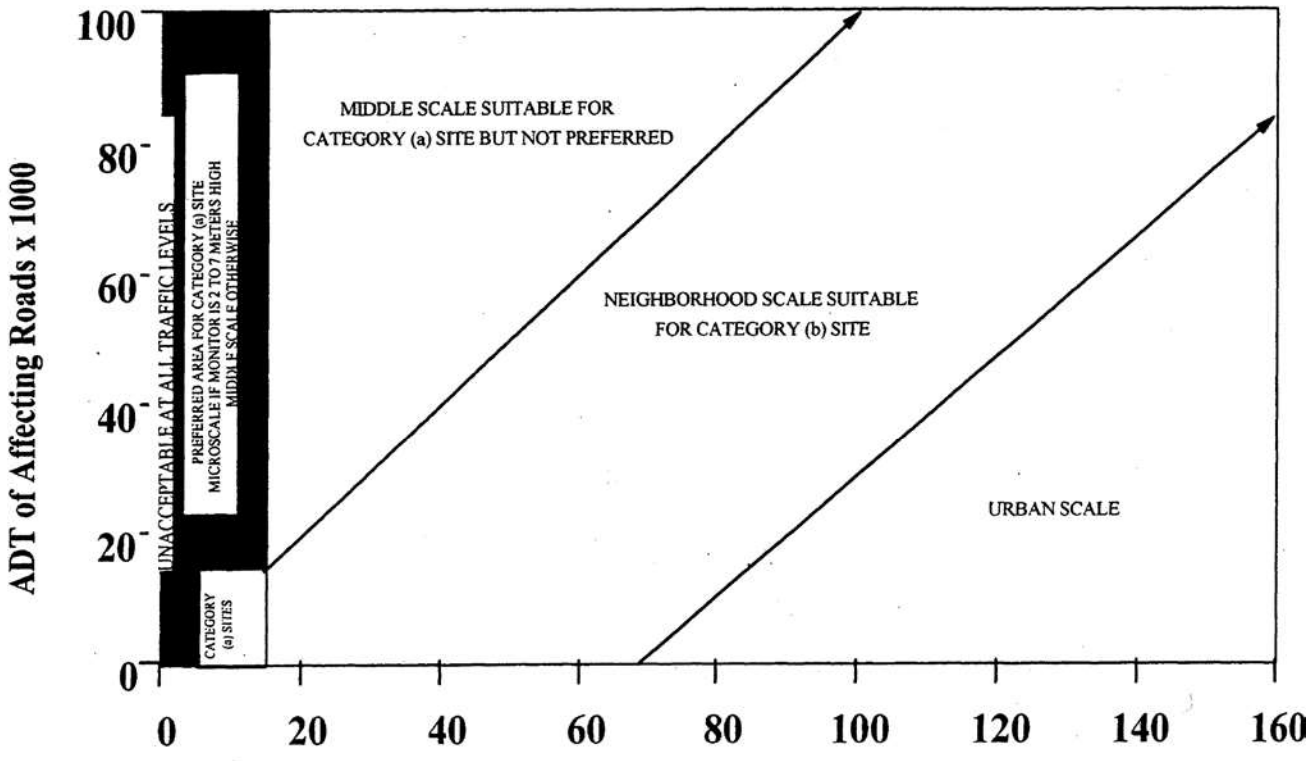


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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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: 12/10/20
AQS Number: 47- 113 -0010
Site Name: Jackson PM

Location: Jackson, 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: Jackson PM **Initials:** EMH **Date:** 12/10/20

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
Demonbreum Drive	245.0 m	Northwest	Local Street	NA	NA
North Highland Avenue	1101.8 m	West	Major Street	15961	2020

Electrical

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

Additional Comments:

1. Arrival, departure, and photo times are in Central Standard time.
2. QAPP and SOPs are available via the operator's tablet. eSIMs (APC's electrionic logbook is available via the operator's tablet. A hardcopy logbook is on site in case eSIMs cannot be accessed.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Jackson PM **Initials:** EMH **Date:** 12/10/20

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

Arrival Time: 11:05 am **Departure Time:** 11:45 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	W19444

MSEF: Local Site Name: Jackson PM **Initials:** EMH **Date:** 12/10/20

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven R55	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
PM2.5	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.

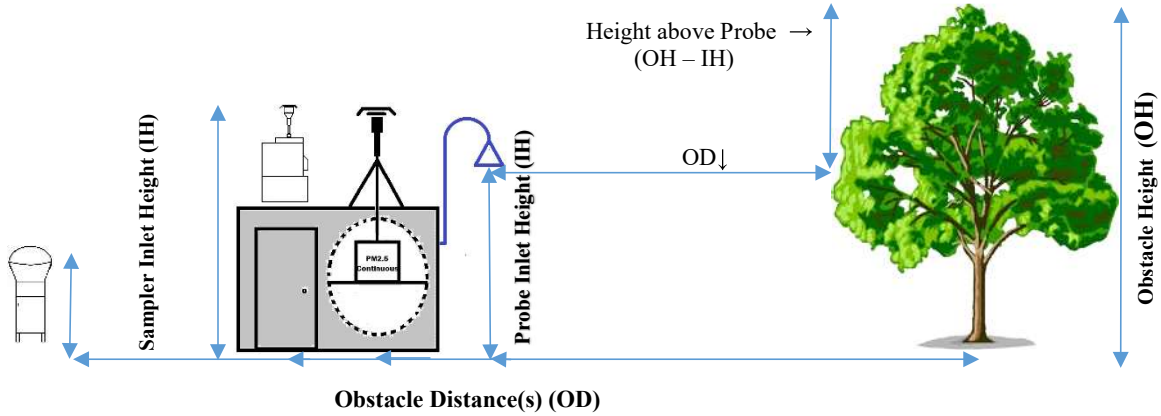
MSEF: Local Site Name: Jackson PM **Initials:** EMH **Date:** 12/10/20

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 03/09/17

MSEF: Local Site Name: Jackson PM **Initials:** EMH **Date:** 12/10/20

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	3.5	2.6	1.8	78.1	☐	359
2	Building	2.5	2.6	NA	92.8	☐	352
3	Building	4.6	2.6	4.0	95.7	☐	348
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:** _____

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:

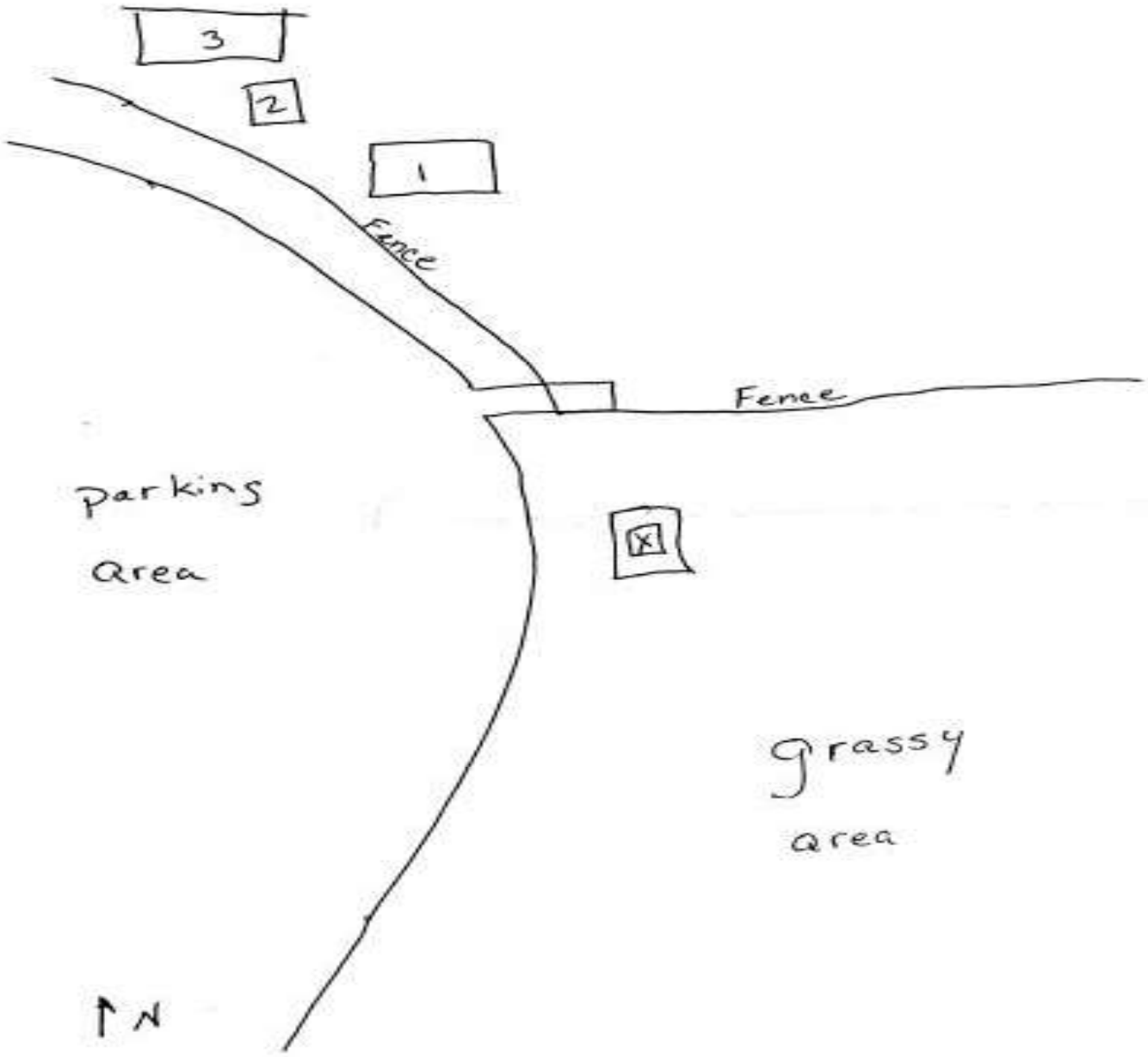
The distance between the inlet and the electrical panel is 0.9 meters. The panel is 2 meters tall.

Monitor is located in an enclosed cage.

MSEF : Local Site Name: Jackson PM **Initials:** EMH **Date:** 12/10/20

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:** 12/10/20

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

Photo: 001 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: North Directional

Photo: 002 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: East Directional

Photo: 004 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: South Directional

Photo: 006 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: West Directional

Photo: 008 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 12/10/20 **Time:** 11:35 am **Photographer:** EMH **Description:** Monitor

Photo: 010 Date: 12/10/20 Time: 11:35 am Photographer: EMH Description: Site

Photo: 011 **Date:** 12/10/20 **Time:** 11:35 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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Pollutant	Micro	Middle	Neighborhood	Urban	Regional
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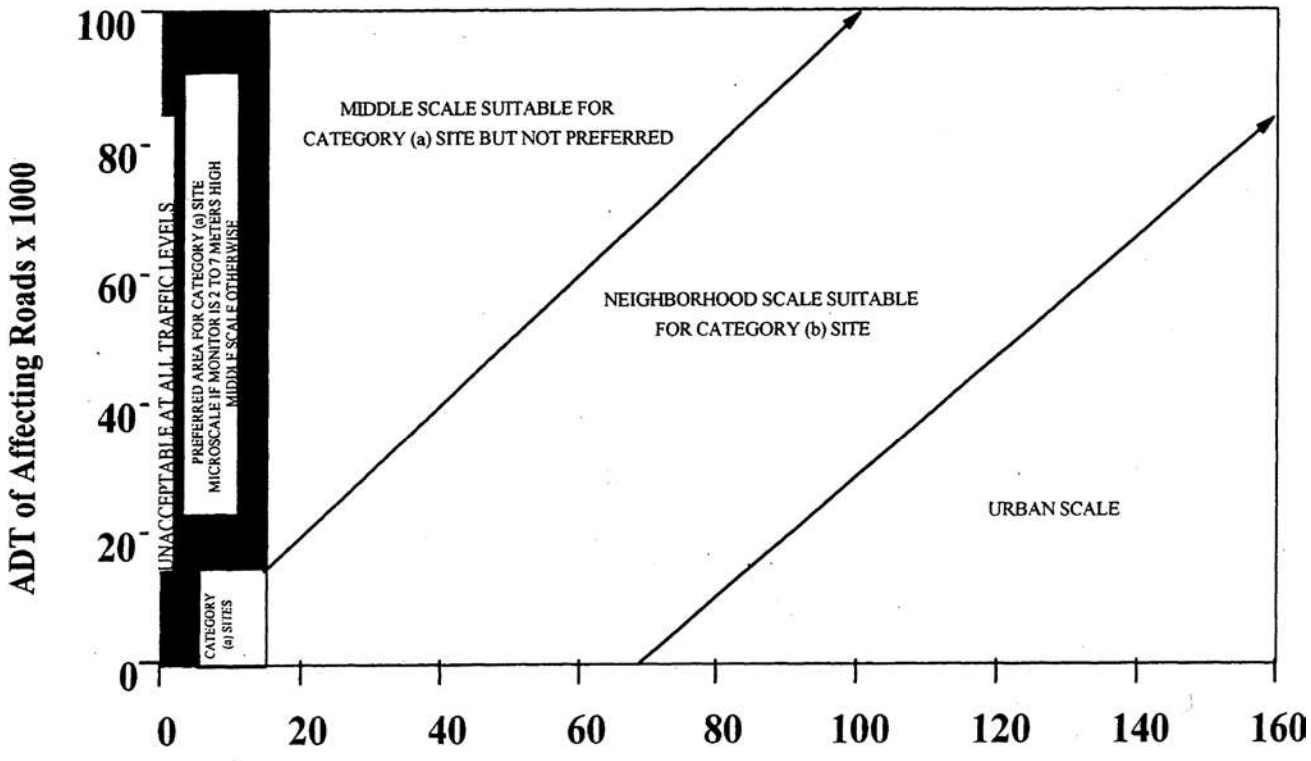

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Residence Time: The chart provides the maximum probe line length (in feet) of ¼" OD tubing at given flow rate - using a 20 second residence time. The ID's shown are for thick (1/8"), intermediate (5/32") and thin (3/16") wall Teflon® tubing. The line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

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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: 02/24/21
AQS Number: 47- 119 - 2007
Site Name: Columbia PM

Location: Columbia, Tennessee
Pollutants: PM2.5

Print Name / Signature / Initials / Duties

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

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/24/21

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	West	Major Highway	43329	2020

Electrical

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

Additional Comments:

1. Distance between inlet and utility inside fence is 1.1 meters.
2. QAPP and SOPs are available electronically via the operator's tablet.
3. eSIMS (APC's electronic logbook) is also available via the operator's tablet. A hard copy logbook is on site in case can not access eSIMS.
4. Site conditions are being monitored due to nearby construction. EPA was notified of construction activity and the site will be considered for relocation if the construction becomes a problem.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/24/21

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:** 10:55 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: Some nails started to come loose and were nailed back in.

PLATFORMS: □ **Not Present**

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

Issues: Some nails started to come loose and were nailed back in.

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	T17016

MSEF: Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/24/21

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:** _____

Issue(s): _____

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

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

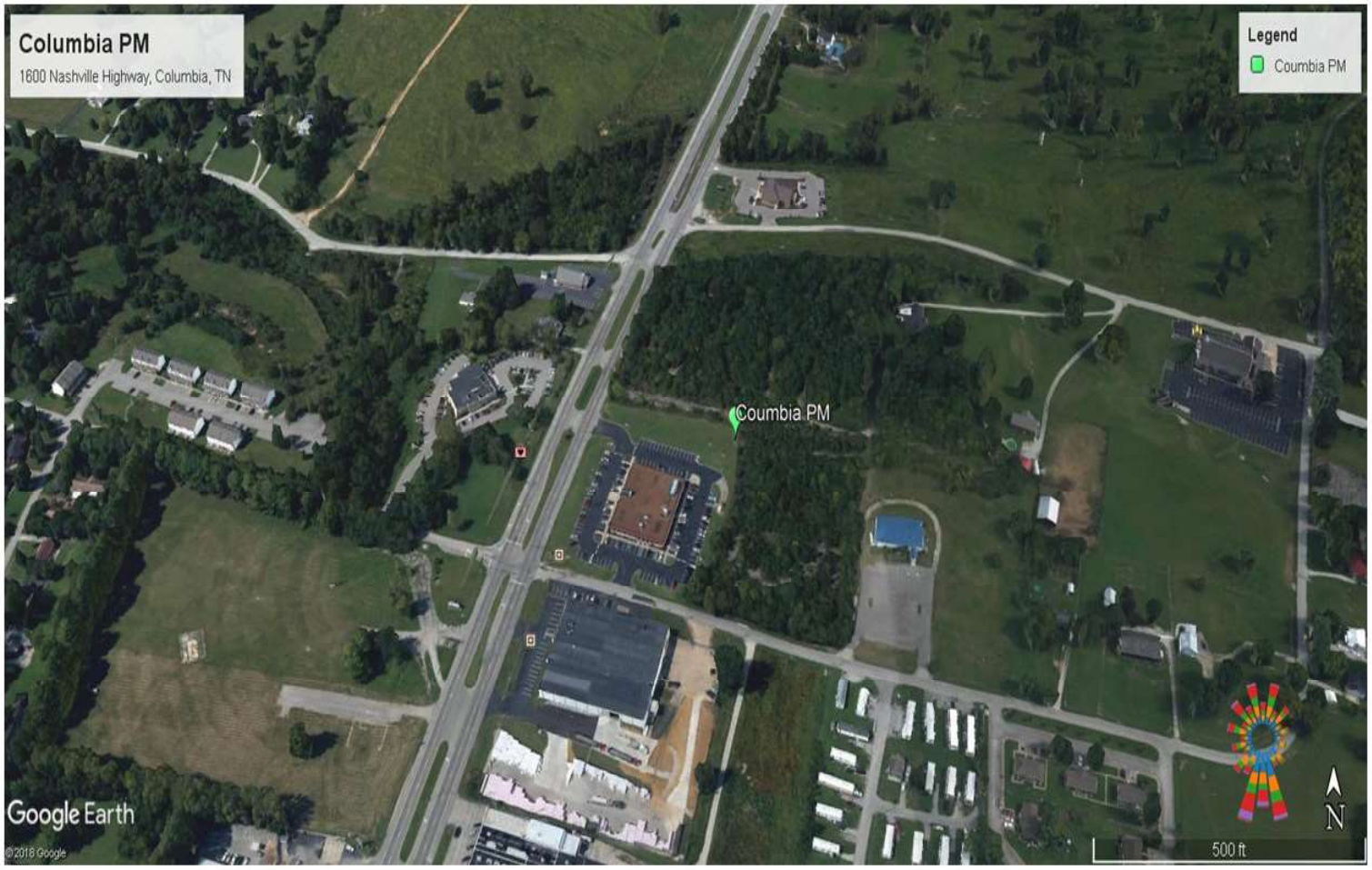
*Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved 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
PM2.5	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:** 02/24/21

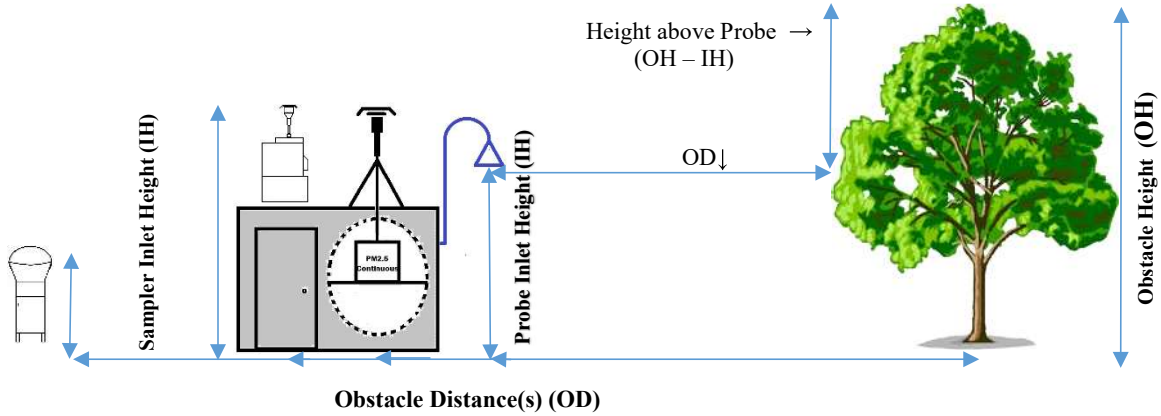
Aerial Photo with Wind Rose



Source: Google Earth Pro **Imagery Date:** 12/30/16

MSEF: Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/24/21

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	4.6	2.6	4.0	15.0	☐	5
2	Trees	4.6	2.6	4.0	13.5	☐	45
3	Trees	4.8	2.6	4.4	12.5	☐	106
4	Trees	6.0	2.6	6.8	13.5	☐	146
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:** 02/24/21

TREE DRIPLINE(s): 11.8 **meters** (nearest inlet to dripline) □ **No Trees Present**
12.0 **meters** (nearest inlet to dripline) ☐ Not Present
13.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

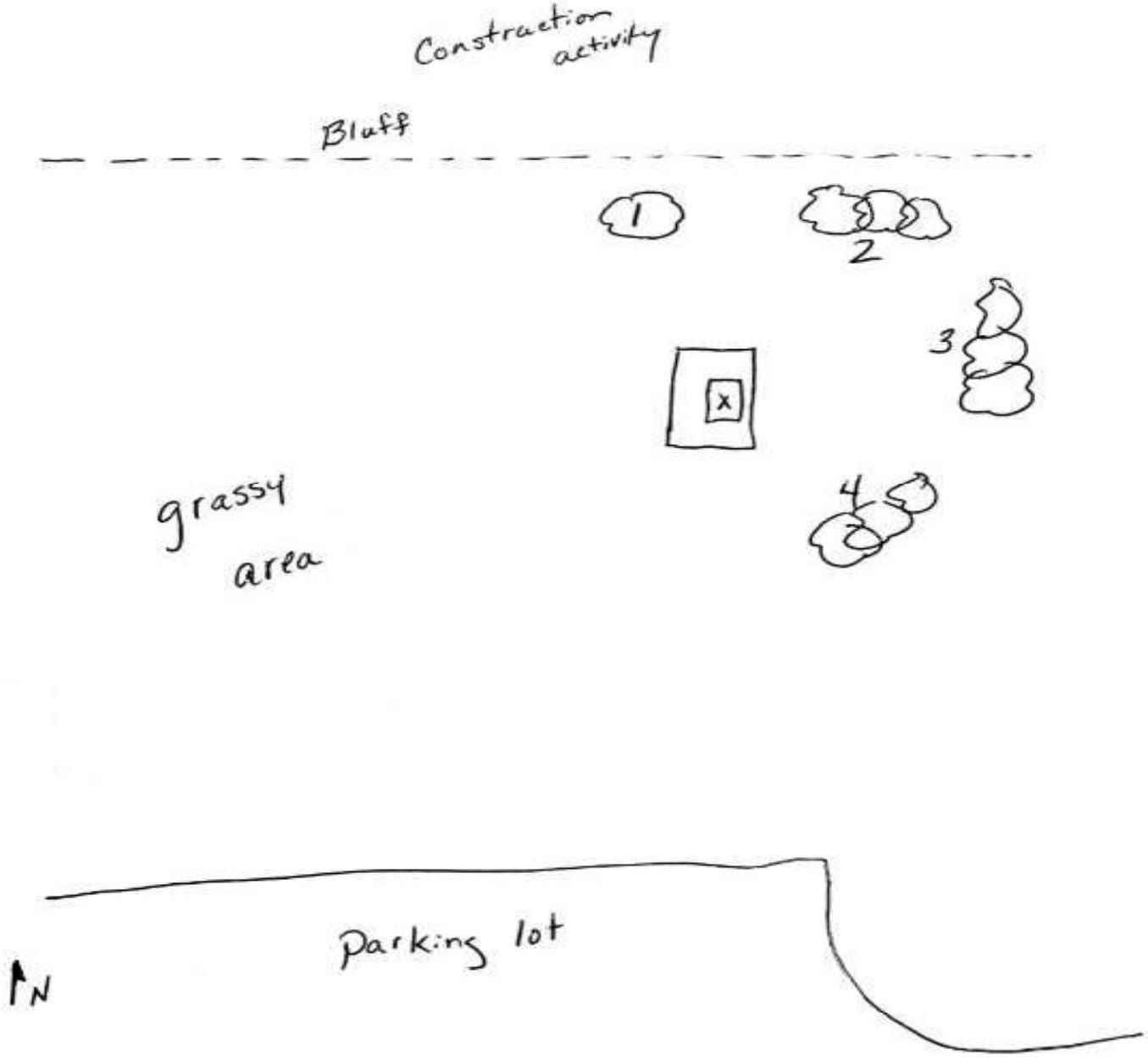
Additional Information:

None of the trees surrounding the monitoring site are obstacles and are greater than 10 meters from the inlet; no dripline problems.

MSEF : Local Site Name: Columbia PM **Initials:** EMH **Date:** 02/24/21

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:** 02/24/21

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

Photo: 001 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: North Directional

Photo: 002 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: East Directional

Photo: 004 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: South Directional

Photo: 006 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: West Directional

Photo: 008 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 02/24/21 **Time:** 10:40 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 02/24/21 Time: 10:40 am Photographer: EMH Description: Monitor

Photo: 011 **Date:** 02/24/21 **Time:** 10:40 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

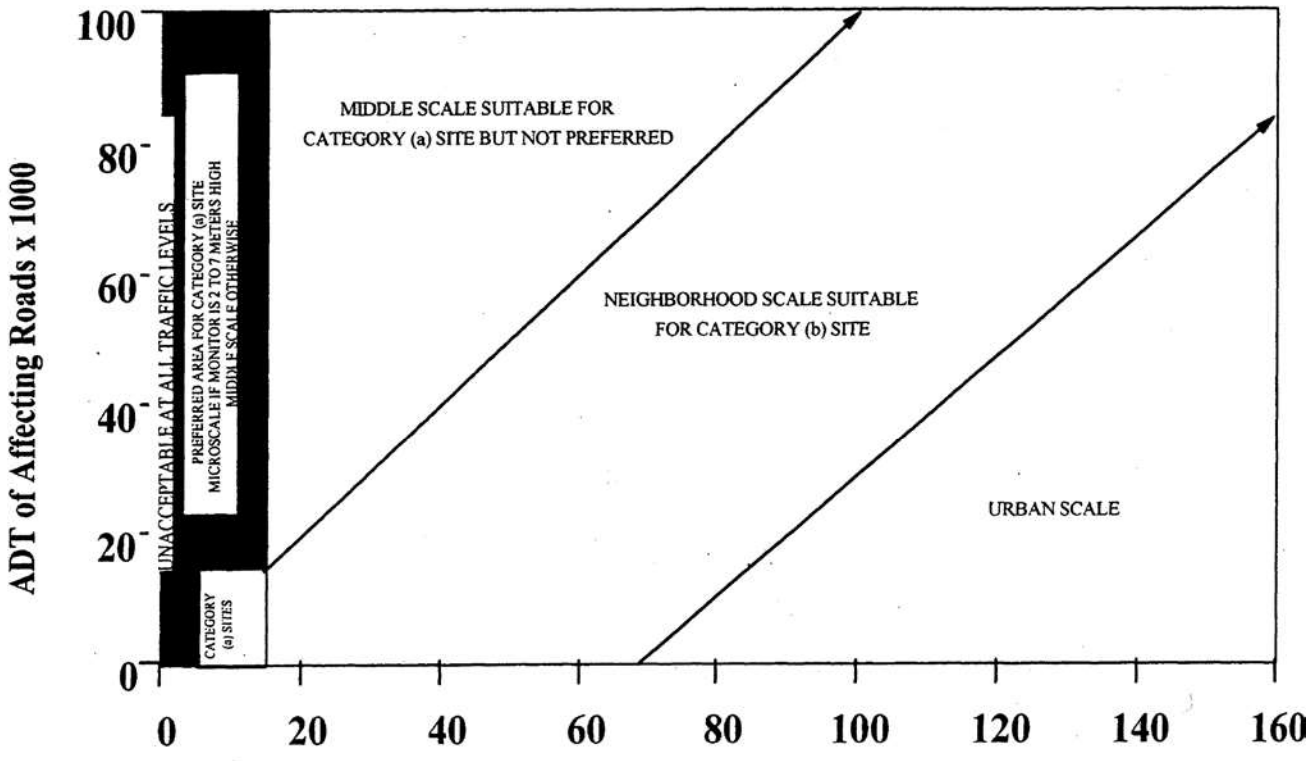


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 03/29/21
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:** 03/29/21

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 Street	NA	NA
West Coyote Trail Road	116.4 m	West	Local Street	NA	NA
Peachers Mill Road	573.0 m	East	Local Street	16352	2020

Electrical

Utilities Company: Clarksville Power and Electric Meter #: 9036750

Additional Comments:

1. Distance between utility pole and inlet is 2.4 meters.
2. QAPP and SOPs are available via the operator's tablet. eSIMS (APC's electronic logbook) is also available via the operator's tablet. A hard copy logbook is on site in case the operator cannot acces eSIMS.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Clarksville PM **Initials:** EMH **Date:** 03/29/21

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

Arrival Time: 12:05 pm **Departure Time:** 12:50 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: _____

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:** 03/29/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610254021016	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:** _____

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
PM2.5	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.

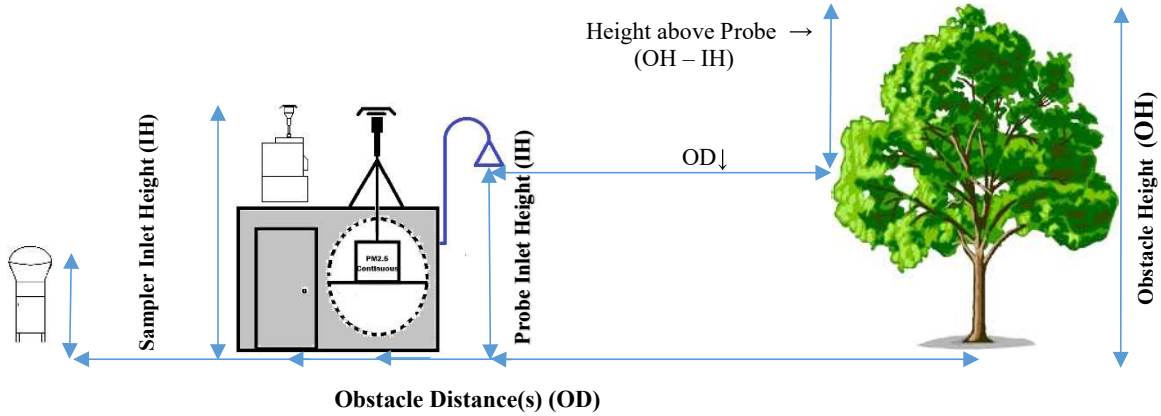
MSEF: Local Site Name: Clarksville PM **Initials:** EMH **Date:** 03/29/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 04/01/19

MSEF: Local Site Name: Clarksville PM **Initials:** EMH **Date:** 03/29/21

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	15.0	2.6	24.8	145.5		317
2	Trees	19.0	2.6	32.8	130.0		9
3	Trees	22.5	2.6	39.8	119.0		34
4	Condos	8.2	2.6	11.2	65.2		69
5	Condos	8.0	2.6	10.8	62.0		85
6	Trees	20.9	2.6	36.6	68.0		132
7	Trees	15.0	2.6	25.0	50.0		224
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: Clarksville PM **Initials:** EMH **Date:** 03/29/21

TREE DRIPLINE(s): 50.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

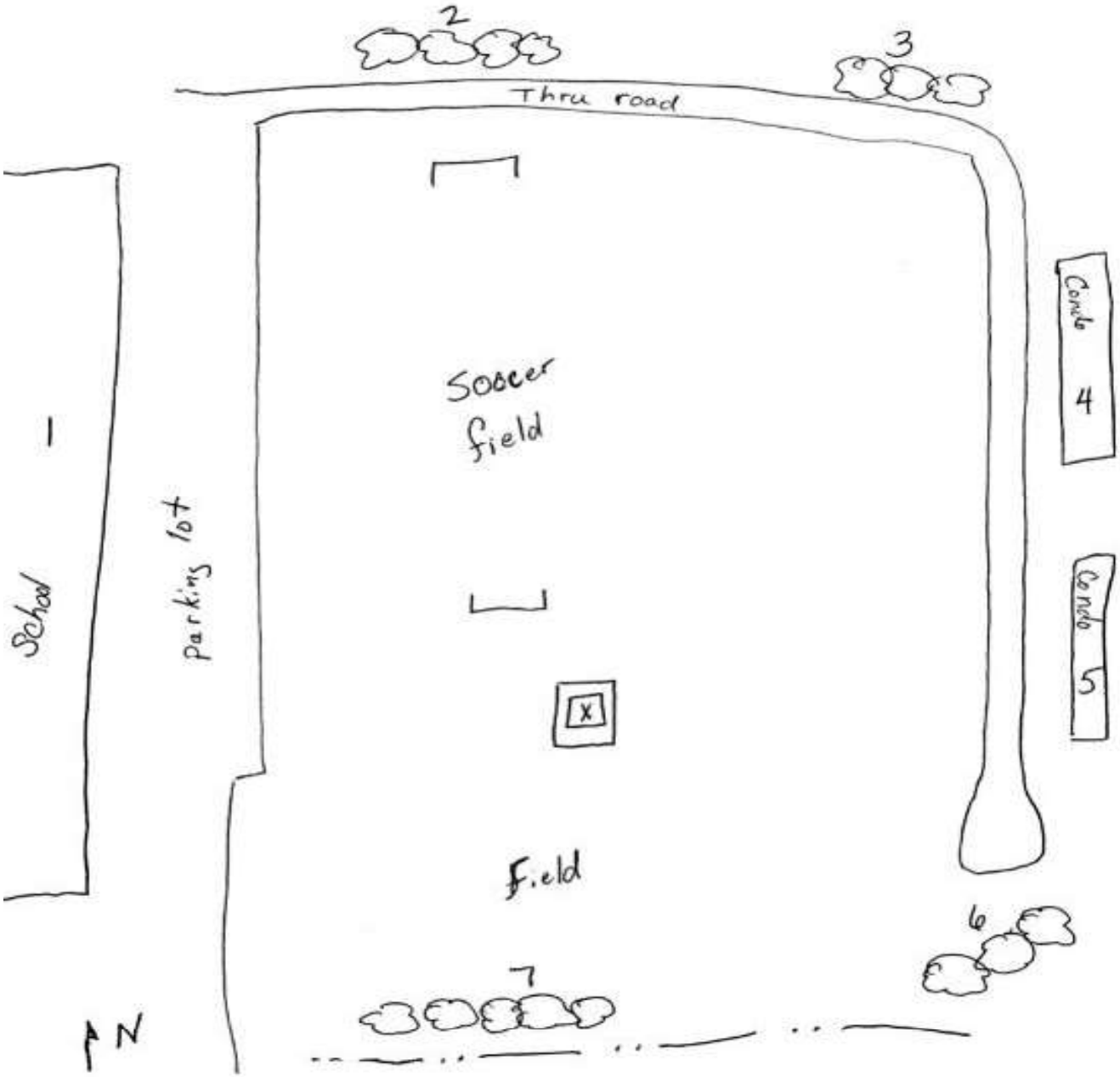
Additional Information:

Closest trees are > 20 meters away from inlet.

MSEF : Local Site Name: Clarksville PM **Initials:** EMH **Date:** 03/29/21

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:** 03/29/21

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

Photo: 001 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/29/21 **Time:** 12:40 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/29/21 Time: 12:40 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 03/29/21 **Time:** 12:40 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

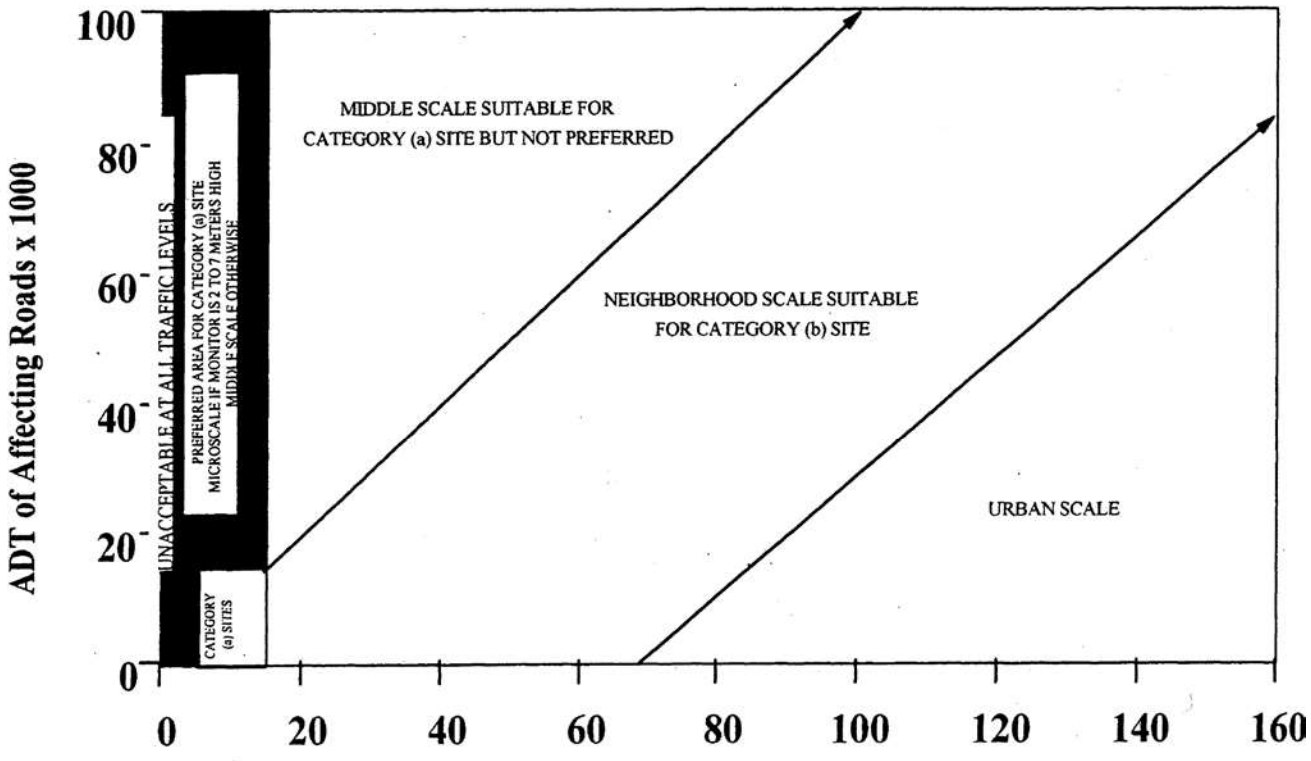


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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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: 11/13/20
Location: Cookeville, Tennessee
AQS Number: 47- 141 - 0005
Site Name: Cookeville 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: Cookeville PM **Initials:** EMH **Date:** 11/13/20

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	East	Local Street	NA	NA
East 20th Street	116.4 m	North	Local Street	NA	NA
North Washington Avenue	348.0 m	West	Local Street	7136	2020

Electrical

Utilities Company: Cookeville Electric District Meter #: 20274

Additional Comments:

1. Arrival, departure and photo times are Central Standard time,

2. Records: QAPP and SOPs are available electronically via the operator's tablet. eSIMs (APC's electronic logbook) is also available electronically via the operator's tablet. A hardcopy logbook is on site in case the operator cannot access eSIMs.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Cookeville PM **Initials:** EMH **Date:** 11/13/20

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

Arrival Time: 9:45 am **Departure Time:** 10:45 am **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
PM2.2	Met One	BAM 1022	T21580

MSEF: Local Site Name: Cookeville PM **Initials:** EMH **Date:** 11/13/20

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven R55	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
PM2.5	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.

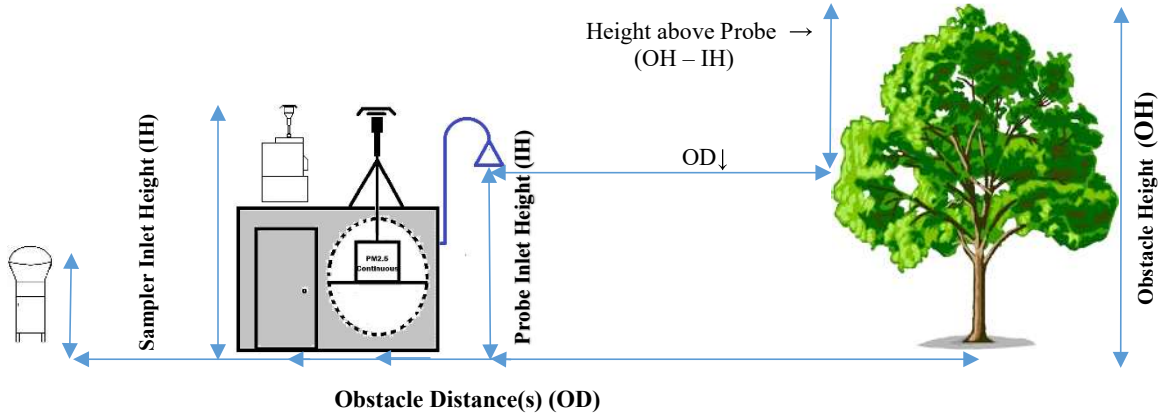
MSEF: Local Site Name: Cookeville PM **Initials:** EMH **Date:** 11/13/20

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/31/16

MSEF: Local Site Name: Cookeville PM **Initials:** EMH **Date:** 11/13/20

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	8.6	2.6	12.0	54.0	☐	351
2	Trees	23.0	2.6	40.8	64.8	☐	37
3	Tree	22.1	2.6	39.0	32.1	☑	53
4	Tree	18.2	2.6	31.2	25.8	☑	60
5	Tree	20.8	2.6	36.4	25.2	☑	81
6	Tree	20.2	2.6	35.2	29.5	☑	87
7	Garage	4.3	2.6	3.4	8.6	☐	106
8	Tree	9.7	2.6	14.2	25.1	☐	130
9	Tree	18.8	2.6	32.4	41.0	☐	152
10	Trees	16.5	2.6	27.8	63.0	☐	181
11	Trees	20.0	2.6	34.8	67.5	☐	215
12	Trees	13.8	2.6	22.4	66.0	☐	227
13	Tree	17.4	2.6	29.6	46.8	☐	270
14	Trees	12.8	2.6	20.4	41.8	☐	283
15	Tree	19.2	2.6	33.2	46.8	☐	292
16	Picnic Shed	3.7	2.6	2.2	49.0	☐	326
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:** 11/13/20

TREE DRIPLINE(s): 25.2 **meters** (nearest inlet to dripline) □ **No Trees Present**

25.8 **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: None. Closest trees are > 20 meters from inlet

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

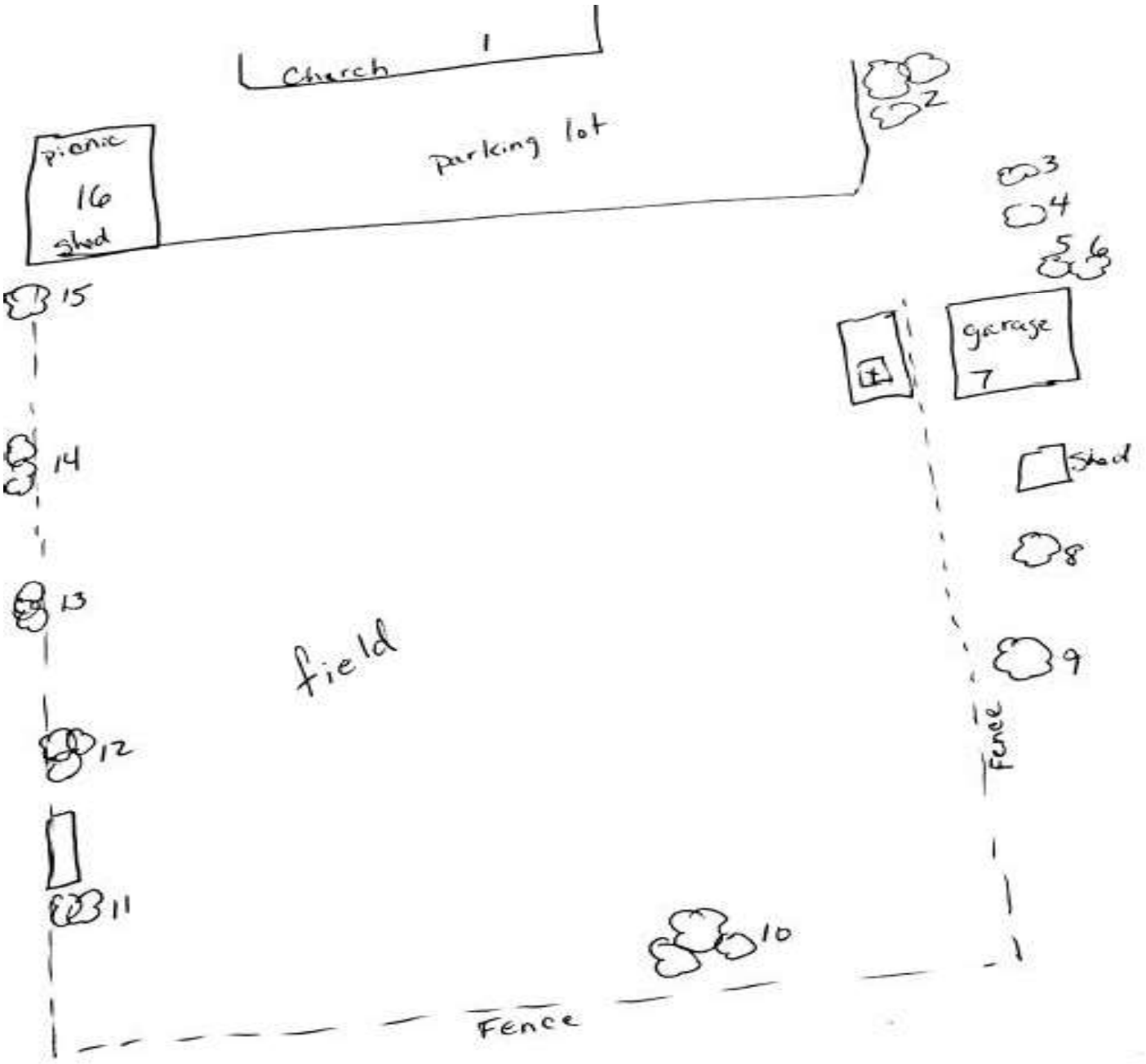
Additional Information:

1. The distance between the inlet and utility pole is 2.6 meters.
2. Four trees (Objects #3, #4, #5, and #6) are considered obstacles and are within one 90 degree quadrant; therefore there is 270 degrees of unrestricted airflow around the inlet.

MSEF : Local Site Name: Cookeville PM **Initials:** EMH **Date:** 11/13/20

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:** 11/13/20

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CFR Part 58, Appendix E, Tables and Figures

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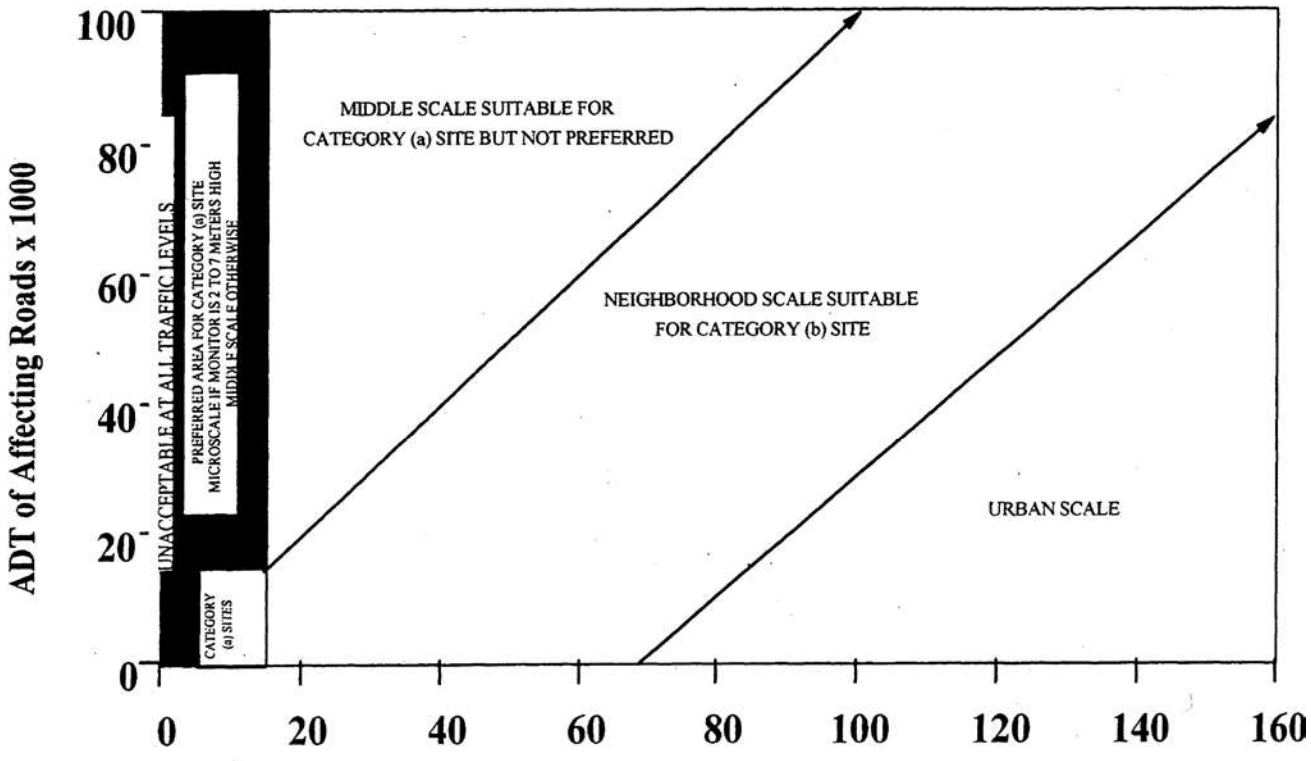

Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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.

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(liters/min)	**feet**	**feet**	**feet**
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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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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: 03/04/21
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:** 03/04/21

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 Street	78.8 m	Northeast	Local Street	2347	2020
Clinton Street	75.6 m	South	Local Street	NA	NA
North Roane Street	121.0 m	Northwest	Local Street	13256	2020
Georgia Street	223.4 m	Southwest	Local Street	1395	2020

Electrical

Utilities Company: Harriman Utility Board Meter #: 30530

Additional Comments:

1. Arrival, departure, and photo times are Eastern Standard time.
2. QAPP and SOPs are available electronically via the operator's tablet.
3. eSIMS (APC's electronic logbook) is also electronically via the operator's tablet.

A hard copy logbook is on site in case the operator cannot access eSIMS.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Harriman PM **Initials:** EMH **Date:** 03/04/21

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

Arrival Time: 12:00 pm **Departure Time:** 12:55 pm **Primary Operator:** Hunter Sherwood

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
PM 2.5	Met One	BAM 1022	W12887

MSEF: Local Site Name: Harriman PM **Initials:** EMH **Date:** 03/04/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93610146021016	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:** _____

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
PM2.6	2.6	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.

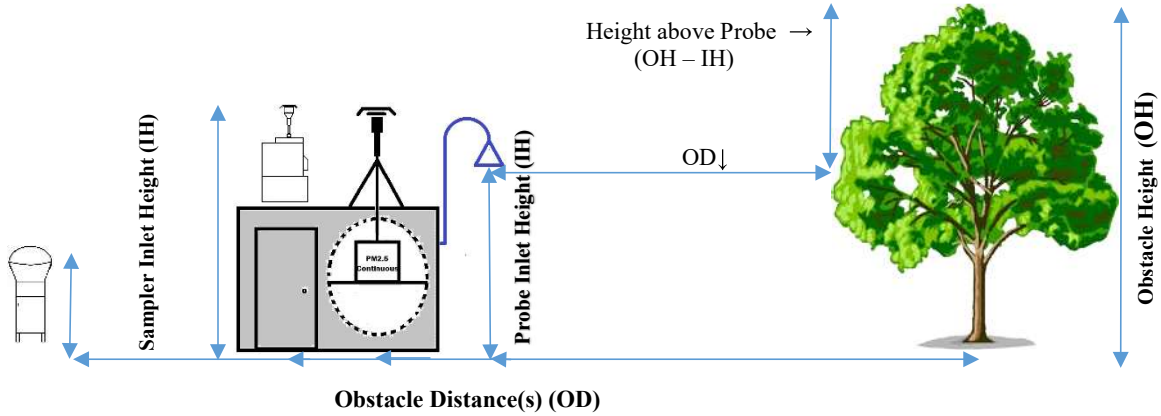
MSEF: Local Site Name: Harriman PM **Initials:** EMH **Date:** 03/04/21

Aerial Photo with Wind Rose

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

MSEF: Local Site Name: Harriman PM **Initials:** EMH **Date:** 03/04/21

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	11.6	2.6	18.0	92.0		316
2	Tree	9.1	2.6	13.0	80.5		327
3	Tree	14.6	2.6	24.0	94.0		349
4	Church	9.0	2.6	12.8	56.0		49
5	Tree	8.9	2.6	12.6	44.0		61
6	Tree	11.7	2.6	18.2	51.0		85
7	Trees	13.0	2.6	20.8	52.0		137
8	Trees	18.8	2.6	32.4	74.0		150
9	Tree	25.5	2.6	45.8	83.0		168
10	School	7.4	2.6	9.6	53.0		283
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:** 03/04/21

TREE DRIPLINE(s): 44.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues:

None

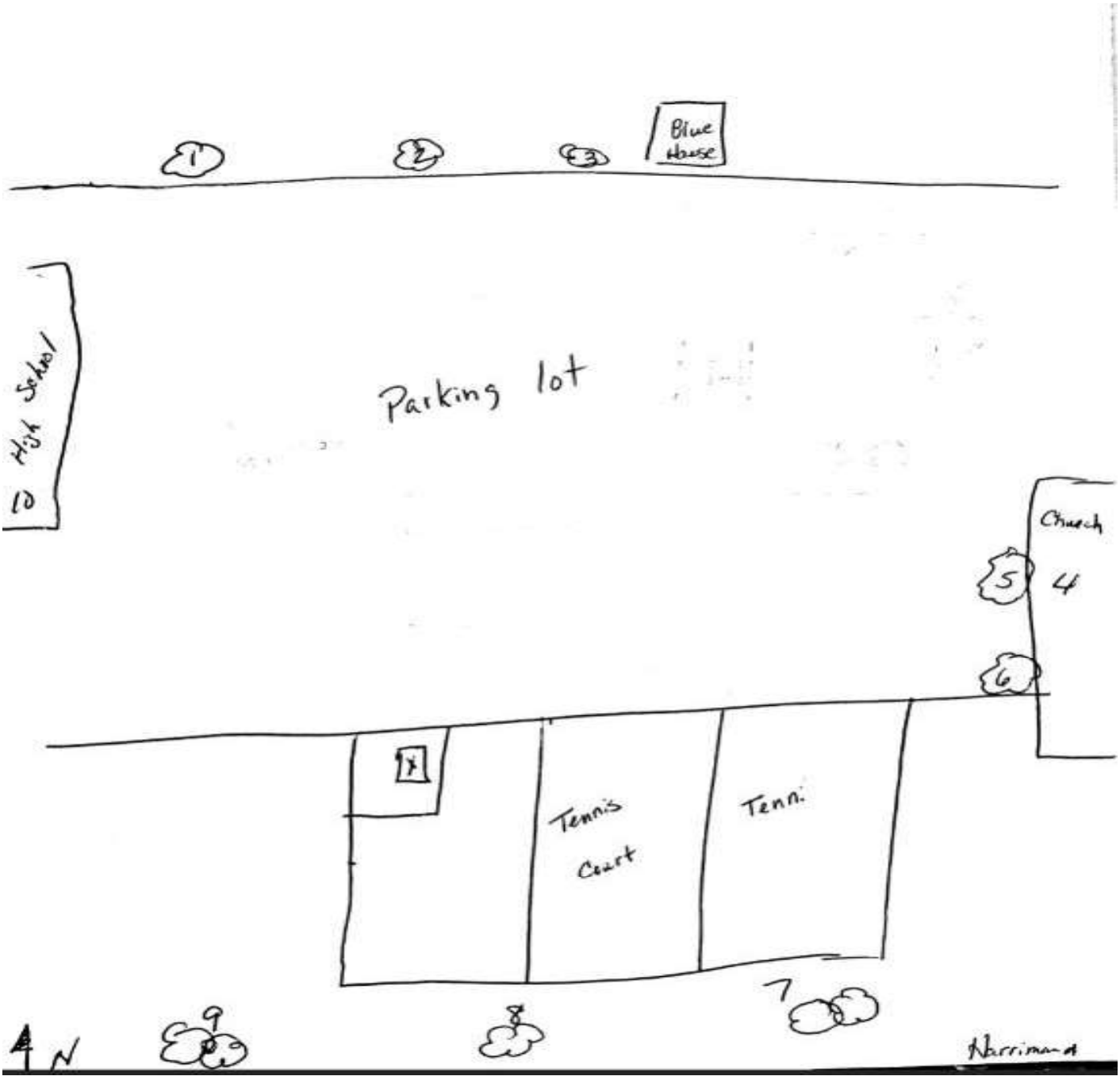
Additional Information:

Closest tree is greater than 20 meters; no dripline issues.

MSEF : Local Site Name: Harriman PM **Initials:** EMH **Date:** 03/04/21

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:** 03/04/21

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

Photo: 001 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/04/21 **Time:** 12:40 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/04/21 Time: 12:40 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 03/04/21 **Time:** 12:40 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

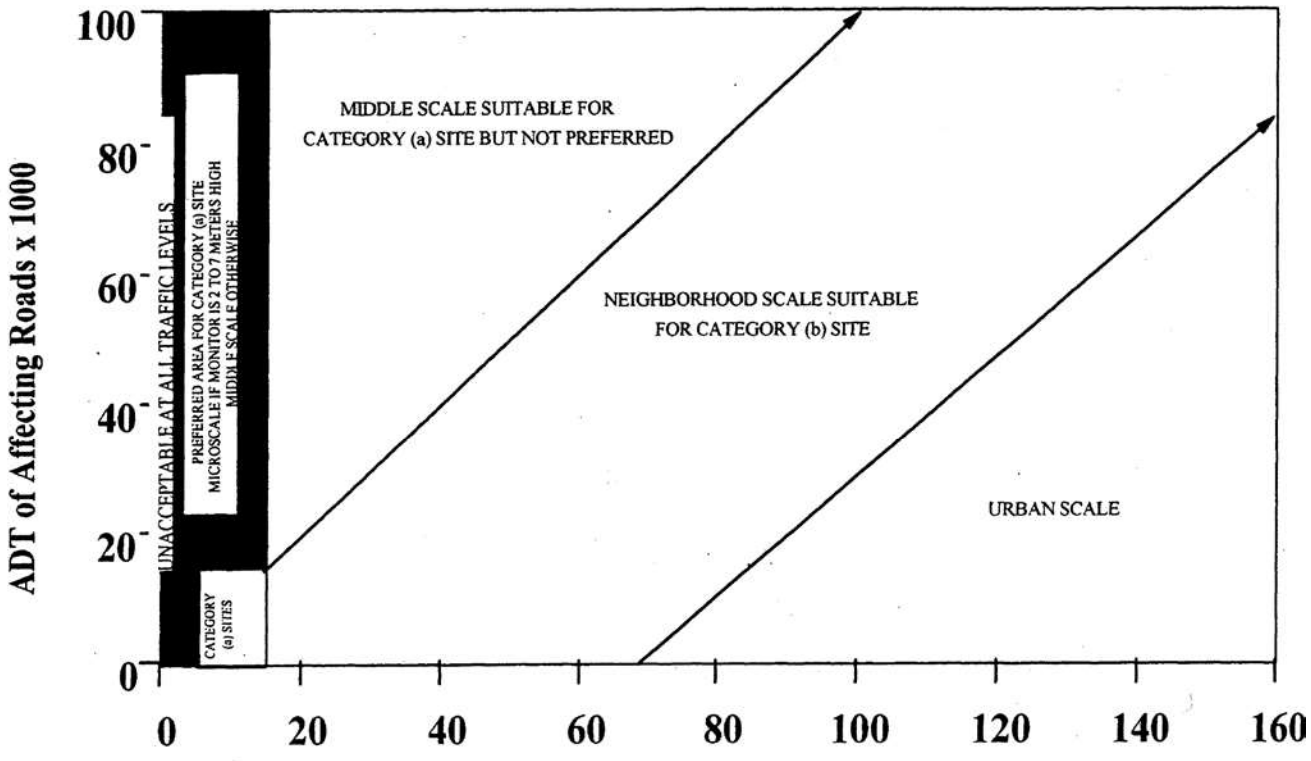


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 04/07/21
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:** 04/07/21

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	South	Local Street	13055	2020
D Street	47.0 m	West	Local Street	NA	NA
Westmoreland Avenue	37.8 m	North	Local Street	NA	NA
E Street	52.4 m	East	Local Street	NA	NA

Electrical

Utilities Company: Appalachian Electric Power Meter #: 783191241

Additional Comments:

1. Arrival, departure and photo times are Eastern Standard time.
2. Distance between the utility pole and the inlet is 1.4 meters.
3. QAPP and SOPs are available electronically via the operator's tablet. eSIMS (APC's electronic logbook) is also available electronically the same way as the QAPP and SOPs. A hard copy logbook is on site in case the operator cannot access eSIMS.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Kingsport PM **Initials:** EMH **Date:** 04/07/21

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

Arrival Time: 12:35 pm **Departure Time:** 1:20 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:** 04/07/21

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:** _____

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
PM2.5	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.

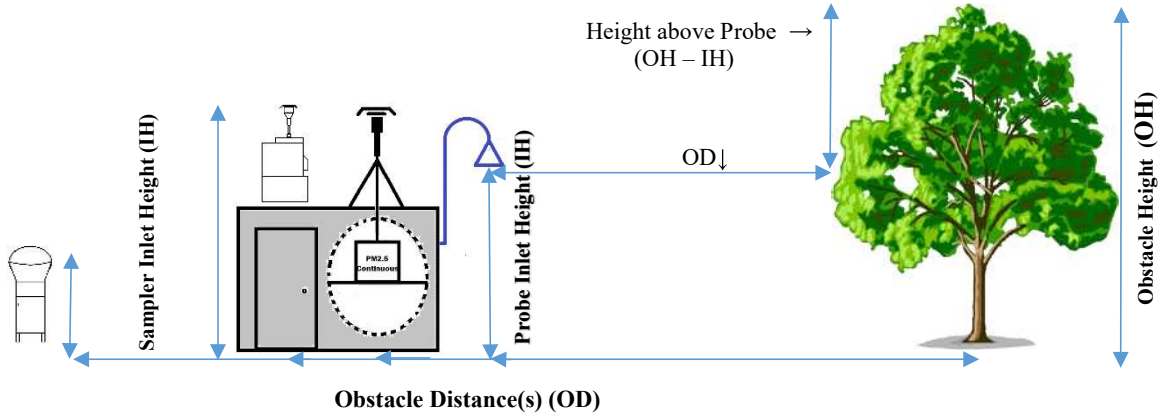
MSEF: Local Site Name: Kingsport PM **Initials:** EMH **Date:** 04/07/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 11/10/15

MSEF: Local Site Name: Kingsport PM **Initials:** EMH **Date:** 04/07/21

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	2.7	6.6	55.8		31
2	Tree	9.0	2.7	12.6	30.8		36
3	Tree	2.6	2.7	NA	30.0		9.2
4	Tree	3.7	2.7	2.0	35.1		360
5	Bushes	2.1	2.7	NA	8.5		15
6	Tree	7.0	2.7	8.6	11.7		355
7	Tree	7.0	2.7	8.6	18.6		324
8	Tree	7.4	2.7	9.4	14.8		301
9	Tree	10.8	2.7	16.2	19.6		109
10	Tree	13.4	2.7	21.4	26.8		94
11	Tree	3.5	2.7	1.6	18.0		70
12	Bushes	2.0	2.7	NA	10.0		57
13	Tree	6.3	2.7	7.2	15.1		49
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:** 04/07/21

TREE DRIPLINE(s): 9.6 **meters** (nearest inlet to dripline) ☐ **No Trees Present**
10.8 **meters** (nearest inlet to dripline) ☐ Not Present
14.6 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

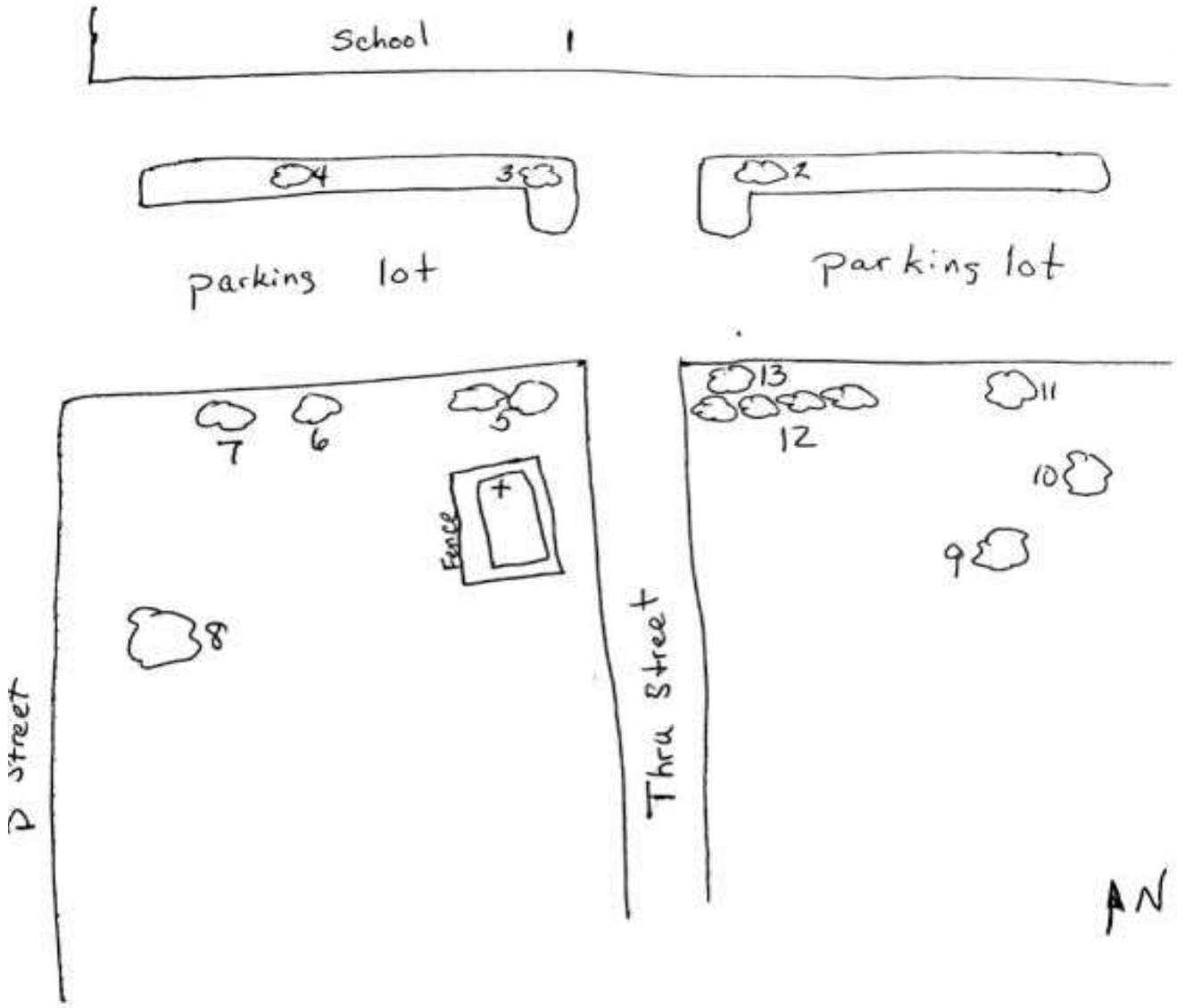
Additional Information:

Driplines were measured for Trees (Objects: 6, 7, 8, and 11). The objects were not considered obstacles; therefore there were no dripline issues. For the bushes with a distance less than 10 meters (Object 5), the bushes were below the inlet height. Trimming will need to be done in the fall to ensure the site continues to meet siting criteria.

MSEF : Local Site Name: Kingsport PM **Initials:** EMH **Date:** 04/07/21

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:** 04/07/21

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

Photo: 001 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 04/07/21 **Time:** 1:05 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 04/07/21 Time: 1:05 pm Photographer: EMH Description: Monitor

Photo: 011 **Date:** 04/07/21 **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

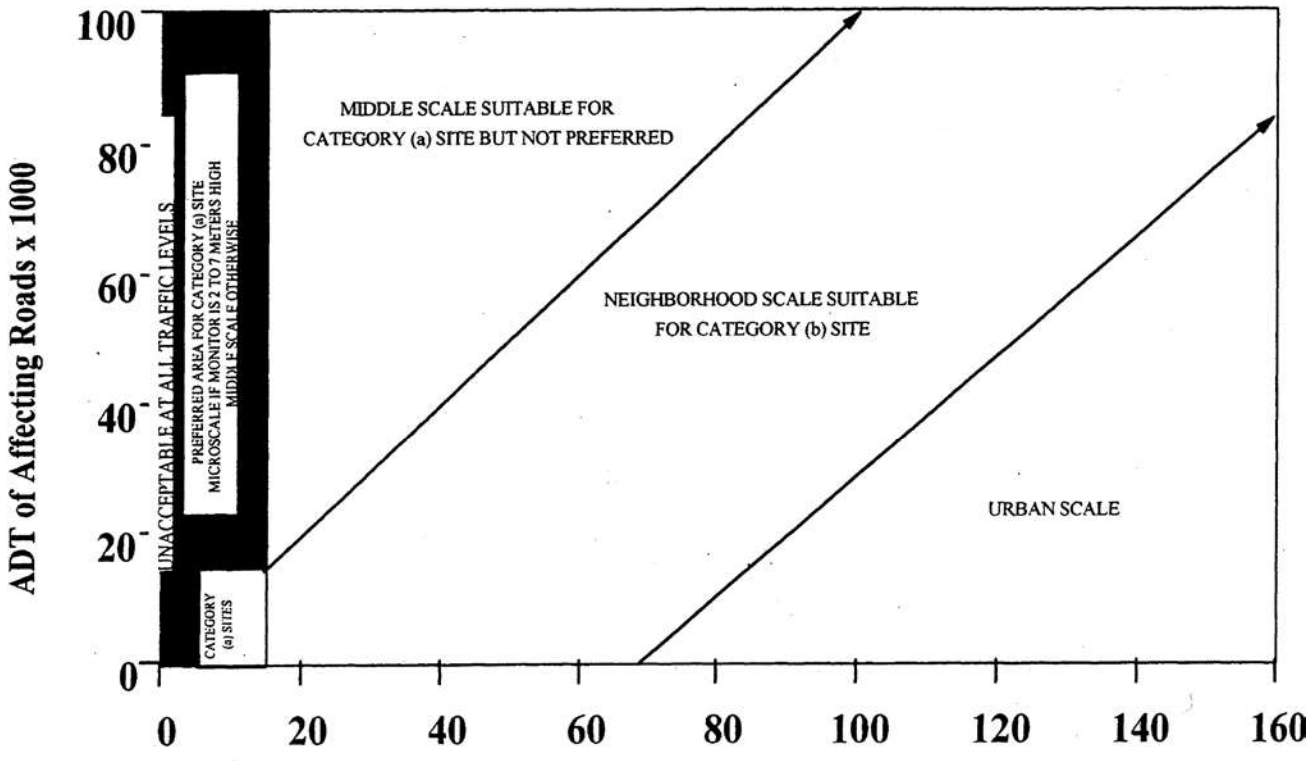


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 04/07/2021
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:** 04/07/2021

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	North	Local Street	NA	NA
Hill Road	174.4 m	East	Local Street	NA	NA
Memorial Blouvard	254.5 m	North	Local Street	7430	2020
Fall Creek Road	847.8 m	West	Local Street	2323	2020

Electrical

Utilities Company: Appalachian Electric Power Meter #: 783638139

Additional Comments:

1. Arrival, departure and photo times are Eastern Standard.
2. Shelter is located within a fenced-in area.
3. Temperature inside the shelter was 70 degrees F.
4. The fire extinguisher is in good condition.
5. Shelter is bolted down to cement pad.
6. QAPP and SOPs are available electronically via the operator's tablet or Agilaire 8872.

eSIMS (APC's electronic logbook) is available electronically the same way as the QAPP and SOPs.

A hard copy logbook is on site in case the operator cannot access eSIMS.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Blountville O3 **Initials:** EMH **Date:** 04/07/21

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

Arrival Time: 9:40 am **Departure Time:** 10:15 am **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: 22.6 **°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:** 04/07/21

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

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2282

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	647	01/26/21	07/26/21

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:** 04/07/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R93740156011016	Modem	Main
Agilaire	8872	512	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:** 02/03/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/03/21

[■ 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:** 04/07/21

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: 6.2 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.

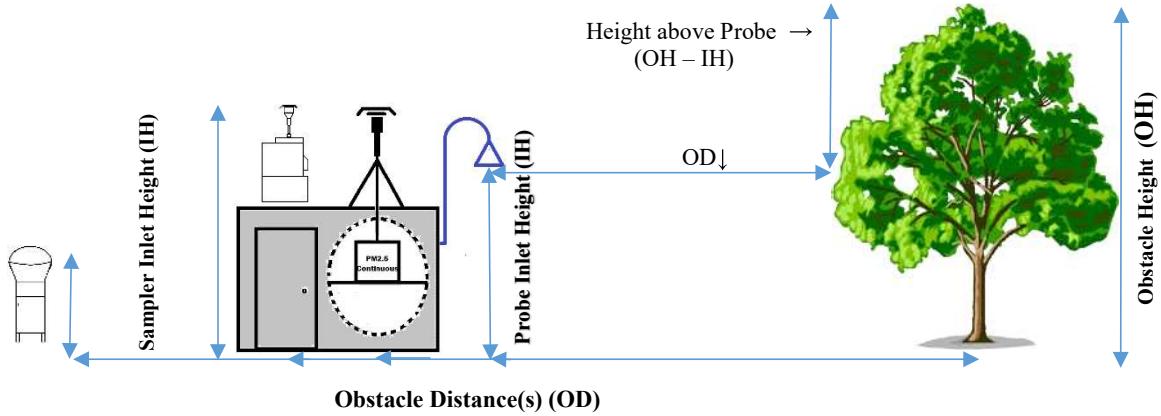
MSEF: Local Site Name: Blountville O3 **Initials:** EMH **Date:** 04/07/21

Aerial Photo with Wind Rose

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

MSEF: Local Site Name: Blountville **Initials:** EMH **Date:** 04/07/21

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	5.5	4.6	18.0	44.2	☐	1
2	Trees	12.0	4.6	14.8	32.2	☐	347
3	Trees	9.4	4.6	9.6	24.4	☐	332
4	Trees	15.6	4.6	22.0	43.5	☐	298
5	Community Center	3.4	4.6	NA	13.2	☐	123
6	Trees	14.0	4.6	18.8	34.0	☐	86
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: Blountville O3 **Initials:** EMH **Date:** 04/07/21

TREE DRIPLINE(s): 24.2 **meters** (nearest inlet to dripline) □ **No Trees Present**

32.2 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

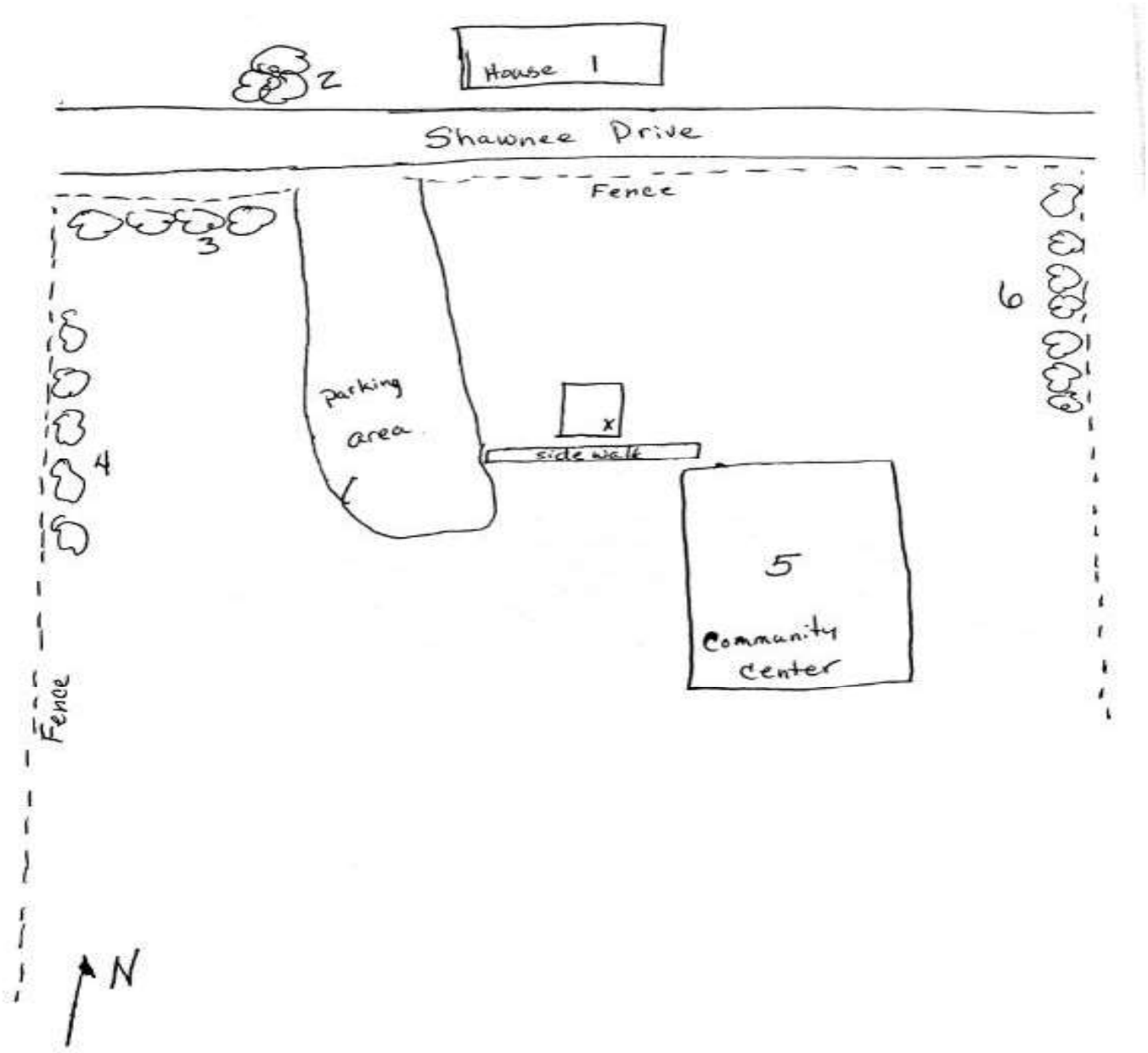
Additional Information:

Closest tree is > 20 meters away from probe; no dripline issues.

MSEF : Local Site Name: Blountville O3 **Initials:** EMH **Date:** 04/07/21

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:** 04/07/21

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

Photo: 001 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: North Directional

Photo: 002 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: East Directional

Photo: 004 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: South Directional

Photo: 006 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: West Directional

Photo: 008 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 04/07/21 **Time:** 10:05 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 04/07/21 Time: 10:05 am Photographer: EMH Description: Probe

Photo: 011 **Date:** 04/07/21 **Time:** 10:05 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

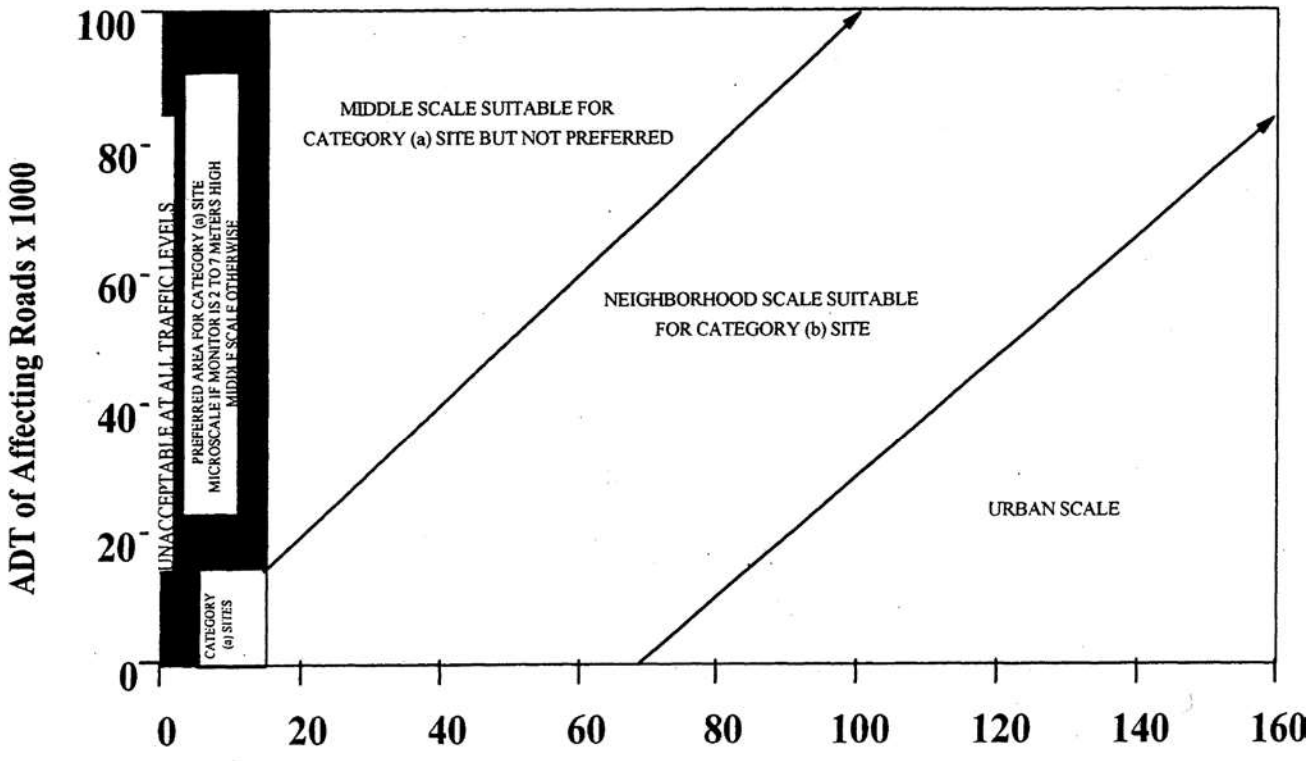


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 04/07/2021
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:** 04/07/2021

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	240.8 m	North	Local Street	2960	2020
Packing House Road	198.0 m	East	Local Street	NA	NA
Kentron Drive	37.5 m	Southeast	Local Street	NA	NA
New Beason Well Road	455.0 m	West	Local Street	4586	2020

Electrical

Utilities Company: Appalachian Electric Power Meter #: 784207275

Additional Comments:

1. Arrival, departure and photo times are Eastern Standard time.
2. The temperature inside the shelter was 77 degrees F.
3. The fire extinguisher is in good condition.
4. The shelter is bolted down to cement pad.
5. QAPP and SOPs are available electronically via the operator's tablet or the Agilaire 8872. eSIMS (APC's electronic logbook) is also available electronically the same way as the QAPP and SOPs. A hard copy logbook is on site in case the operator cannot access eSIMS.
6. The Kingsport O3 site is one of the sites with the multi pollutant experimental sensors.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 04/07/21

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:** 12:10 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: 25.3 **°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: Kingsport O3 **Initials:** EMH **Date:** 04/07/21

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

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2278

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	01/07/21	07/07/21

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:** 04/07/21

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:** 02/03/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/03/21

[■ 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:** 04/07/21

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: 6.2 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.

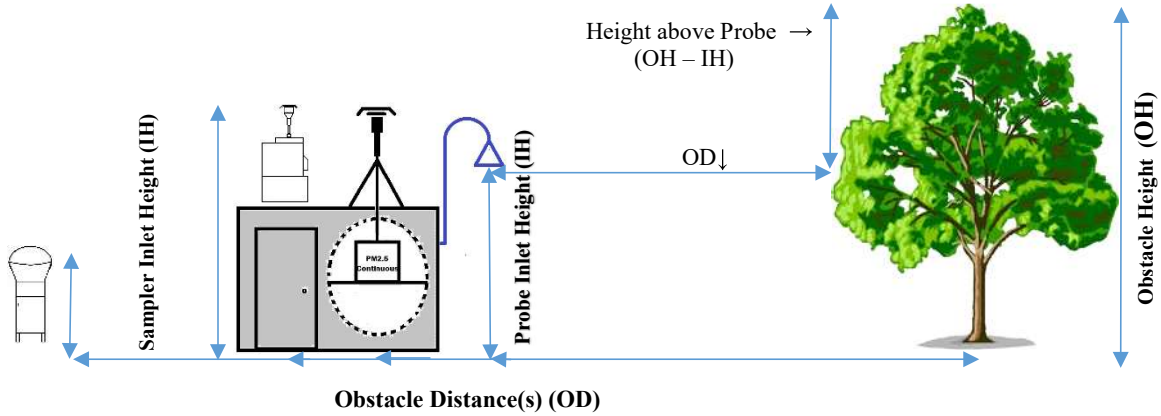
MSEF: Local Site Name: Kingport O3 **Initials:** EMH **Date:** 04/07/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/14/15

MSEF: Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 04/07/21

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	Shrubs	6.0	4.2	3.6	12.0	☐	147
2	Shrubs	3.9	4.2	NA	12.0	☐	196
3	Tree	7.0	4.2	5.6	21.3	☐	287
4	School	9.4	4.2	10.4	30.5	☐	3.6
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: Kingsport O3 **Initials:** EMH **Date:** 04/07/21

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

21.3 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

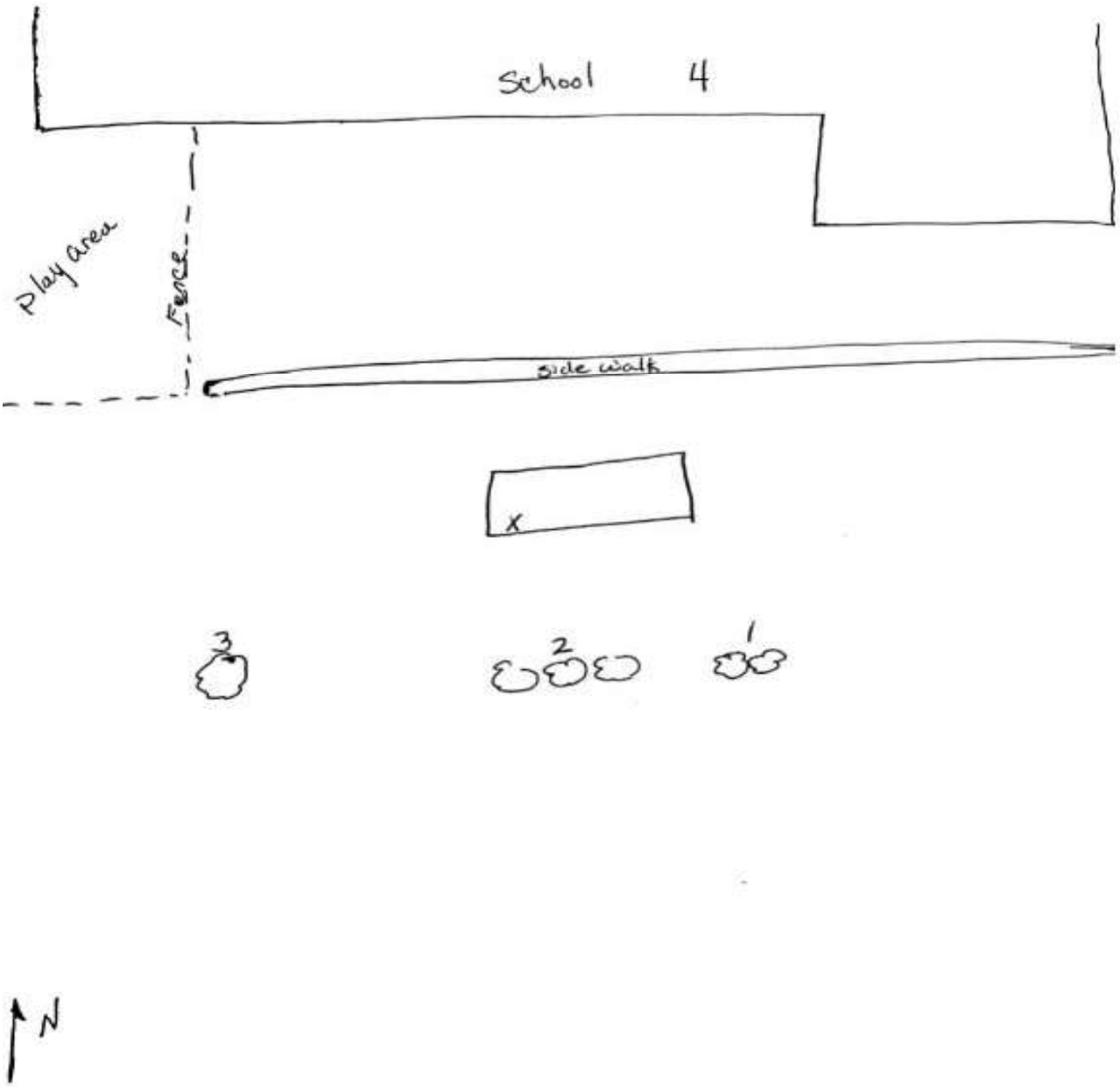
Additional Information:

Two shrubs are taller than the height of the probe and 12.0 meters from the probe. The distance from the shrubs to the probe is greater that 2 times [Object height minus Inlet Height (3.6 meters)]. The shrubs are not considered obstacles.

MSEF : Local Site Name: Kingsport O3 **Initials:** EMH **Date:** 04/07/21

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:** 04/07/21

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

Photo: 001 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 04/07/21 **Time:** 12:00 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 04/07/21 Time: 12:00 pm Photographer: EMH Description: Probes

Photo: 011 **Date:** 04/07/21 **Time:** 12:00 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)
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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

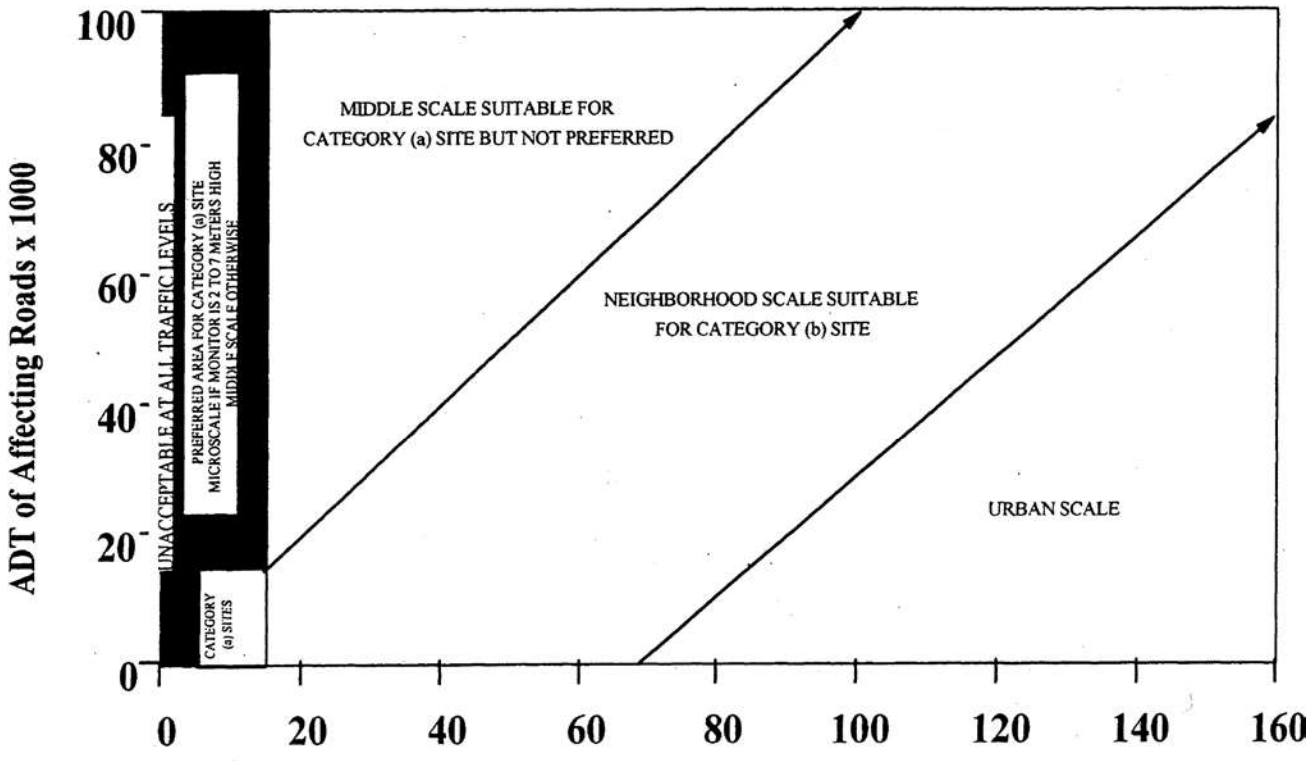

Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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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.

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Strip Chart: Is the operator proficient at retrieving and viewing the strip chart?
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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: 04/07/21 **Location:** Bristol, Tennessee

AQS Number: 47- 163 - 3004

Site Name: Exide PB **Pollutants:** Pb

Print Name / Signature / Initials / Duties

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

2:_____

Air Monitoring Site Evaluation Summary

Local Site Name: Exide Pb **Initials:** EMH **Date:** 04/07/21

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
Exide Drive	212.8 m	South	Local Street	6039	2020
Red Deer Road	122.4 m	Southwest	Local Street	NA	NA
Edison CIrcle	5.8 m	Southwest	Local Street	NA	NA

Electrical

Utilities Company: Appalachian Electric Power Meter #: 45938

Additional Comments:

1. Arrival, departure and photos times are Eastern Standard.
2. Electricity for the monitors was supplied by the facility. When the Exide facility was turned over to a Trust, the electricity to the facility was shut off and APC installed a new electric meter.
3. QAPP and SOPs are available electronically via the operator's tablet. eSIMS (APC's electronic logbook) is available the same way as the QAPP and SOPs.
4. Both Tisch Hi-Vol monitors do not have serial numbers.
5. Steps need to be replaced. The top stop is rotten in some spots enough to be unsafe.
6. See comments on page 7 about site meeting EPA siting criteria.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Exide Pb **Initials:** EMH **Date:** 04/07/21

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

Arrival Time: 8:35 am **Departure Time:** 9:25 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: _____

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	Tisch	Hi-vol	NA
PB	Tisch	Hi-vol	NA

MSEF: Local Site Name: Exide Pb **Initials:** EMH **Date:** 04/07/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup

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)
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 (Poc 1)	2.0	Ground	2.3		Urban	Urban
PB (Poc 2)	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.

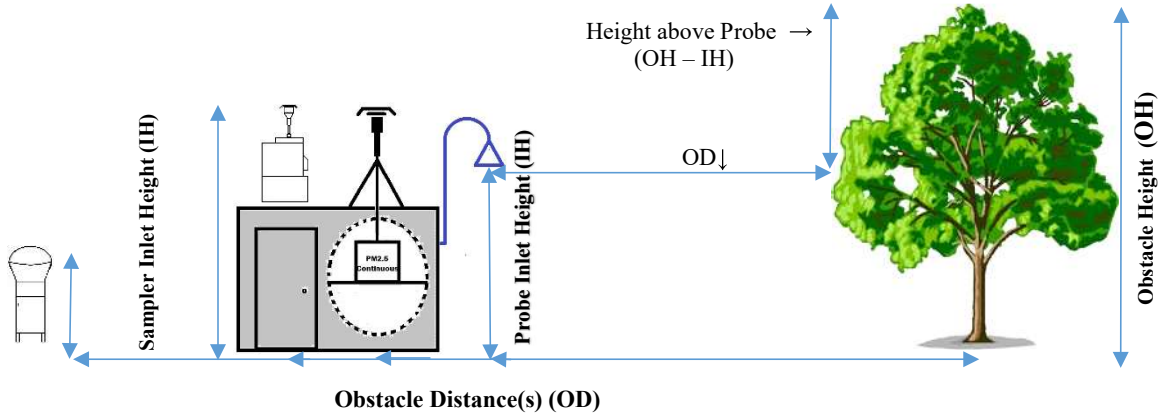
MSEF: Local Site Name: Exide Pb **Initials:** EMH **Date:** 04/07/21

Aerial Photo with Wind Rose

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

MSEF: Local Site Name: Exide Pb **Initials:** EMH **Date:** 04/07/21

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	5.0	2.0	6.0	50.0	☐	338
2	Trees	13.3	2.0	22.6	44.0	☐	315
3	Trees	12.5	2.0	21.2	36.5	☐	310
4	Trees	15.0	2.0	26.0	36.5	✓	282
5	Trees	13.5	2.0	23.0	20.0	✓	226
6	Trees	12.5	2.0	21.0	30.0	☐	173
7	Exide Plant	15.6	2.0	27.2	157.0	☐	80
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: Exide Pb **Initials:** EMH **Date:** 04/07/21

TREE DRIPLINE(s): 14.0 **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 hard wood trees (Object #5) are the closest trees within the treeline located west of the monitors. The closest trees have a dripline of 14.0 meters from the monitors.

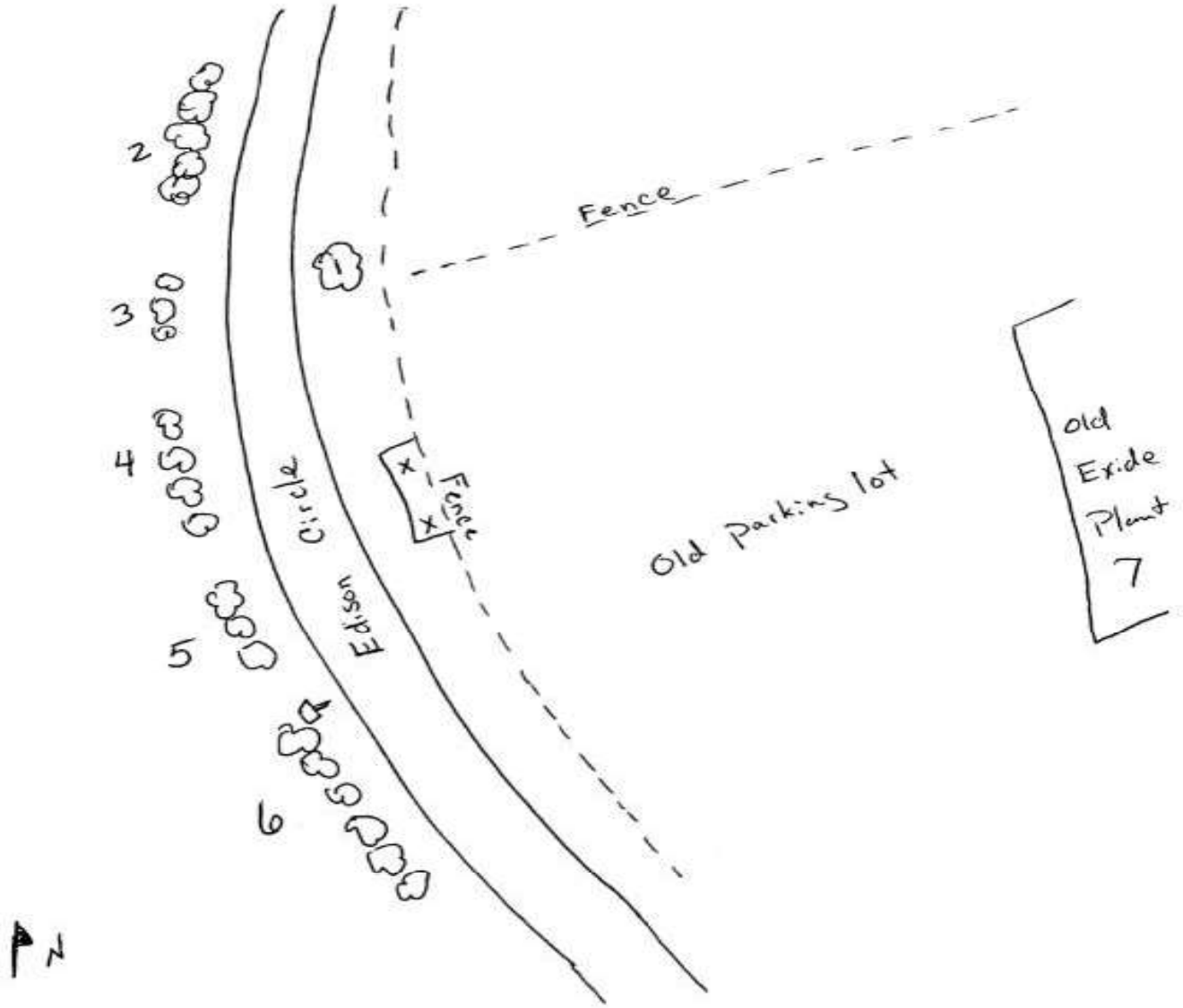
Objects 4 and 5 are considered obstacles. Object 4 are the pine trees starting on the left side of the four short pine trees (Object #3) and Object 5 are the hardwoods ends with the pine trees that fall southwest of the "No Parking on Shoulder" sign.

The Exide site is only APC air monitoring site that is point - source oriented. The Exide facility is located approximately 150 meters east of monitors. Objects 4 and 5 are located in the treeline on the opposite side of Edison Circle and the west of side of the Exide air monitoring site. These obstacles fall outside the 180 degrees arc between the Exide facilty and the lead monitors. Therefore the site meets siting criteria.

MSEF : Local Site Name: Exide Pb **Initials:** EMH **Date:** 04/07/21

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:** 04/07/21

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

Photo: 001 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: North Directional

Photo: 002 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: East Directional

Photo: 004 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: South Directional

Photo: 006 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: West Directional

Photo: 008 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 04/07/21 **Time:** 9:15 am **Photographer:** EMH **Description:** Site

Photo: 010 Date: 04/07/21 Time: 9:15 am Photographer: EMH Description: Monitors

Photo: 011 **Date:** 04/07/21 **Time:** 9:15 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

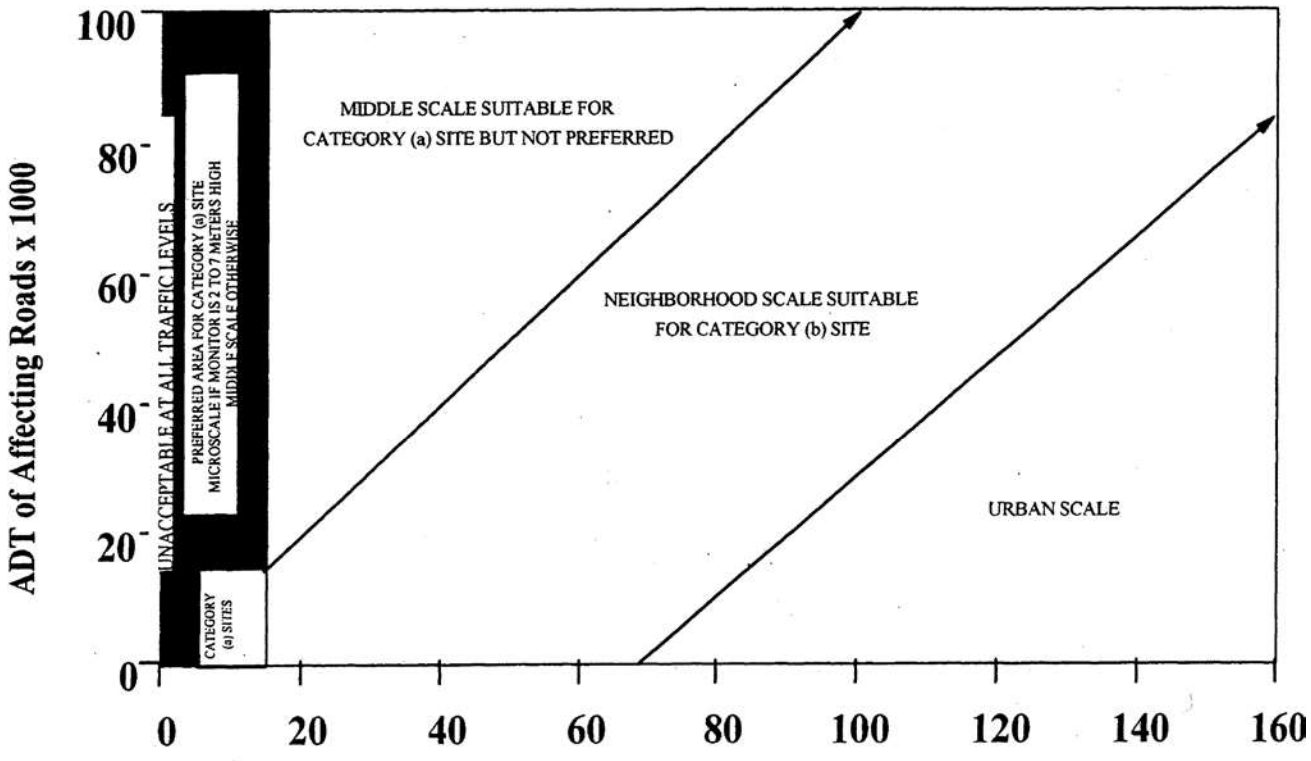


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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.

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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?

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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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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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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.

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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: 04/07/2021
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:** 04/07/2021

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
Wilburn Drive	37.5 m	South	Local Street	NA	NA
East Center Street	91.0 m	East	Local Street	13055	2020
Memorial Blouvard	160.8 m	South	Local Street	7001	2020

Electrical

Utilities Company: Appalachian Electric Power Meter #: 789183326

Additional Comments:

1. Arrival, departure and photo times are Eastern Standard time.
2. Temperature inside shelter was 74 degrees F.
3. Fire extinguisher is in good condition.
4. Shelter is bolted down to cement pad.
5. QAPP and SOPs are available electronically via the operator's tablet and the Agilaire 8872. eSIMS (APC's electronic logbook) is also available electronically the same ways as the QAPP and SOPs. A hard copy logbook is available on site in case the operator cannot access Esims.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman RNR **Initials:** EMH **Date:** 04/07/21

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

Arrival Time: 1:25 pm **Departure Time:** 2:10 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: While most of the area is paved or rock, a small strip inside the fence needs some weedeating.

SHELTER - □ Not Present

Interior

Arrival Temperature: 21.4 **°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: While most of the area is paved or rock, a small strip inside the fence needs some weedeating.

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:** 04/07/21

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

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	T100	3210

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	2596	12/14/20	06/14/21

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	02/05/23	15 ppm + 1.1 %	JJ27921

Issues: _____

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 04/07/21

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:** _____ **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 06/30/21

[■ 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:** 04/07/21

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: 6.6 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.

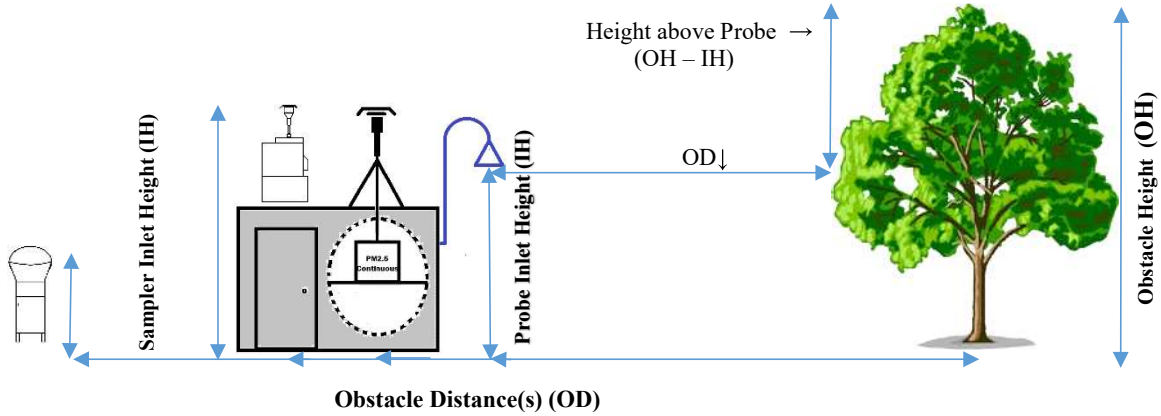
MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 04/07/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/14/15

MSEF: Local Site Name: Eastman RNR **Initials:** EMH **Date:** 04/07/21

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	4.2	3.2	2.0	24.5	☐	360
2	Trees	17.4	3.2	28.4	48.5	☐	46
3	Building	2.2	3.2	NA	5.0	☐	62
4	Tree	11.0	3.2	15.6	43.2	☐	51
5	Tree	9.2	3.2	12.0	48.0	☐	68
6	Building	7.0	3.2	7.6	71.4	☐	132
7	Shed	3.4	3.2	0.4	17.5	☐	302
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:** 04/07/21

TREE DRIPLINE(s): 43.2 **meters** (nearest inlet to dripline) □ **No Trees Present**

48.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

Additional Information:

Closest tree is > 20 meters from the probe; no dripline issues.

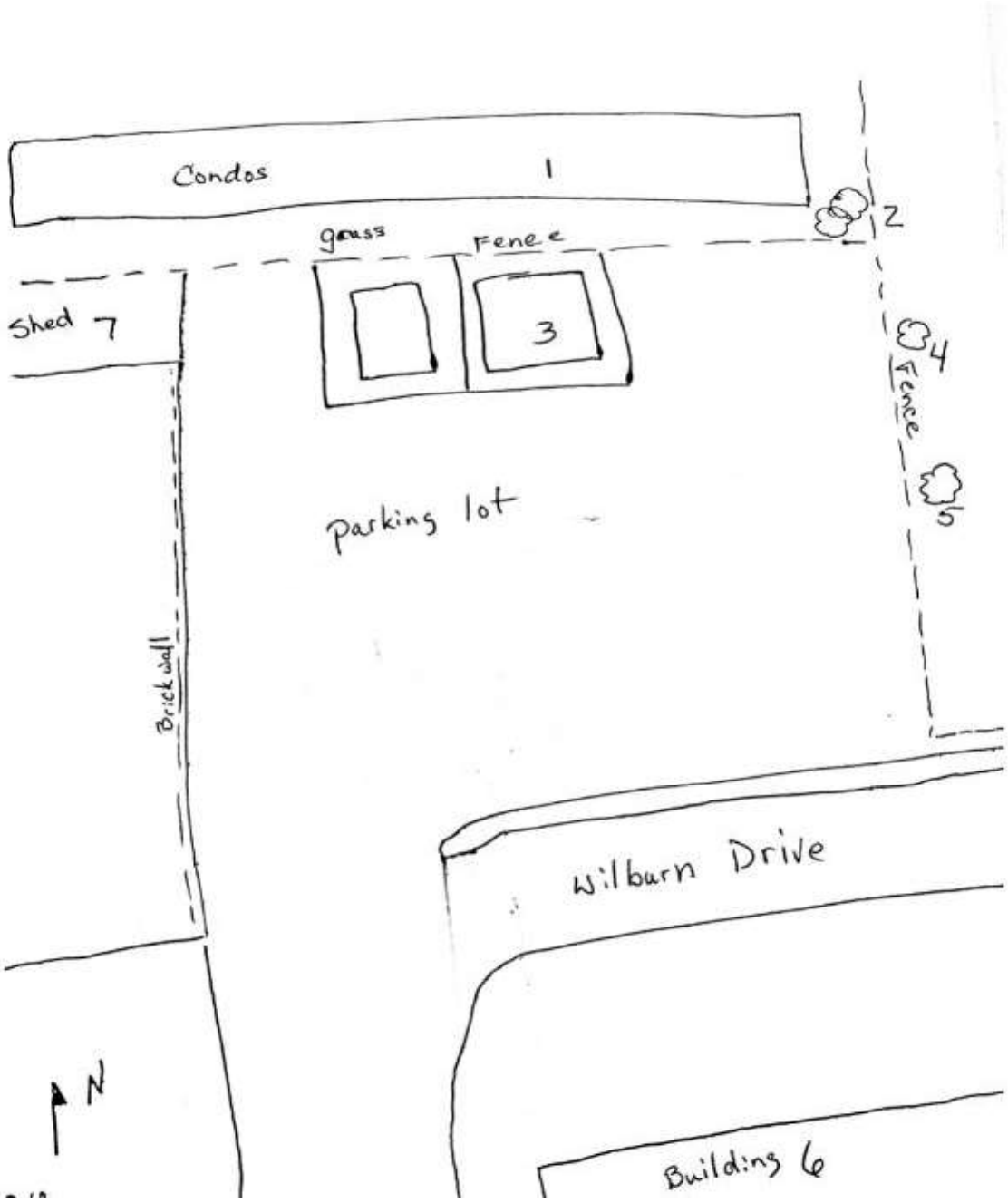
Distance between probe and Eastman monitor is 5.0 meters.

Distance between utility pole and probe is 2.3 meters.

MSEF : Local Site Name: Eastman RNR **Initials:** EMH **Date:** 04/07/21

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:** 04/07/21

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

Photo: 001 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 04/07/21 **Time:** 1:55 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 04/07/21 Time: 1:55 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 04/08/21 **Time:** 1:55 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

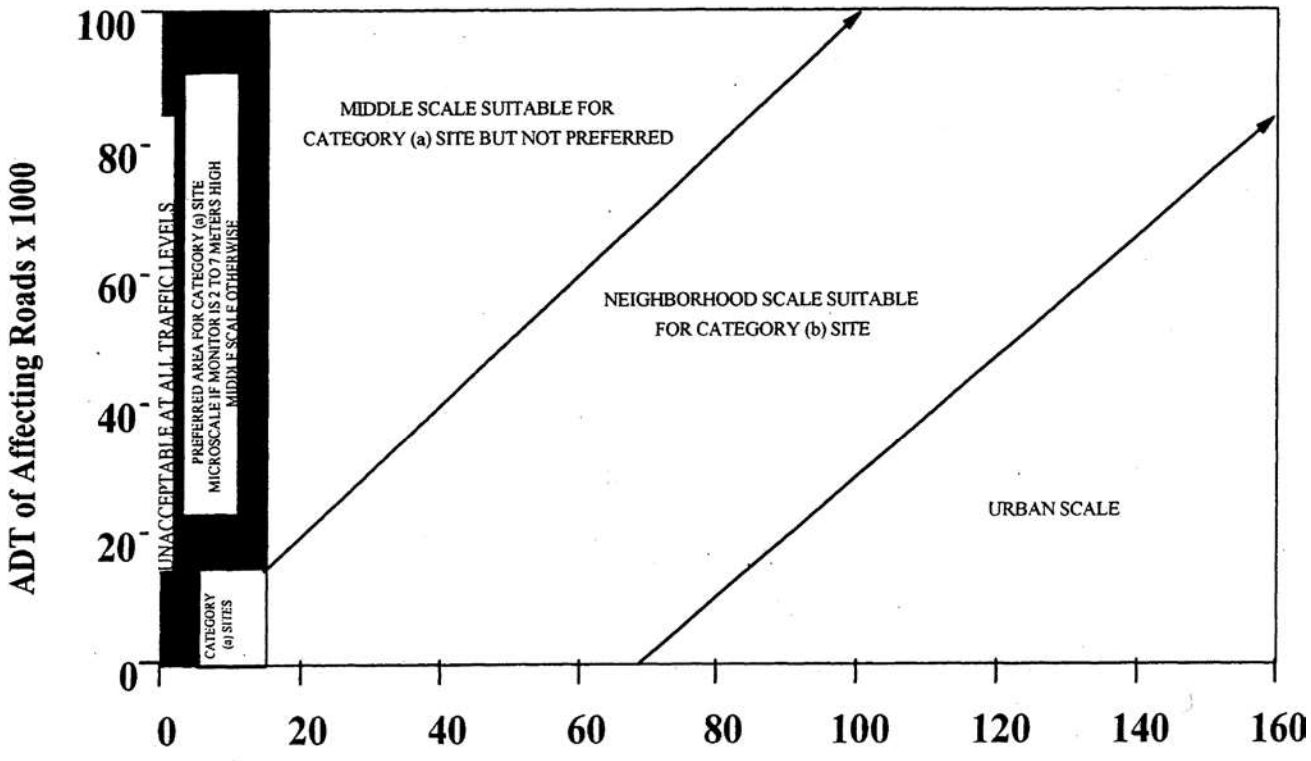


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 04/07/2021
AQS Number: 47 - 163 - 6002
Site Name: Eastman Skyland

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 Skyland **Initials:** EMH **Date:** 04/07/2021

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	Northwest	Local Street	NA	NA
Bagwell Street	25.1 m	South	Local Street	NA	NA
Cooks Valley Road	577.6 m	Southeast	Local Street	67	2020
Memorial Blouvard	943.6 m	North	Local Street	16184	2020
East Line Drive	512.0 m	West	Local Street	838	2020

Electrical

Utilities Company: Appalachian Electric Power Meter #: 73191035

Additional Comments:

1. Arrival, departure and photo times are Eastern Standard time.
2. QAPP and SOPs are available electronically on the operator's tablet or Agilaire 8872.

eSIMS (APC's electronic logbook) is available electronically the same way as the QAPP and SOPs.

A hardcopy logbook is available on site in case the operator cannot access eSIMS.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Skyland **Initials:** EMH **Date:** 04/07/21

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

Arrival Time: 10:25 am **Departure Time:** 11:25 am **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: 24.2 **°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: 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 **Initials:** EMH **Date:** 04/07/21

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

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	T100	3212

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	1432	12/09/20	06/09/21

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	1500	02/05/23	15.1 ppm + 1.1 %	JJ13861

Issues: _____

MSEF: Local Site Name: Eastman Skyland **Initials:** EMH **Date:** 04/07/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R94120251011016	Modem	Main
Agilaire	8872	465	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:** _____ **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 08/25/20

[■ 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 **Initials:** EMH **Date:** 04/07/21

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: 16.5 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.

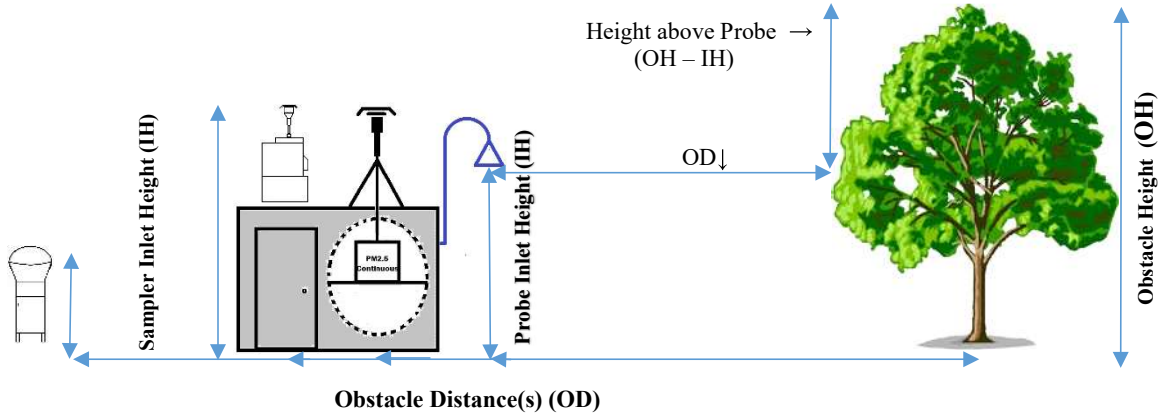
MSEF: Local Site Name: Eastman Skyland **Initials:** EMH **Date:** 04/07/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/14/15

MSEF: Local Site Name: Eastman Skyland **Initials:** EMH **Date:** 04/07/21

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	4.6	12.0	NA	37.9	☐	52
2	Water Tower	18.8	12.0	13.6	11.5	☑	346
3	Tree	12.0	12.0	0	23.0	☐	287
4	House	5.0	12.0	NA	39.0	☐	241
5	Tree	6.4	12.0	NA	22.6	☐	201
6	Trees	19.0	12.0	14.0	28.0	☐	146
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 **Initials:** EMH **Date:** 04/07/21

TREE DRIPLINE(s): 22.6 **meters** (nearest inlet to dripline) ☐ **No Trees Present**

23.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

Additional Information:

Closest tree is > 20 meters from tower; no dripline issues

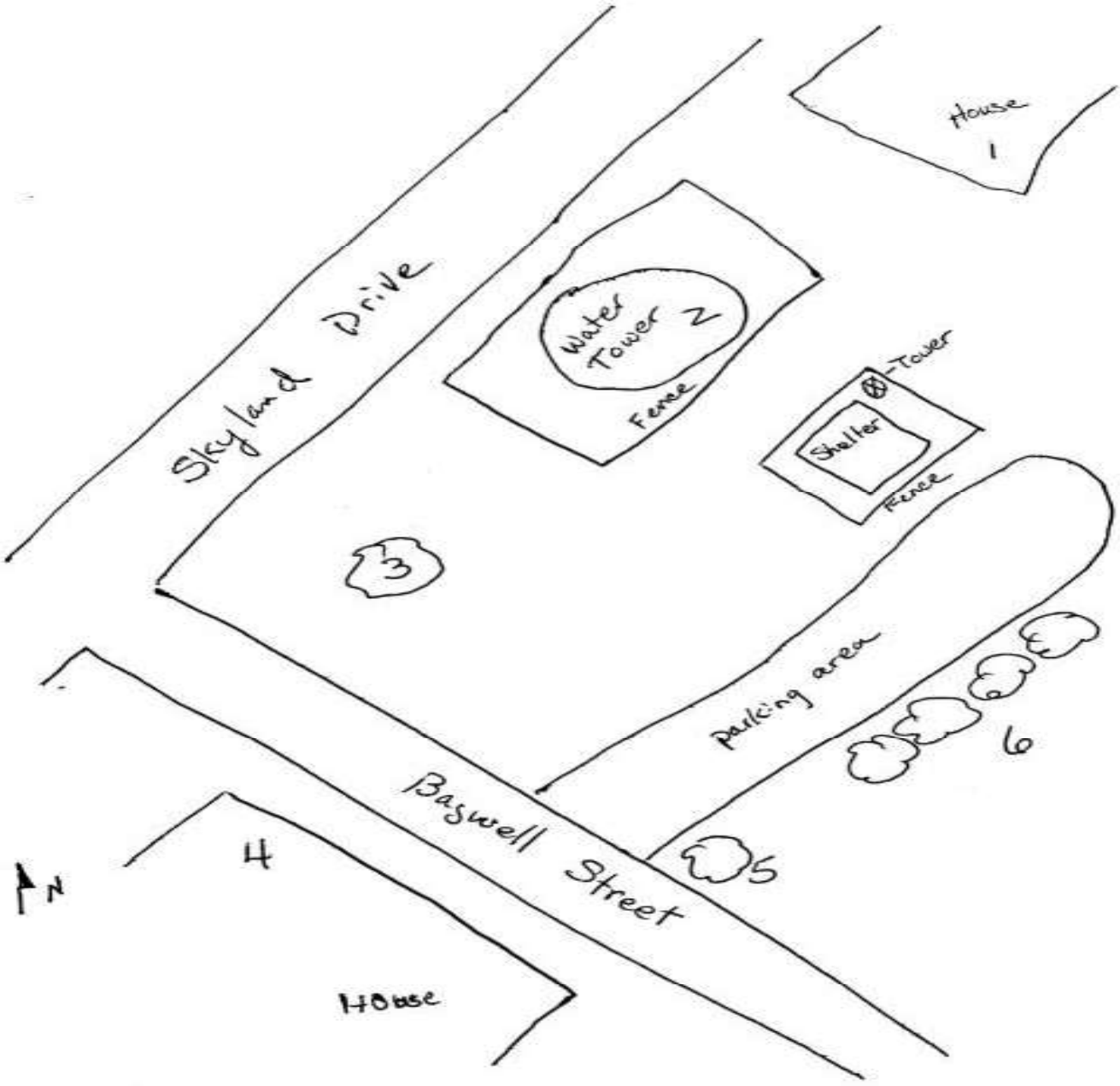
Water tower (Object #2) is an obstacle but falls within one 90 degrees quadrant.

Therefore meets the >270 degrees of unrestricted air flow around probe.

MSEF : Local Site Name: Eastman Skyland **Initials:** EMH **Date:** 04/07/21

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 **Initials:** EMH **Date:** 04/07/21

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

Photo: 001 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 04/07/21 **Time:** 11:15 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 04/07/21 Time: 11:15 pm Photographer: EMH Description: Tower

Photo: 011 **Date:** 04/07/21 **Time:** 11:15 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

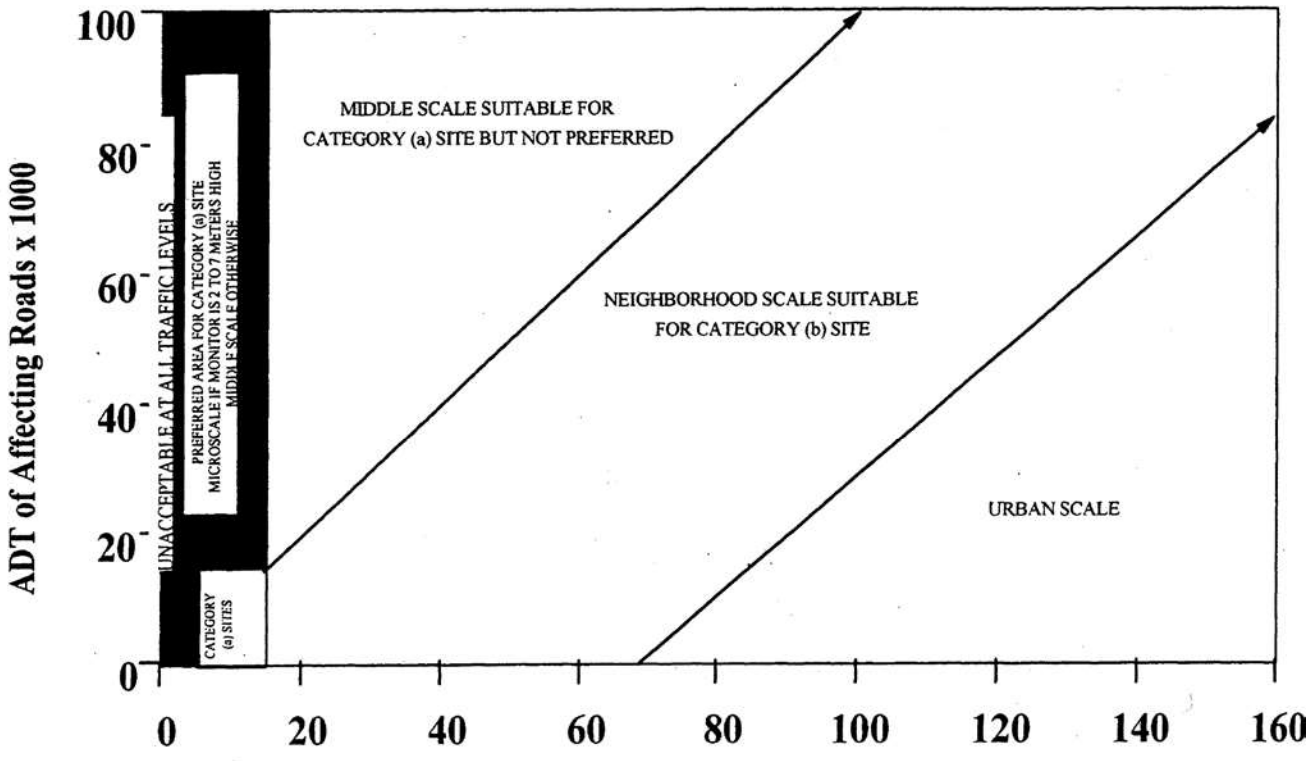


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 10/08/2020 **Location:** Kingsport, Tennessee

AQS Number: 47 - 163 - 6003

Site Name: Eastman Andrew Johnson **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 **Initials:** EMH **Date:** 10/08/2020

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	North	Local Street	NA	NA
East Sevier Avenue	159.0 m	West	Local Street	NA	NA
Montrose Street	21.0 m	East	Local Street	NA	NA
Bruce Street	9.0 m	East	Local Street	NA	NA
Konnarock Road	388.0 m	S to SW	Local Street	4012	2020
North Eastman Road	510.0 m	North	Local Street	8242	2020
Sherwood Road	280.0 m	East	Local Street	1268	2020

Electrical

Utilities Company: Appalachian Electric Power Meter #: 780 269 931

Additional Comments:

1. Montrose Street and Bruce Street were measured with measuring wheel. All other streets were measured with Google Earth Pro.
2. Arrival, departure, and photo times are in Eastern Standard time.
3. Fire extinguisher is in good condition.
4. Shelter is bolted down to concrete pad.
5. Records: QAPP and SOPs are available via electronically via the operator's tablet or Agilaire 8872. eSIMs (APC's electronic logbook) is also via electronically via the operator's tablet or Agilaire 8872. A hardcopy logbook is on site in case the operator cannot access eSIMs.
6. Vendor of SO2 cylinder is Praxair.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Andrew Johnson **Initials:** EMH **Date:** 10/08/20

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

Arrival Time: 9:35 am **Departure Time:** 10:15 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: 21.7 **°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 **Initials:** EMH **Date:** 10/08/20

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

Monitor(s)	Manufacturer	Model	Serial Number
SO2	Teledyne	T100	4301

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	08/31/20	03/30/21

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	1025	01/27/22	26.6	JJ13225

Issues: _____

MSEF: Local Site Name: Eastman Andrew Johnson **Initials:** EMH **Date:** 10/08/20

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven R55	2R93610083011016	Modem	Main
Agilaire	8872	8872	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# 1349

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** _____ **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 11/18/20

[■ 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 **Initials:** EMH **Date:** 10/08/20

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: 7.2 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.

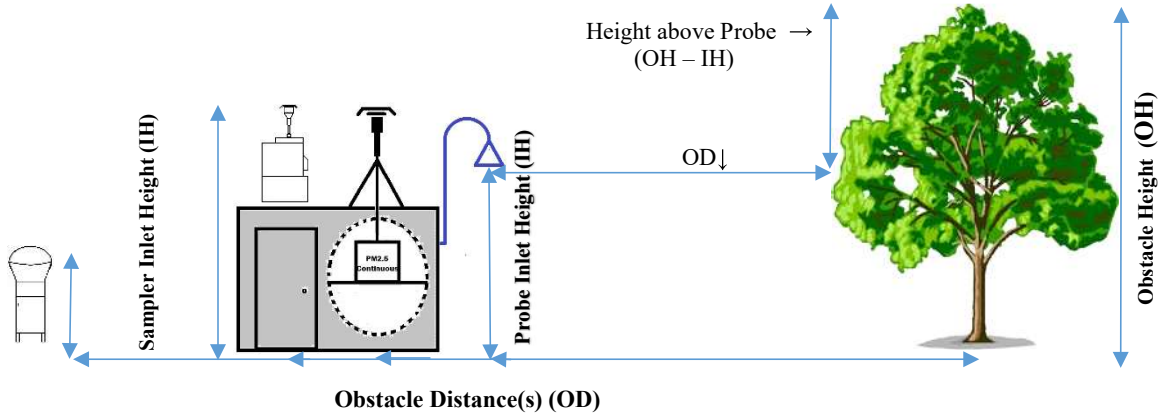
MSEF: Local Site Name: Eastman Andrew Johnson **Initials:** EMH **Date:** 10/08/20

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 12/13/15

MSEF: Local Site Name: Eastman Andrew Johnson **Initials:** EMH **Date:** 10/08/20

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	5.0	4.8	0.4	35.5	☐	127
2	House	5.2	4.8	0.8	36.3	☐	24
3	Tree	6.8	4.8	4.0	42.0	☐	27
4	Tree	20.0	4.8	30.4	61.0	☐	27
5	Tree	18.9	4.8	28.2	59.5	☐	6
6	Trees	19.0	4.8	28.4	98.0	☐	2
7	Trees	22.0	4.8	34.4	124.0	☐	350
8	School	5.4	4.8	1.2	145.0	☐	333
9	Trees	22.0	4.8	34.4	133.0	☐	323
10	Trees	22.5	4.8	35.4	54.0	☐	199
11	Tree	20.0	4.8	30.4	43.0	☐	192
12	Tree	20.6	43.8	31.6	26.5	☑	176
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 **Initials:** EMH **Date:** 10/08/20

TREE DRIPLINE(s): 26.5 **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: None. Closest tree is 26.5 meters from probe.

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

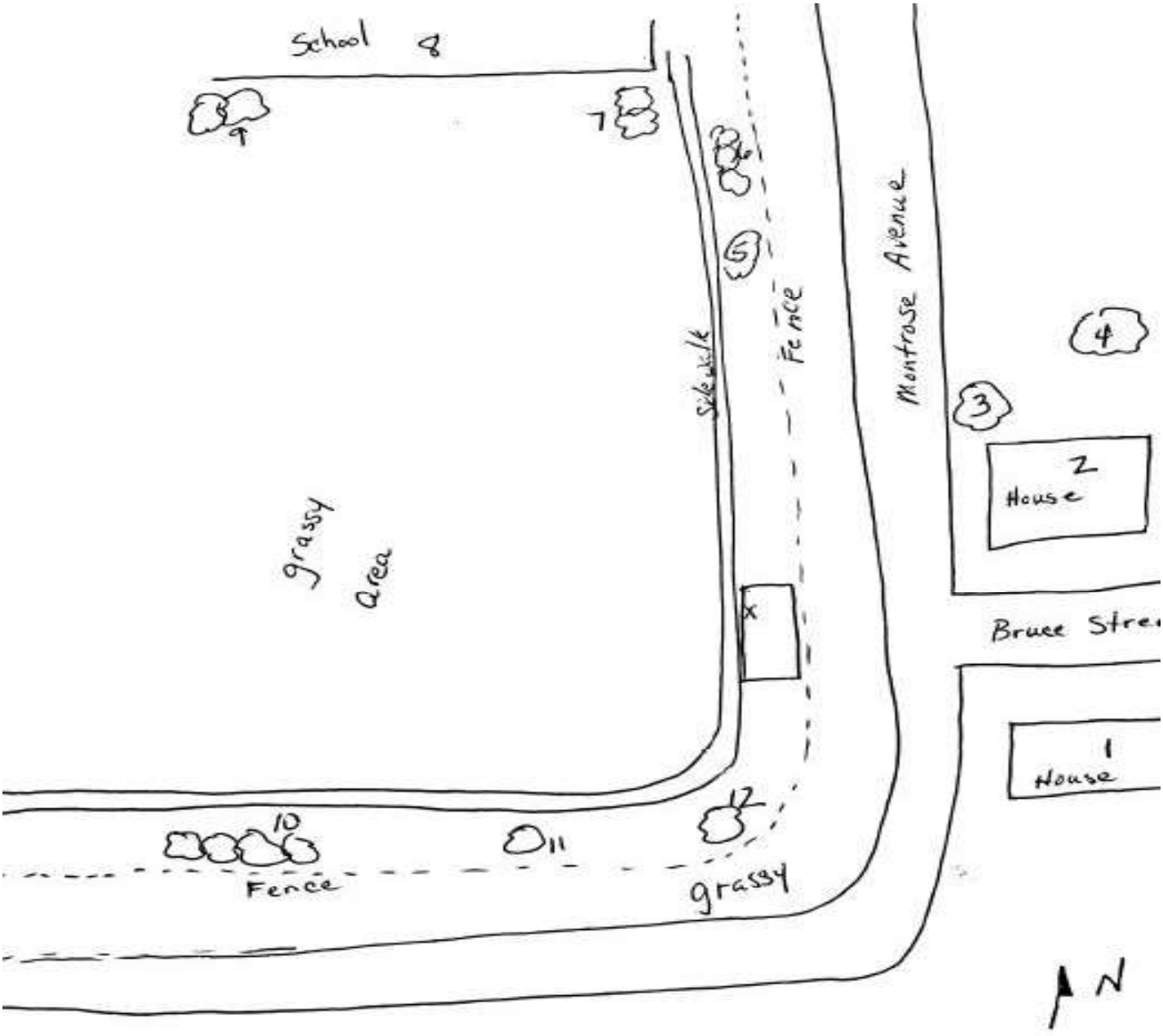
Additional Information:

1. Probe height was measured from ground level to probe.
2. One tree (Object #12) is an obstacle and fall within one 90 degree quandrant. There is greater than 270 degrees of unrestricted airflow around the probe.

MSEF : Local Site Name: Eastman Andrew Johnson **Initials:** EMH **Date:** 10/08/20

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 **Initials:** EMH **Date:** 10/08/20

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

Photo: 001 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: North Directional

Photo: 002 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: East Directional

Photo: 004 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: South Directional

Photo: 006 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: West Directional

Photo: 008 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 10/08/20 **Time:** 10:00 am **Photographer:** EMH **Description:** Site from North

Photo: 010 Date: 10/08/20 Time: 10:00 am Photographer: EMH Description: Site from Northeast

Photo: 011 **Date:** 10/08/20 **Time:** 10:00 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

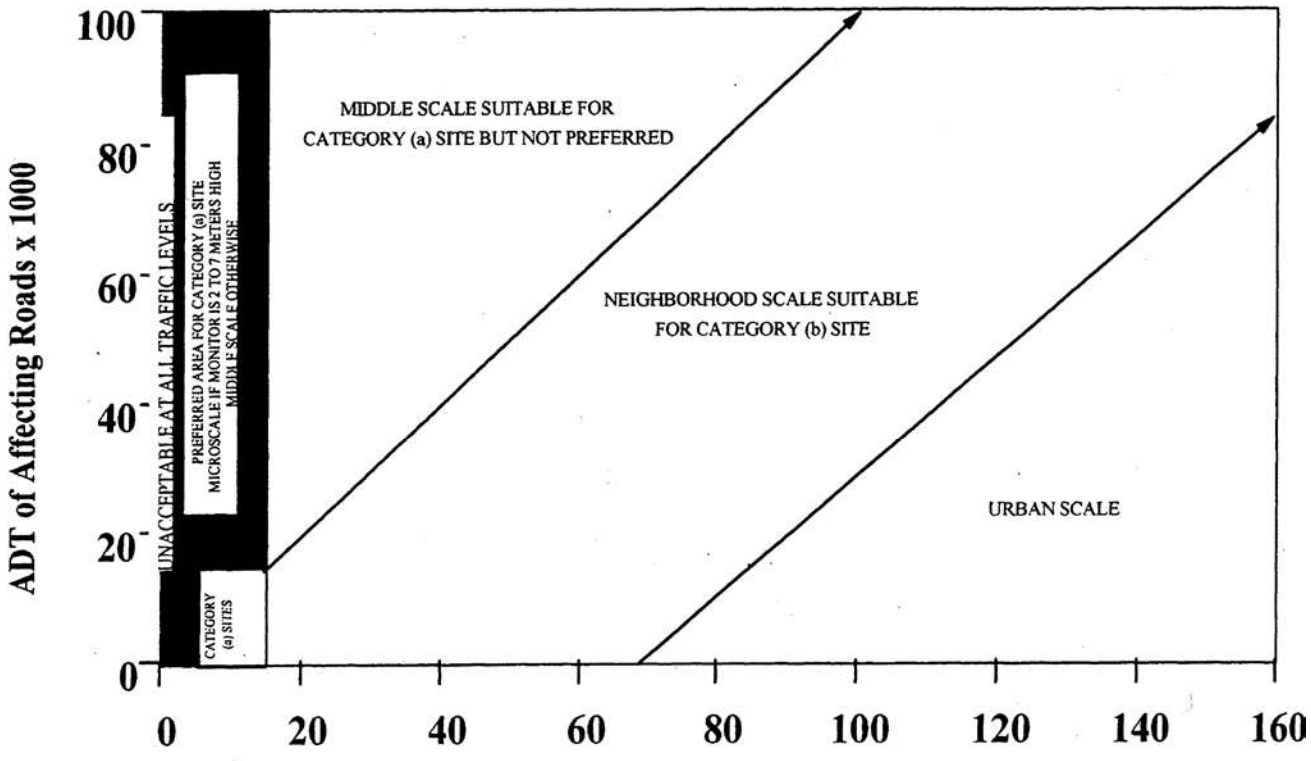


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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: 10/08/2020
AQS Number: 47 - 163 - 6004
Site Name: Eastman Happy Hill

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 Happy Hill **Initials:** EMH **Date:** 10/08/2020

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	Northeast	Local Street	NA	NA
South Eastman Road	648.0 m	Northwest	Local Street	525	2020
Mooreland Road	168.0 m	Northeast	Local Street	480	2020

Electrical

Utilities Company: Appalachian Electric Power Meter #: 783 184 544

Additional Comments:

1. Arrival, departure, and photo times are Eastern Standard time.
2. Shelter temperature is 68 degrees Fahrenheit.
3. Fire extinguisher (Aug 2018) - good condition
4. Records: QAPP and SOPs are available electronically via the operator's tablet or Agilaire 8872 datalogger. eSIMs (APC's electronic logbook) is available electronically via the operator's tablet or 8872. A hardcopy logbook is located on site in case the operator cannot access eSIMs.
5. The vendor of the SO2 cylinder is Praxair.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Eastman Happy Hill **Initials:** EMH **Date:** 10/08/20

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

Arrival Time: 8:05 am **Departure Time:** 9:15 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: 20.6 **°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 **Initials:** EMH **Date:** 10/08/20

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	3513	08/20/20	02/20/21

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	1300	02/05/23	15.1	JJ13627

Issues: _____

MSEF: Local Site Name: Eastman Happy Hill **Initials:** EMH **Date:** 10/08/20

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Verizon	Raven R55	2R9361026911016	Modem	Main
Agilaire	8872	494	Data logger	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:** _____ **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 08/26/20

[■ 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 **Initials:** EMH **Date:** 10/08/20

PROBE SYSTEM(s): External □ **Not Present**

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

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

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

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

Issue(s): _____

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

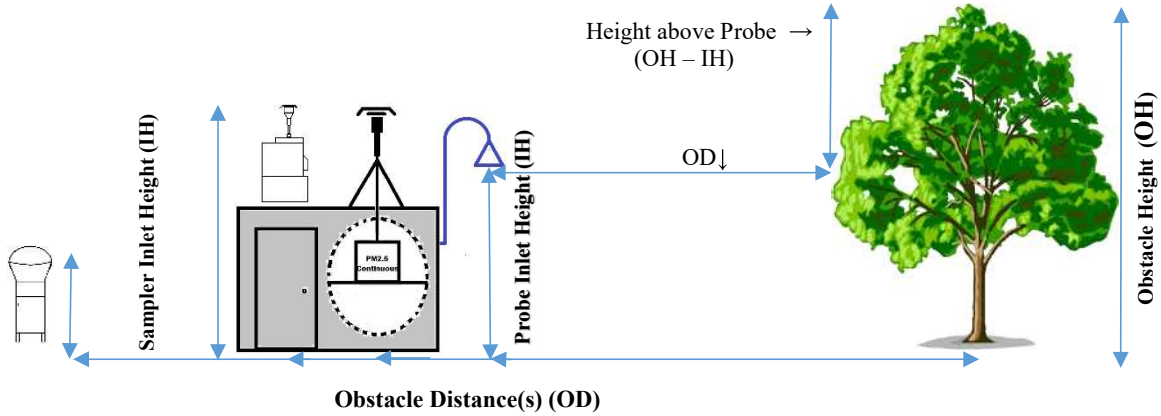
MSEF: Local Site Name: Eastman Happy Hill **Initials:** EMH **Date:** 10/08/20

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 12/13/15

MSEF: Local Site Name: Eastman Happy Hill **Initials:** EMH **Date:** 10/08/20

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	3.6	11.0	NA	61.3		15
2	Tree	17.8	11.0	13.6	65.5		14
3	Tree	10.5	11.0	NA	30.5		3
4	Tree	10.0	11.0	NA	19.6		343
5	Tree	17.1	11.0	12.2	29.0		325
6	Trees	17.1	11.0	12.2	19.0		294
7	Tree	2.9	11.0	NA	6.6		282
8	Trees	2.3	11.0	NA	4.9		211
9	Trees	4.0	11.0	NA	7.9		159
10	Tree	19.6	11.0	17.2	39.0		150
11	Trees	16.2	11.0	10.4	75.0		150
12	Tree	15.0	11.0	8.0	32.0		68
13	Trees	19.9	11.0	17.8	54.7		51
14	Barn	8.2	11.0	NA	12.4		67
15	House	7.6	11.0	NA	48.0		29
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 **Initials:** EMH **Date:** 10/08/20

TREE DRIPLINE(s): 19.0 **meters** (nearest inlet to dripline) □ **No Trees Present**

19.6 **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: Trees northwest of probe are less than 20 m but greater than 10 meters

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

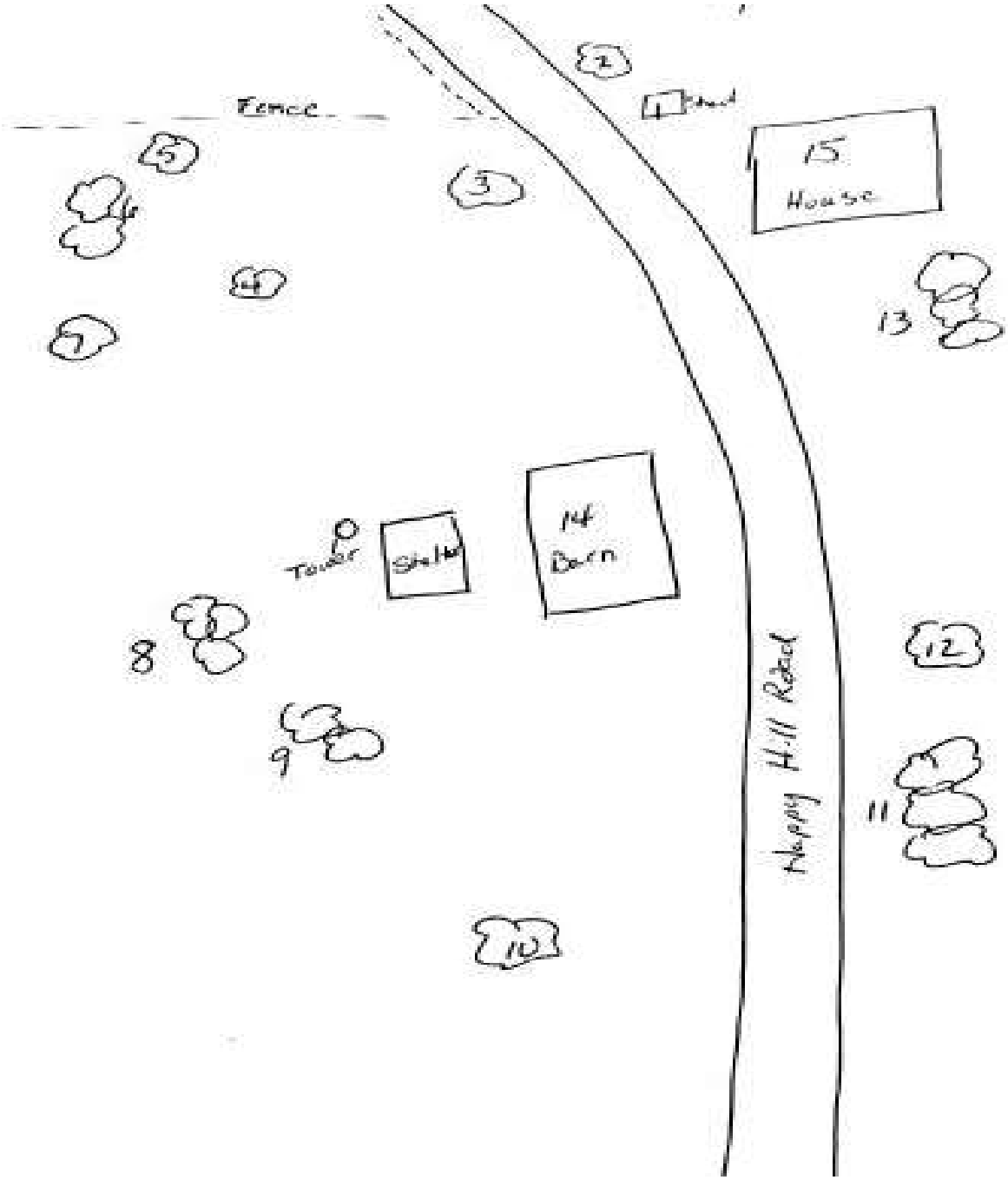
Additional Information:

Trees (walnut and hemlock) growing south to southwest of shelter will need to cut back in future

MSEF : Local Site Name: Eastman Happy Hill **Initials:** EMH **Date:** 10/08/20

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 **Initials:** EMH **Date:** 10/08/20

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

Photo: 001 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: North Directional

Photo: 002 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: East Directional

Photo: 004 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: South Directional

Photo: 006 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: West Directional

Photo: 008 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 10/08/20 **Time:** 9:00 am **Photographer:** EMH **Description:** Site with tower

Photo: 010 Date: 10/08/20 Time: 9:00 am Photographer: EMH Description: Electric meter

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

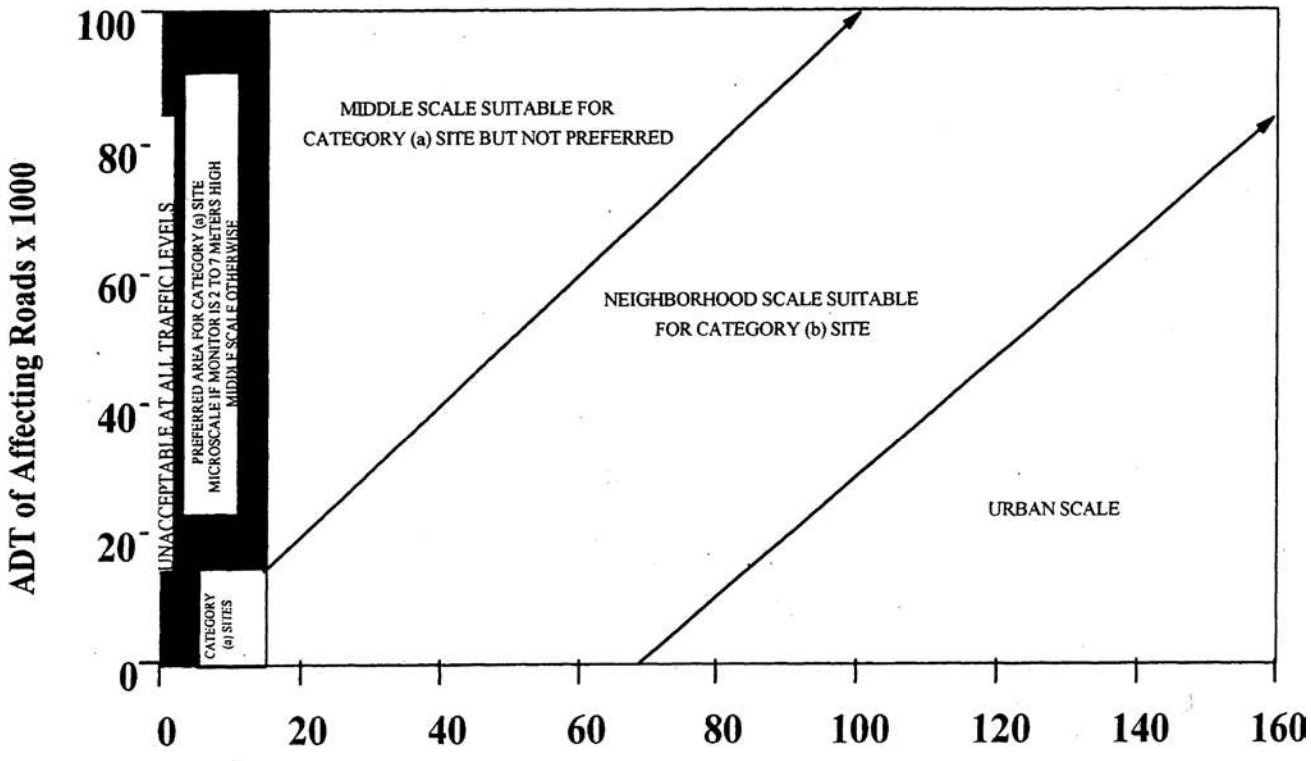


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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?

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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: 03/24/2021
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:** 03/24/2021

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	North	Local Street	NA	NA
Power Plant Road	255.0 m	Northwest	Local Street	NA	NA
Rockland Road	607.5 m	North	Local Street	1815	2020

Electrical

Utilities Company: Nashville Electric System Meter #: 334974

Additional Comments:

1. John Helton is the PM2.5 operator and Ken Cooper is the O3 operator for the Hendersonville site.
2.The temperature inside the shelter is 72 degrees F.
3. The fire extinguisher inside shelter is in good condition.
4. The shelter is bolted down to cement pad.
5. QAPP and SOPs are available electronically via the operators' tablet or the Agilaire 8872.
eSIMS (APC's electronic logbook) is available electronically the same way as the QAPP and SOPs.
Hard copy logbooks are located on site in both PM2.5 monitors in case the operator cannot access eSIMS.
6. Site is located in fenced-in area of the US Corp of Engineers.
7. The Hendersonville site is one of the sites with a multi pollutant experimental sensor tower.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Hendersonville **Initials:** EMH **Date:** 03/24/21

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

Arrival Time: 11:30 am **Departure Time:** 12:25 pm **Primary Operator:** See additional comments

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: 23.7 **°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 Dur-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: Hendersonville **Initials:** EMH **Date:** 03/24/21

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

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	4514
PM2.5	Met One	BAM 1022	W17125
PM2.5	Thermo	2025-i	2025IW212311708

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	330	01/29/21	07/29/21

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:** 03/24/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Raven	R55V	2R94120103021016	Modem	Main
Agilaire	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:** 02/01/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/01/21

[■ 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:** _____

Issue(s): _____

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

Pollutant	Flow (Hi / Lo)	*Separation Distance (meters)
PM2.5	Lo	1.8
PM2.5	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:** 03/24/21

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: 6.2 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	7.9		Urban	Urban
PM2.5 (BAM)	2.6	Ground	1.8		Urban	Urban
PM2.5 (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.

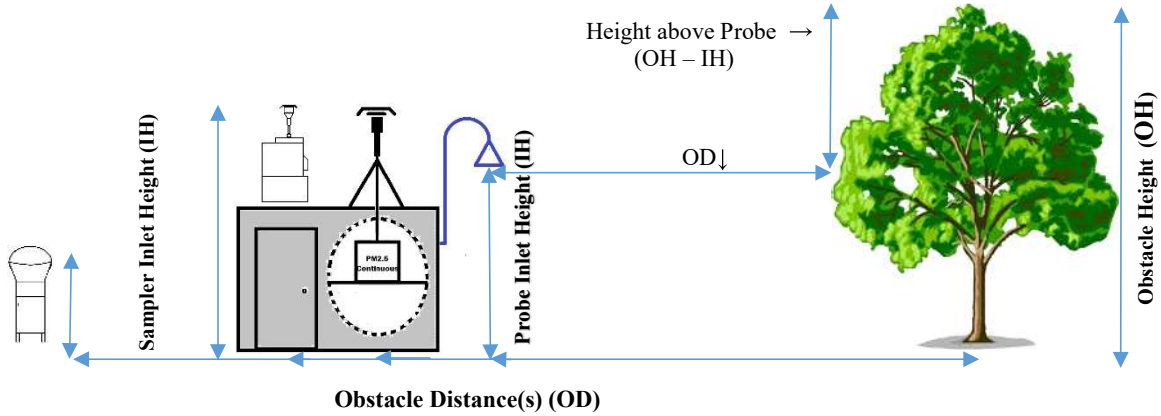
MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 03/24/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 04/19/18

MSEF: Local Site Name: Hendersonville **Initials:** EMH **Date:** 03/24/21

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	31.0	☐	253
2	Trees	10.7	2.6	16.2	44.0	☐	228
3	Tree	14.6	2.6	24.0	42.4	☐	214
4	Tree	10.0	2.6	15.0	43.0	☐	198
5	Shed	4.0	4.2	NA	42.3	☐	97
6	Building	8.5	4.2	8.6	38.3	☐	66
7	Shed	4.3	2.6	3.4	16.9	☐	3
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:** 03/24/21

TREE DRIPLINE(s): 42.3 **meters** (nearest inlet to dripline) □ **No Trees Present**
42.4 **meters** (nearest inlet to dripline) □ Not Present
44.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

Additional Information:

Closest tree is > 20 meters from the closest inlet; no dripline issues.

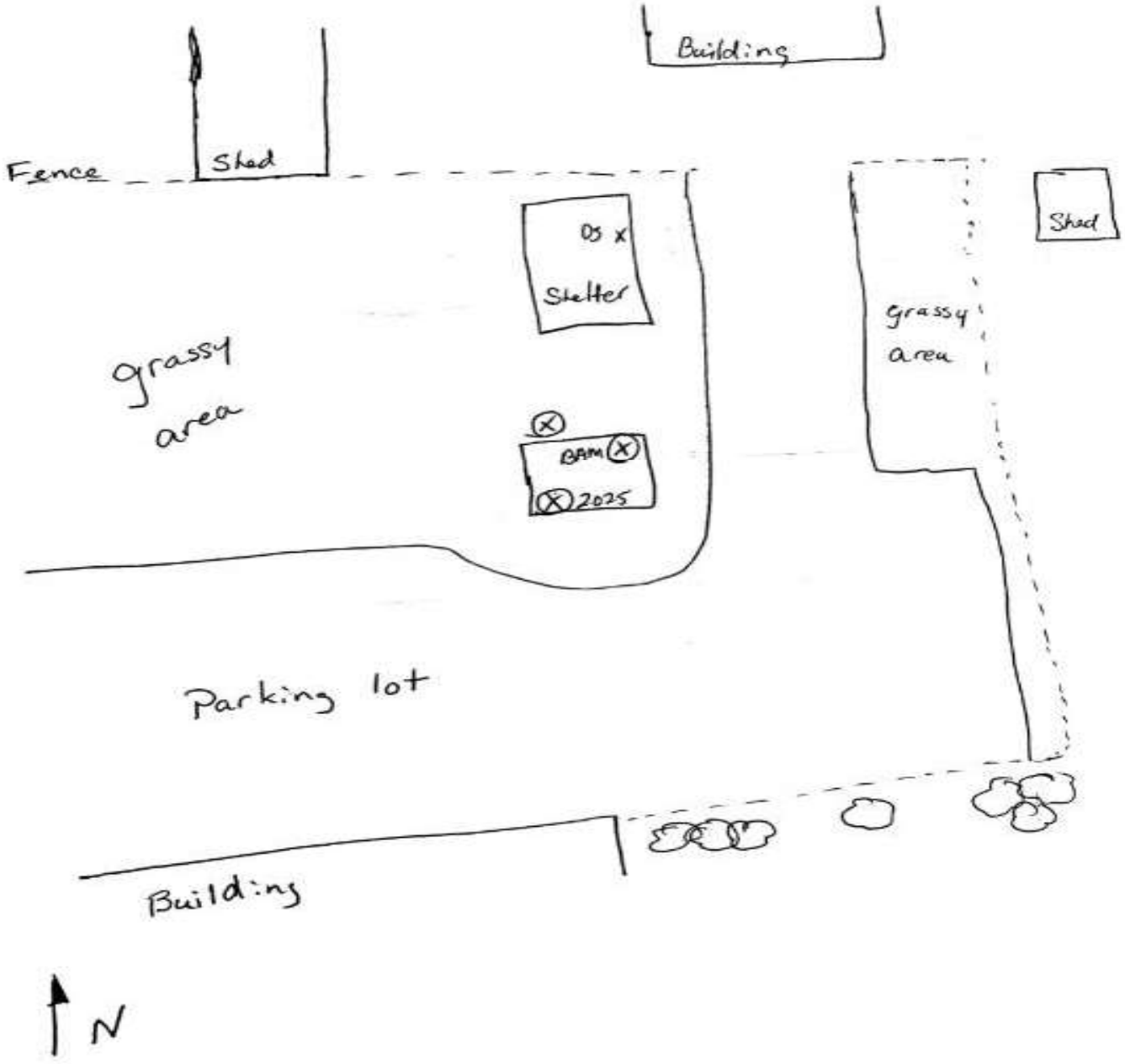
Objects 1, 2, 3 and 4 were measured from the 2025-i monitor. Object 5 and 6 were measured from the O3 probe. Object 7 was measured from BAM monitor.

The distance between the O3 probe and the BAM inlet is 7.9 meters. The distance between the multi pollutant experimental sensor tower and the BAM monitor is 1.6 meters.

MSEF : Local Site Name: Hendersonville **Initials:** EMH **Date:** 03/24/21

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:** 03/24/21

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

Photo: 001 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/24/21 **Time:** 12:10 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/24/21 Time: 12:10 pm Photographer: EMH Description: Shelter with Probe

Photo: 011 **Date:** 03/24/21 **Time:** 12:10 pm **Photographer:** EMH **Description:** Monitors

Photo: 012 Date: 03/24/21 Time: 12:10 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

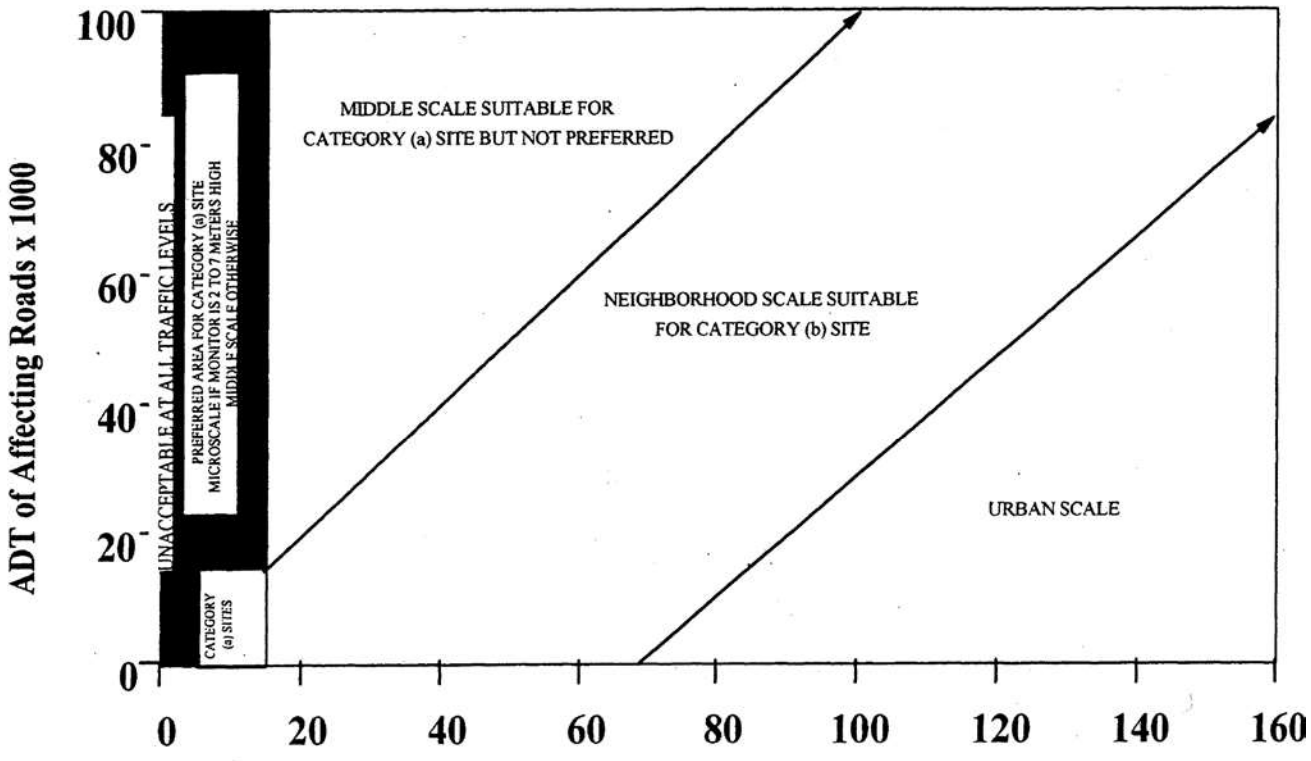


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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
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For a Commercial System: give the make and model
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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: 03/30/2021
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:** 03/30/2021

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	East	Thru Street	NA	NA
Cumberland Drive	401.0 m	North	Local Street	747	2020
Highway 100	432.0 m	West	Local Street	9190	2020

Electrical

Utilities Company: Middle Tennessee Electric Corp. Meter #: 539170

Additional Comments:

1. Distance from unknown service road and probe is 13.0 meters (measured using laser rangefinder.)
2. Distance between probe and utility pole is 2.7 meters.
3. Temperature inside shelter was 74 degrees F.
4. Fire extinguisher is in good condition.
5. Shelter is bolted down to cement pad.
6. QAPP and SOPs are available via the operator's tablet or Agilaire 8872. eSIMS (APC's electronic logbook) is also available the same ways as QAPP and SOPs. A hard copy logbook is on site in case the operator cannot access the eSIMS via electronic modes.
7. Fairview site has an air quality egg sensor for evaluation.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Fairview O3 **Initials:** EMH **Date:** 03/30/21

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:** 12:25 pm **Primary Operator:** Ray Stubblefield

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: 24.4 **°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: Fairview O3 **Initials:** EMH **Date:** 03/30/21

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	644	01/25/21	07/25/21

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:** 03/30/21

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:** 02/12/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/12/21

[■ 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:** 03/30/21

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: 6.2 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			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.

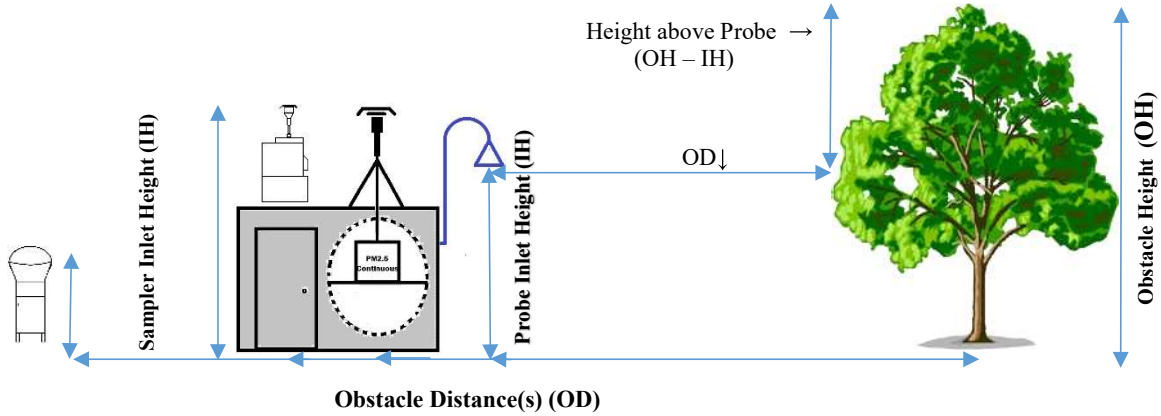
MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 03/30/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/22/19

MSEF: Local Site Name: Fairview O3 **Initials:** EMH **Date:** 03/30/21

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	6.6	4.2	4.8	51.4	☐	42
2	Shed	4.0	4.2	NA	42.4	☐	80
3	Tree	8.9	4.2	9.4	80.5	☐	117
4	Trees	12.6	4.2	16.8	83.0	☐	138
5	Building	3.0	4.2	NA	61.0	☐	176
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:** 03/30/21

TREE DRIPLINE(s): 84.0 **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: None

Minor Sources:

- Groundcover, grass, etc present? (especially for PM samplers)
- Excessive number of chimnies, smoke stacks, fireplaces, diesel heating
- Off road diesel generators near NO_2 or SO_2 analyzers

Issues: None

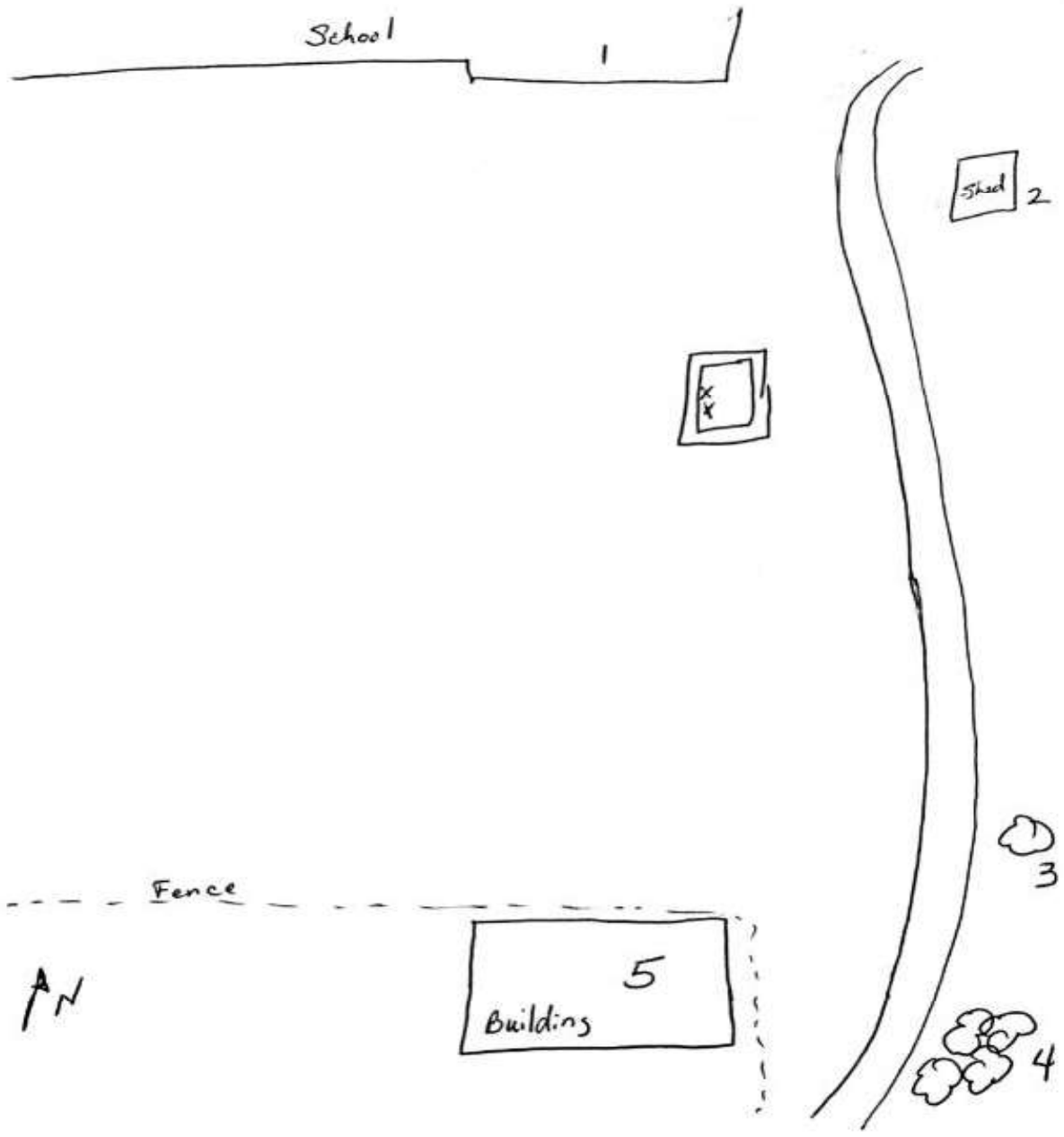
Additional Information:

Closest tree is > 20 meters from probe; no dripline issues.

MSEF : Local Site Name: Fairview O3 **Initials:** EMH **Date:** 03/30/21

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:** 03/30/21

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

Photo: 001 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 03/30/21 **Time:** 12:10 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 03/30/21 Time: 12:10 pm Photographer: EMH Description: Probes

Photo: 011 **Date:** 03/30/21 **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

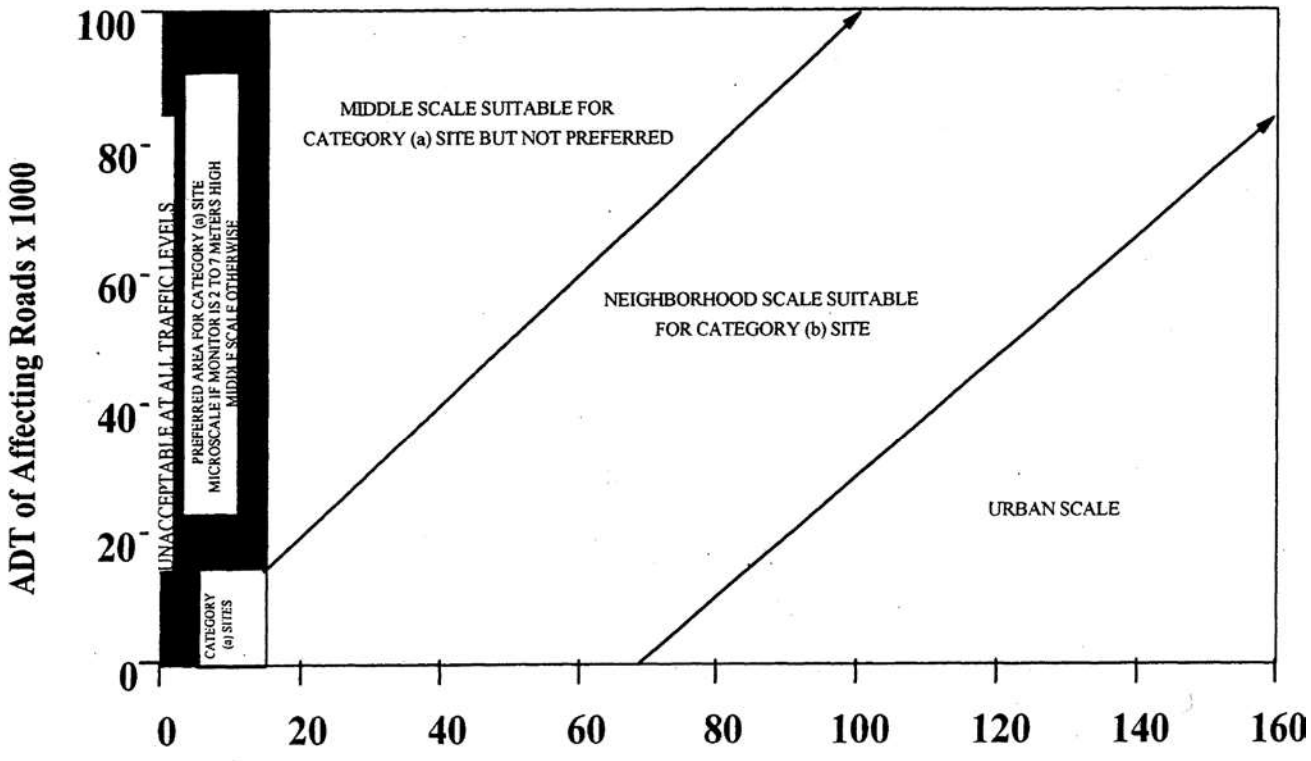


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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.

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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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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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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: 02/23/2021
AQS Number: 47 - 189 - 0103
Site Name: Cedars O3

Location: Lebanon, 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: Cedars O3 **Initials:** EMH **Date:** 02/23/2021

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
Cedars Forest Road	42.0 meters	North	Local Street	109	2020

Electrical

Utilities Company: Middle Tennessee Electric Corp. Meter #: 403615

Additional Comments:

1. Temperature inside shelter was 73 degrees F.
2. Shelter bolted to cement pad.
3. QAPP and SOPs are available electronically via the operator's tablet or Agilaire 8872.
4. eSIMS (APC's electronic logbook) is available electronically via the operator's tablet or Agilaire 8872.
5. Inlet height measured from bottom of concrete slab.
6. Fire extinguisher is in good condition.

MONITORING SITE EVALUATION FORM (MSEF)

Local Site Name: Cedars O3 **Initials:** EMH **Date:** 02/23/21

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

Arrival Time: 12:05 pm **Departure Time:** 1:25 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: _____

SHELTER - □ Not Present

Interior

Arrival Temperature: 24.0 **°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: _____

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: Cedars O3 **Initials:** EMH **Date:** 02/23/21

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

Monitor(s)	Manufacturer	Model	Serial Number
O3	Teledyne	T400	2285

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

QC	Make	Model	Serial Number	Certification Date	Expiration Date
X	Teledyne	T703	327	12/15/20	06/15/21

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:** 02/23/21

DATA COLLECTION/DOCUMENTATION:

Data loggers/Modems:

Make	Model	Serial Number	Data logger/Modem	Main/Backup
Agilaire	8872	516	Data logger	Main
Raven	R55V	2R93330167011016	Modem	Main

SUPPORTING INSTRUMENTATION: **Internal □ Not Present**

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

Zero Air System: **Commercial System** (Make / Model): Teledyne T701 # 1343

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

[□ Yes ■ No] **Needs Service** **Last Service Date:** 02/21/21 **Condition:** _____

Issues: _____

Probe Line(s): [■Replaced / □Cleaned] – Frequency: 1/year **Last Service Date:** 02/21/21

[■ 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:** 02/23/21

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: 8.2 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			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.

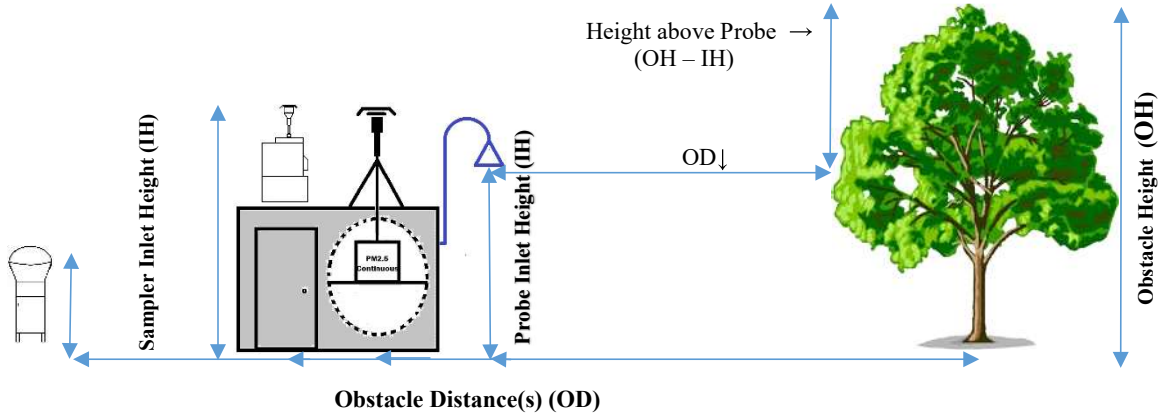
MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 02/23/21

Aerial Photo with Wind Rose

Source: Google Earth Pro **Imagery Date:** 10/22/19

MSEF: Local Site Name: Cedars O3 **Initials:** EMH **Date:** 02/23/21

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	5.7	4.2	3.0	15.8	☐	11
2	Tree	5.7	4.2	3.0	17.6	☐	355
3	Tree	6.5	4.2	4.6	21.7	☐	336
4	Tree	5.9	4.2	3.4	14.2	☐	258
5	Trees	7.3	4.2	6.2	18.0	☐	217
6	Trees	11.3	4.2	14.2	20.0	☐	196
7	Trees	7.2	4.2	6.0	19.2	☐	184
8	Tree	7.4	4.2	6.4	17.0	☐	169
9	Tree	7.6	4.2	6.8	18.8	☐	159
10	Tree	10.3	4.2	12.2	23.0	☐	141
11	Trees	11.6	4.2	14.8	27.0	☐	113
12	Trees	7.8	4.2	7.2	23.0	☐	73
13	Trees	7.6	4.2	6.8	18.5	☐	45
14	Tree	9.2	4.2	10.0	21.0	☐	24
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: Cedars O3 **Initials:** EMH **Date:** 02/23/21

TREE DRIPLINE(s): 15.8 **meters** (nearest inlet to dripline) □ **No Trees Present**

17.0 **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

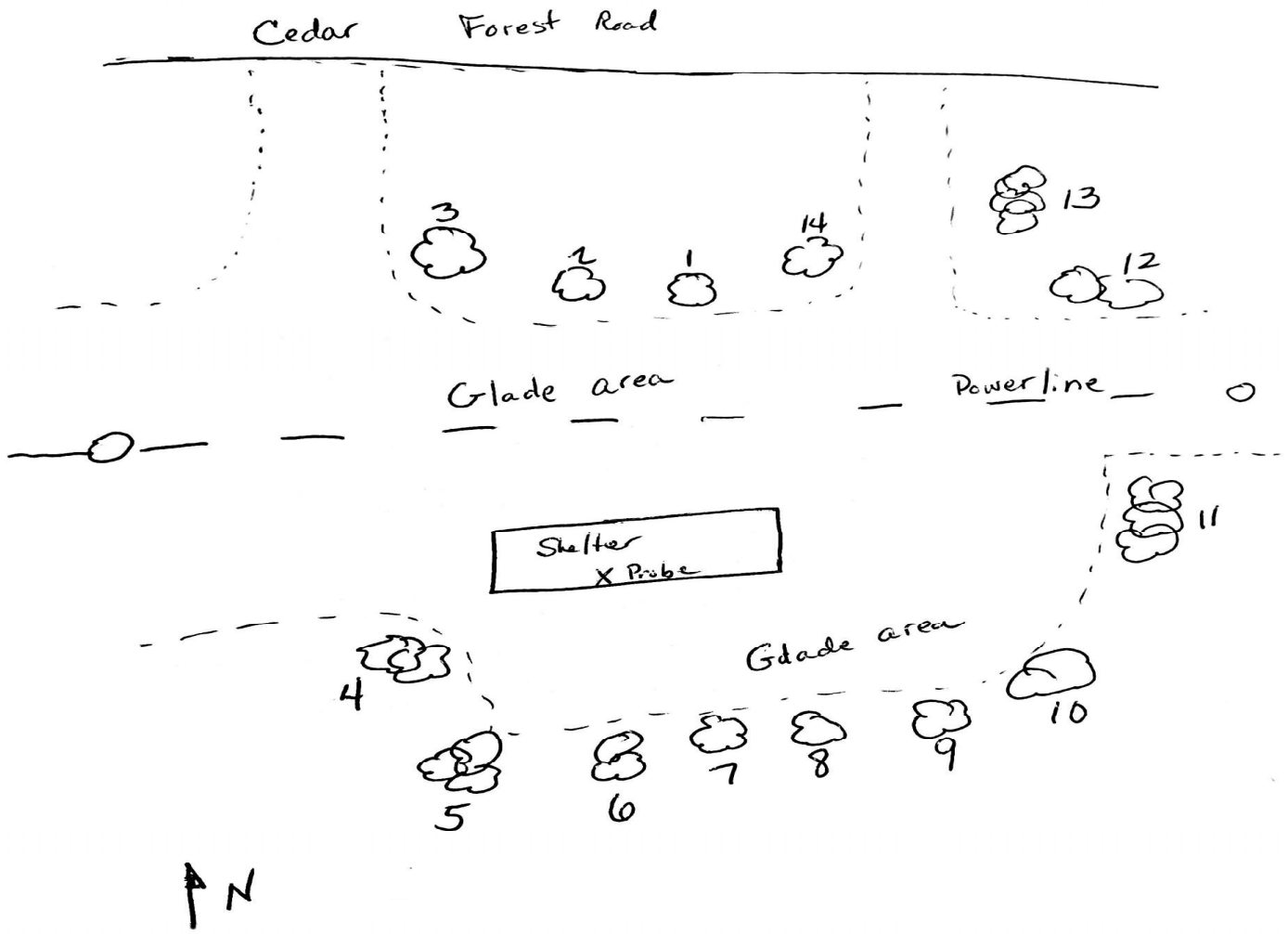
Additional Information:

Closest dripline is 15.8 meters from probe and the next closest dripline is 17.0 meters.

MSEF : Local Site Name: Cedars O3 **Initials:** EMH **Date:** 02/23/21

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:** 02/23/21

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

Photo: 001 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: North Directional

Photo: 002 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: Northeast Directional

Photo: 003 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: East Directional

Photo: 004 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: Southeast Directional

Photo: 005 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: South Directional

Photo: 006 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: Southwest Directional

Photo: 007 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: West Directional

Photo: 008 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: Northwest Directional

Photo: 009 **Date:** 02/23/21 **Time:** 1:10 pm **Photographer:** EMH **Description:** Site

Photo: 010 Date: 02/23/21 Time: 1:10 pm Photographer: EMH Description: Probe

Photo: 011 **Date:** 02/23/21 **Time:** 1:10 pm **Photographer:** EMH **Description:** Electric Meter

Photo: 012 Date: _____ Time: _____ Photographer: EMH 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

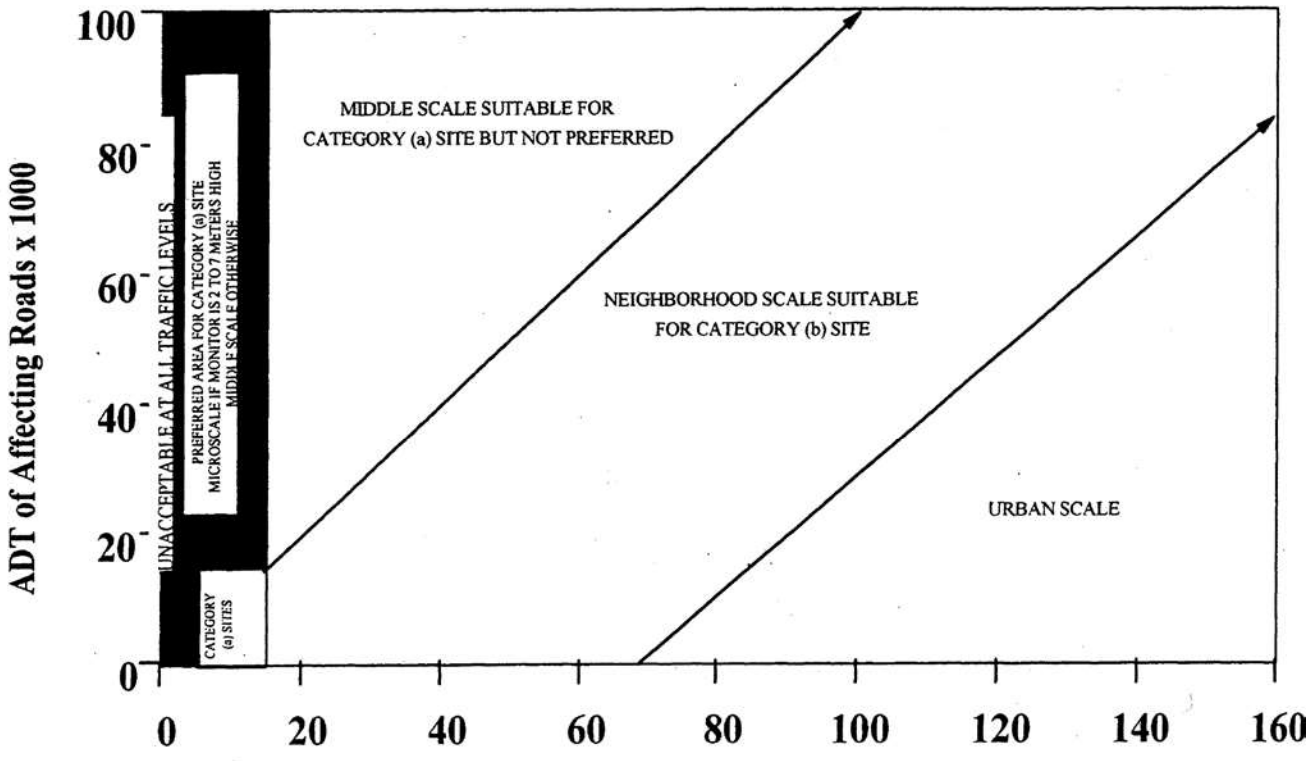


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

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.