June 29, 2026

Addendum to Fenceline Perimeter Air Monitoring Plan (PAMP) dated January 13, 2026
MIPC Chelsea Facility Remediation Program

One Fixed 24-Hour Sampling Location
Fenceline Sampling Using Thermal Desorption Tubes

Prepared for:
MIPC Chelsea Facility
920 Cherry Tree Road
Aston Township, Pennsylvania

1.0 INTRODUCTION

This document is prepared by Langan Engineering and Environmental Services, LLC (Langan) to as an Addendum to the January 13, 2026, PAMP (Addendum) for the MIPC Chelsea Facility located at 920 Cherry Tree Road, Aston, Pennsylvania. The purpose of this Addendum to outline to the Pennsylvania Department of Environmental Protection (DEP) the proposed revisions to the fenceline perimeter sampling program based on:

1. DEP Comment Letter dated January 29, 2026
2. DEP Comment Letter dated April 6, 2026
3. The results of almost six months of the 24-hour fenceline monitoring program
4. Weekly discussions with the DEP as outlined in the weekly status reports and the weekly update meetings

MIPC conducted daily, 24-hour, TO-15 perimeter air monitoring in accordance with the PADEP Order (Order) since the end of December 2025. To date, laboratory results have been received for over 500 air samples. Daily weather data from both on- and off-site weather stations and analytical results are reported to DEP weekly in progress reports. Per DEP recommendation, air sample results are compared to the EPA's risk-based chronic screening levels (RSLs) for resident air (target hazard quotient of 1.0, target cancer risk of 1 in 100,000) using the more conservative number between the carcinogenic and noncarcinogenic screening levels. Only 5 of the 501 samples (<1%) have had benzene detected above the EPA RSL for resident air of 3.6 ug/m^3.

MIPC received agency approval for the Request for Determination (RFD) application to approve the Multiphase Extraction (MPE) and Soil Vapor Extraction (SVE) systems on May 29, 2026. These systems include emissions control equipment that will be monitored with records maintained onsite.

The proposed revisions to the January 13, 2026, PAMP can be summarized as follows:

1. Monitoring program to consist of desorption tubes and one strategically located 24-hour sampling location pursuant to Option 3 offered by the DEP in the April 6, 2026, DEP letter. The proposed sampling location is consistent with the AA-3 location and is adjacent to the remediation system installations.

2. Reduction in the number of fenceline passive monitoring tubes to 3, covering the extent of potential sources related to the remediation system installations, and based on the results of the historical fenceline monitoring. The three passive sampling stations will be located at, south, and northeast of this fixed canister location based on prevailing wind direction (from the northeast) and the location of the historical light non aqueous phase liquid (LNAPL) recovery activities.

3. Results of the analysis of the fixed 24-hour canister will be set at a turnaround time of 3 days.

4. Incorporation of all the comments received by the DEP in the April 6, 2026 DEP letter in the current Addendum.

The proposed passive air monitoring program supplemented by a 24-hour canister sample at a single location is intended to be consistent with the DEP-approved RFDs for both existing and planned LNAPL recovery systems and over 5 months of data that show that ambient air quality is not impacted above the EPA Resident Air RSLs. MIPC will continue to submit results of the passive sampling program after startup of the multiphase extraction/soil vapor extraction (MPE/SVE) systems, and should these results demonstrate no exceedances of the EPA Residential Air Risk-Based Screening Levels (RSLs) over a defined period of time, MIPC intends to request DEP approval to reduce or ultimately terminate the passive diffusive ambient air sampling program. This request will be supported by a demonstration that, after several months of system operation, site emissions are effectively controlled, and ambient air conditions remain consistently below applicable health-based screening criteria.

Onsite Investigation Activities

Ongoing investigation activities include drilling, soil sampling, well installation, well development, groundwater sampling and well evaluation tests (well slug tests and product transmissivity tests). All the investigation activities are directed by environmental professionals who conduct breathing zone air monitoring using photoionization detectors (PIDs) and as required, benzene meters. The environmental professionals also note and report the presence of odors and have stop work authority to terminate activities if odors, monitoring, or other observations/measurements are not consistent with the requirements of the Project Health and Safety Plan.

1.1 ONSITE REMEDIATION ACTIVITIES

Several remediation technologies are currently being implemented or proposed at the MIPC Chelsea Facility to recover gasoline product and impacted groundwater identified during investigation activities on the west side of the facility. These activities include Vacuum Enhanced Fluid Recovery (VEFR) using vacuum trucks (activity diminishing with the startup of the MPE/SVE system), operation of a temporary wastewater treatment unit (WTU) to separate and treat

recovered groundwater and product, proposed solar-powered skimmers installed in recovery wells, and proposed MPE/SVE systems for combined product and vapor recovery. The following sections describe these remediation technologies and their operation at the site.

Vacuum Enhanced Fluid Recovery (VEFR)

The interim remedial action using VEFR consists of the vacuum extraction of gasoline product in recovery wells using a vacuum truck. The truck is tied to a series of hoses connected to packers and stingers in wells containing gasoline. Up to 3 wells are extracted at one time, with the vacuum exhaust direct through 400-pound carbon canisters. The carbon canister effluent is routinely checked with a PID) for breakthrough. The exhaust hose from the carbon canisters is directed approximately 30-40 feet to the west. Environmental professionals are monitoring and observing the operation of the VEFR events and are monitoring breathing airspace and the potential for fugitive emissions with PIDs and benzene meters consistent with the requirements of the Project Health and Safety Plan. Fluids recovered in the vacuum trucks are subsequently delivered to the Monroe Refinery for processing and/or disposal.

Subsequent to startup and operation of the MPE/SVE systems, the ongoing mobile VEFR operations at the site may be diminished or discontinued.

Wastewater Treatment Unit

A temporary WTU was permitted by PADEP in September 2025 and is used to collect subsurface groundwater in a belowground vault adjacent to the former spring house structure. The system consists of pumps, controls, carbon canisters, bag filters and frac tanks to separate the gasoline and to treat the water pumped prior to discharge, consistent with the PADEP permit. Environmental professionals operating the system also oversee the removal of gasoline product from the top of the frac tanks. The gasoline product is removed by vacuum trucks using carbon canisters for the treatment of vacuum exhaust as described above. Environmental professionals also monitor the presence of odors and maintain monitoring of breathing space consistent with the requirements of the MIPC Health and Safety Program.

Solar Skimmers

Solar product skimmers are installed for recovery wells in the Tank 708 area. The skimmers reside in the wells at the product/groundwater interface, and pump product to a central product recovery tank. The product recovery tank will be equipped with carbon canisters for the treatment of the tank vent effluent. The tops of the wellheads will be monitored for odors/fugitive emissions using PIDs. The use of the solar skimmers from an air emission perspective has been approved by the DEP via an RFD.

MPE/SVE Systems

The remedial approach includes the installation, operation, monitoring, and maintenance of an MPE/SVE systems to support continued remediation of the gasoline release. The system is designed to address three primary emission streams: (1) extracted vapor, (2) recovered product or light non-aqueous phase liquids (LNAPL), and (3) gasoline-impacted groundwater. Each of these streams will be captured, managed, and treated as part of the integrated remediation system. Effluent gas from the systems will be treated using propane-fired regenerative thermal

oxidizer (RTO) and electric catalytic oxidizers with greater than 90% destruction of volatile organic compounds. The use of emission system controls has been approved by the DEP in the RFD approval dated May 29, 2026.

2.0 PROPOSED AIR SAMPLING PROCEDURES

The procedures outlined herein are consistent with EPA Method 325A (Volatile Organic Compounds from Fugitive and Area Sources – Sampler Deployment and VOC Sample Collection) and EPA Method 325B (Volatile Organic Compounds from Fugitive and Area Sources – Sampler Preparation and Analysis), and have been adapted to address potential air quality impacts associated with remediation activities at the MIPC Chelsea Facility. The plan includes identification of sampling locations, preparation and handling of sample media, sample deployment, field documentation, sample recovery, chain-of-custody procedures, meteorological data collection, and relevant process and offsite data tracking.

The sampling of the 24-hour canister will be consistent with the January 13, 2026, PAMP and the revisions based on the DEP comment letter.

The primary objective of this monitoring program is to measure ambient concentrations of benzene, which is the principal compound of concern associated with gasoline-related remediation activities. Additional volatile organic compounds (VOCs), including toluene, ethylbenzene, xylenes, cumenes, naphthalene, and trimethylbenzene may be included in the analytical suite, as appropriate based on laboratory analytical capabilities and project needs. The final list of target analytes will be developed and presented to the Department of Environmental Protection (DEP) for review and concurrence prior to implementation.

Monitoring locations are designed to assess potential offsite impacts from remediation activities and to evaluate concentrations at the facility boundary in areas representative of nearby receptors. The monitoring network is intended to provide both spatial coverage and representative data to support evaluation of potential emissions associated with ongoing investigation and remediation activities.

To address potential short-term concentration variability identified in regulatory feedback, the monitoring program will incorporate a daily weekday 24-hour canister sampling at a fixed location AA-3 (Option 3 in the DEP response letter dated April 10, 2026). The AA-3 location was selected for the 24-hour canister sampling based on the results of the months of analytical and weather data, along with the locations of the planned remediation systems. Moving forward into the remediation program, the likely sources for potential emissions will be in the vicinity of the fixed 24-hour canister. Trigger levels will be established based on site-specific conditions, anticipated background concentrations, and instrument capabilities.

Passive diffusive sampling will also be implemented to provide time-integrated concentration data and spatial coverage across the monitoring perimeter.

Monitoring results will be evaluated in the context of meteorological conditions, site activity logs, and data quality assurance/quality control (QA/QC) validation prior to interpretation. This integrated evaluation framework is necessary to support appropriate interpretation of monitoring data, minimize the potential for misattribution, and provide a defensible basis for assessing potential emission sources and site-related impacts.

This monitoring framework is responsive to regulatory concerns that longer-duration passive sampling may mask short-term concentration variability, while providing a technically defensible, flexible, and operationally practical approach for evaluating air quality impacts during remediation activities.

2.1 IDENTIFICATION OF SAMPLE LOCATIONS

Sampling locations were selected in accordance with the requirements of EPA Method 325A and several site-specific factors were considered in establishing the monitoring network, including the location of ongoing remediation activities, facility layout and boundary conditions, nearby residential receptors, historical monitoring results over the last 5-6 months, meteorological information obtained from available sources and observations from routine field air monitoring conducted during investigation and remediation activities.

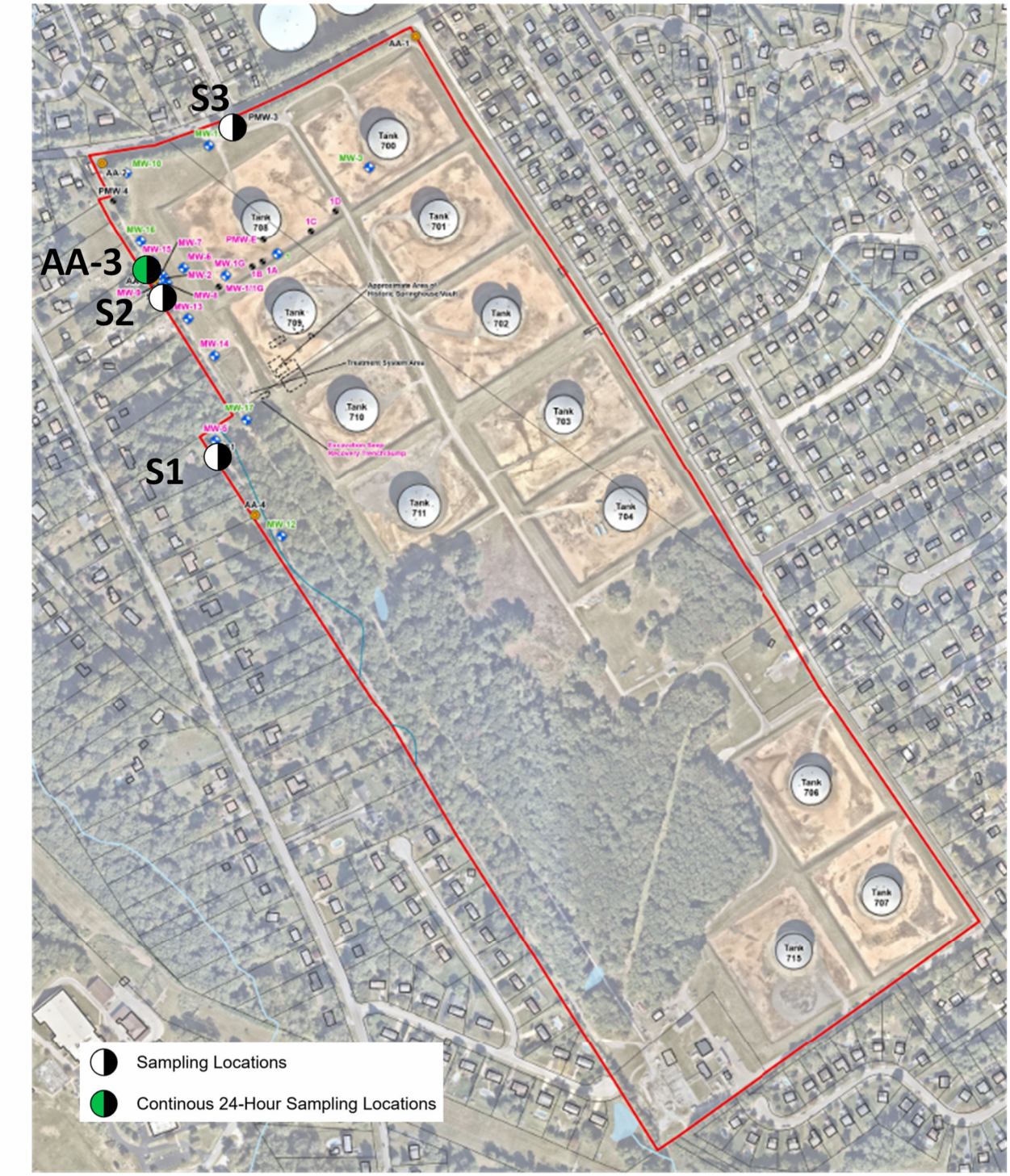
2.2 REQUIREMENTS FOR SAMPLE LOCATIONS

Sample locations at the MIPC Chelsea Facility are established in accordance with the Linear Method described in Section 8.2.3 of EPA Method 325A. Three (3) primary sample locations are placed along the monitoring perimeter to encompass the known ongoing and future VOC remediation emission sources. A site figure illustrating the monitoring perimeter and sample locations is provided in Figure 2-1. The final configuration includes **3** sampling locations (black symbols) distributed along the monitoring perimeter along with the fixed 24-hour location (green). Primary sampling locations (shown in Figure 2-1) provide focused monitoring-perimeter coverage around the facility.

Guidelines for Sampling Placement

1. **Perimeter Monitoring:** Sampling points are placed primarily along the facility boundary to detect fugitive emissions from the remediation activities that could impact nearby residential areas.
2. **Upwind and Downwind Considerations:** Prevailing wind direction is considered during placement, with emphasis on downwind locations from emission sources.

Figure 2-1 Sample Locations



A sampling location summary table (Table 2-1) is provided documenting station ID, coordinates, mounting height, nearby structures, and siting rationale consistent with Method 325A placement considerations.

Table 2-1: Sampling Location Summary

Station ID	Latitude	Longitude	Mounting Height (m)	Nearby Structures	Siting Basis
S1	39.864298	-75.457566	2	Residential properties adjacent to facility boundary	Downwind residential receptor coverage along western boundary from remediation activities
S2	39.865972	-75.458115	2	Residential homes and facility access area	Transitional zone between residential area and edge of remediation activities
S3	39.868011	-75.457486	2	Residential neighborhood north of facility	Northern fenceline receptor monitoring location

2.3 BLANK AND DUPLICATE SAMPLE LOCATIONS

Consistent with EPA Method 325A QA/QC guidance for monitoring networks with fewer than 19 sampling locations, **one co-located duplicate sample and one blank sample will be collected during each sampling period**.

The QA/QC samples will include:

- One co-located duplicate sampler deployed at a selected monitoring station
- One trip blank tube that remains sealed throughout handling and transport

The duplicate location will be rotated periodically among monitoring stations, with preference given to locations expected to represent downwind conditions.

One blank sample will be included during each sampling period as a **trip blank**. The trip blank tube will remain sealed with its brass storage caps throughout shipment, field handling, deployment activities, recovery, and return shipment to the laboratory. The trip blank will not be opened or exposed to ambient air and is used to evaluate potential contamination associated with sample handling, transport, and laboratory preparation.

2.4 DAILY 24-HOUR SAMPLING FRAMEWORK

A continuous 24-hour canister sampling program will be maintained near Sample Location S2. The location of the TO-15 sample will coincide with the AA-3 air monitoring station, which is the only location that has had a benzene detection above 3.6 ug/m^3 since inception of the perimeter air monitoring program (January 2026).

Canister Analysis

Canister samples will be analyzed for benzene as the primary analyte, along with additional VOCs (e.g., BTEX), to confirm and characterize the event identified by the continuous monitor.

Role of Passive Sampling

Passive diffusive sampling is intended to serve a supplemental role for spatial and time-integrated assessment.

3.0 SAMPLE MEDIA AND RECEIPT BY PARTICIPANT

Sampling tubes will be shipped from the designated analytical laboratory to the MIPC Chelsea Facility or to the consultant's office prior to each sampling round.

The sample media consists of FLM Carbopack X sorbent tubes. These tubes are ¼-inch OD stainless steel with interior coating and are approximately 3.5 inches in length. Each tube is uniquely identified with a serial number and barcode.

The Carbopack X sorbent tube and diffusion-cap configuration used for this program is laboratory-validated for benzene monitoring using passive diffusive sampling. The analytical laboratory provides compound-specific uptake rates and performs analysis in accordance with EPA Method 325B thermal desorption and gas chromatography procedures.

Brass long-term storage caps with PTFE ferrules are fitted to each end of the tube to seal the media prior to deployment and following sample recovery.

Each shipment will include:

- Individual sampling tubes in protective plastic containers (See Figure 3-1)
- Diffusion caps
- Ice packs for return shipment
- Field Data Sheets and Chain-of-Custody (COC) forms
- Return shipping label

Upon receipt:

1. Verify shipment contents against the packing list.
2. Inspect tubes for damage or missing caps.
3. Store tubes in a temperature-controlled indoor location.
4. Use tubes within 30 days of laboratory conditioning.

Unused tubes and diffusion caps must be returned to the laboratory and should not be retained for future use.

Figure 3-1. Supelco Passive Diffusive Sampling Tube

See Figure 3-2 for a photo of the cooler shipment and its contents. Spare tubes and diffusion caps are to be used only if needed (i.e. a tube or diffusion cap gets lost or damaged). Unused items should be placed in the cooler to be returned to the laboratory with each shipment (i.e., extras should be returned and not removed and "saved"). Subsequent shipments will include the same items; except they will contain only 3 diffusion caps as diffusion caps are to be reused. The sample shelters will be shipped separately.

Figure 3-2. Initial Cooler and Contents

4.0 SAMPLE PREPARATION AND PRE-DEPLOYMENT

Ice packs should be removed from the cooler and placed in a freezer until needed for return shipment.

Sample tubes must remain in their storage containers until deployment. Tubes should be allowed to equilibrate to ambient temperature prior to deployment (approximately 30 minutes to 1 hour). Field Data Sheets/COCs shall be completed as tubes are deployed. Sample IDs shall be assigned at the time of deployment.

Sample ID format:
AAAAA-BBB-C-DDDDDD

Where:
AAAAA = Facility ID (MIPC)
BBB = Sample Location ID
C = Sample Type (S, D, or B)
DDDDDD = Sample event start date

Example:
MIPC-05-S-021526

Field equipment required includes:

- GPS (required during initial setup, optional for subsequent sample periods);
- Camera (optional);
- Location map with coordinates (required during initial setup, optional for subsequent sample
- periods);
- Posts, shelters, and mounting supplies (initial setup only);
- Sample protocol;
- Pens;
- Work gloves;
- Powder-free nitrile gloves;
- Zip ties;
- Numbered zip ties for custody seal;
- Clipboard;
- 9/16" and 1/2" wrenches;
- General toolbox;
- Field Data Sheet/COC from previous deployment;
- Pre-filled Field Data Sheet/COC, printed from electronic version (optional) for deployment.

For each trip, except the first and last, you will have two coolers, one containing conditioned tubes that are ready for deployment and one to collect used tubes, ready to be returned to the laboratory for 325B analysis. Sampled tubes must never be placed in the same shipping container as clean conditioned sampling tubes.

5.0 SAMPLE LOCATION: SAMPLE SHELTER MOUNTING AND SAMPLE TUBE DEPLOYMENT

5.1 MOUNTING OF SAMPLE SHELTER

Sample shelters (Figure 5-1) shall be securely mounted at designated monitoring locations. Shelters must be mounted:

- With open end facing downward
- At a height between 1.5 and 3 meters (5 to 9.8 feet) above ground level under standard fence conditions in accordance with EPA Method 325A Section 8.5.5. Where sound barriers are present and would obstruct airflow at standard mounting height, monitoring height may be increased as necessary to maintain unobstructed airflow at the facility boundary consistent with Sections 4.1 and 8.1.2 of the EPA Method 325A perimeter monitoring guidelines.
- On a stable structure such as a post or fence

Sample shelters must be mounted securely in the locations that were previously designated for the fenceline ambient sampling program. In accordance with EPA Method 325A Section 8.2.1, passive samplers shall be placed on or inside the facility boundary as part of the established monitoring perimeter. Samplers shall be positioned so that they measure ambient air conditions at the facility boundary and are not influenced by nearby physical obstructions. Placement shall consider and avoid the influence of structures that could interfere with air parcel flow to the sampler, consistent with Sections 4.1 and 8.1.2 of Method 325A.

Where the perimeter fence coincides with the facility boundary, shelters shall be mounted immediately inside the fence line and shall not be set further back within the facility boundary. Vertical adjustments made to avoid obstructions (e.g. sound barriers) shall not alter the established horizontal position of the monitoring station at the facility boundary.

Figure 5-1. Sample Shelter

Sample shelters can be mounted as deemed appropriate by the participating facility for the specific location that has been chosen for deployment as long as it provides a secure and stable position for the sampler. Each unit must be mounted with the open end facing down, at a height

of 1.5 – 3 meters (5 – 9.8 feet) above ground level (unless adjusted in accordance with the elevated installation procedures outlined in Section 5.3) using a pole or other secure structure (i.e. fence post, light post, etc.). Hardware required to secure the shelters depends on the structure to which the sample shelters are being mounted and needs to be purchased separately. It is not recommended that samplers be placed near or against solid structures such as buildings, solid fences, large tanks, etc. or anywhere where the structure itself could affect the surrounding ambient air flow to the sampler. Chain link fences are acceptable as long as they are of the open type with no privacy slats. Each sample location should be identified with a sign or other type of indicator that displays the sample location ID and, if possible, the GPS coordinates. This will provide an easy way for field personnel to identify the location and ensure that the sample locations are not mixed up on the Field Data Sheet/COC during sample tube deployment.

Sound barriers may be installed along portions of the facility boundary. During installation, field personnel shall evaluate whether such barriers could interfere with air parcel flow to the sampler. Shelters shall not be mounted directly against obstructions such as solid panels. Where barriers are present, the sampler inlet shall not be positioned below the top of the barrier. Final mounting height and presence of barrier conditions should be documented on the Field Data Sheet.

5.2 SAMPLE TUBE DEPLOYMENT

Once all sample shelters are securely mounted in place at the designated locations, the sample tubes can be deployed. A sequence of deployment for the sample locations should be determined. This sequence should be followed for the duration of the sampling program. This will maintain consistency in the sample times and will help to ensure the proper exposure time for each sampler.

The following steps describe the procedures for sample tube deployment at each location:

1. Upon arrival at the sample location, fill in the Field Test Data Sheet and Chain of Custody (COC) (Attachment A) with all of the required facility information. You may also pre-fill this information in an electronic version and print it out before each trip to deploy/collect samples.
2. Check the sample shelter and ensure that it is secure and stable and has not become loose or dislodged.
3. Note any unusual activities in the vicinity of the sample location and detail them on the Field Data Sheet/COC.
4. Select a sample tube from the lot.
5. Generate the sample ID in the format as described in Section 4.0 and record this on the field data sheet.
6. Wearing nitrile gloves, remove the sample tube from the plastic storage tube.
7. Move to a position directly next to the sample shelter where the tube will be placed prior to opening the inlet side of the tube. This is done to ensure that once the tube is opened up to the ambient air that it will only sample the surrounding air. For example if the tube is opened up in the sampler's field truck or somewhere other than the actual sampling location the tube will initially sample ambient air at a location other than where it was intended to which could potentially bias the results.
8. The arrow points to the non-sampling side. This side can also be identified by the absence of a groove (Figure 5-2). This side will remain sealed with a brass fitting during the entire sample period. Ensure this that the brass fitting on this end is tight. Do not over tighten

the brass fittings as this could damage the PTFE ferrule inside the fitting and compromise the seal.

9. Remove the brass fitting from the inlet end of the sampling tube. The arrow points away from the inlet end. The inlet end is also identified by a groove on the outside of the tube (Figure 5-2). The brass plug does not have to be fully separated from the nut, only loosen the nut and it will slide off the tube. This will retain the PTFE ferrule inside the sealing fitting so it is not misplaced. Place the removed brass fitting back into the storage tube and replace the lid. Return the storage tube back to the cooler. All samples will be returned to the storage tubes for transport to the laboratory. If black powder comes out when the sample end is opened, the tube is leaking. Do not use a tube if it is leaking, has loose or missing storage cap(s), or if the tube is bent, crimped, or damaged. Return unusable tubes to the lab with a notification of the problem and use a different tube.
10. The upper plate of the tube carriage has 3 holes and a slip, plus 2 notches in the edge. The lower plate has 3 holes with red plugs, plus a gated slip. Slide the sample tube through the top plate of the tube carrier and then through the bottom plate, inlet end first.
11. Obtain one diffusion cap. These will be gray plastic caps that slide over the end of the sample tube. During initial deployment, diffusion caps will be in the cooler but during subsequent deployments, diffusion caps will be removed from the collected samples and reused.
12. Slide the diffusion cap over the inlet end of the sample tube. The diffusion cap has two o-rings that seal against the sample tube. Slide the sample tube until both o-rings have sealed against the tube and the inlet end of the tube is just against the diffusion cap screen. The diffusion cap must be pushed on far enough to seal both o-rings. It may take some force with a twisting action to slide the tube far enough into the diffusion cap to seal properly. Improper installation of the diffusion cap can affect the established diffusion rate so proper installation is crucial.
13. The tube is now ready for sampling and should look like the example in Figure 5-3. Note, the location of the groove located on the sample tube with respect to the diffusion cap location. This can be used as a check to ensure that the diffusion cap is installed properly on the tube. THE ARROW SHOULD ALWAYS BE POINTING UP AND THE DIFFUSION CAP SHOULD ALWAYS BE AT THE BOTTOM OF THE TUBE.
14. Record the start date and start time on the Field Data Sheet/COC. Record any other data such as surrounding conditions or any other abnormal conditions near the sampling location. The average temperature and pressure for the entire 2-week period will be provided from meteorological data, so these parameters do not need to be collected in the field.
15. Collect at least one co-located duplicate sample per sampling period. For locations with a duplicate, deploy 2 tubes under the sample shelter. To add a second tube, remove a red plug and insert the tube under the shelter according to the instructions above. The red plugs in the lower plate prevent insects from getting inside the sample shelter and should be left in place for any unused tube sites.
16. Collect at least one field blank per sampling period. For locations with a field blank, deploy 2 tubes under the sample shelter. One of the tubes should be inserted with a diffusion cap according to the instructions above. The other tube, the field blank, must be inserted in the slip so that the storage cap does not need to be removed. Slide back the hinged gate, insert the tube with the brass nut still in place, and close the gate.
17. After all required tubes are in place, hold the handle on the bottom side of the lower plate and align the notches in the top plate with the posts inside the sample shelter (Figure 5-

4). Push the carriage into the shelter so that the upper plate is above the posts and turn the carriage 90 degrees to secure the carriage in place.

18. Each carriage can hold up to four tubes but no more than 2 should be located at a sample location for this study. This procedure is repeated for each monitoring station.

Figure 5-2. Inlet End of Supelco Passive Diffusive Sampling Tube

Figure 5-3. Sample tube secured inside tube carriage

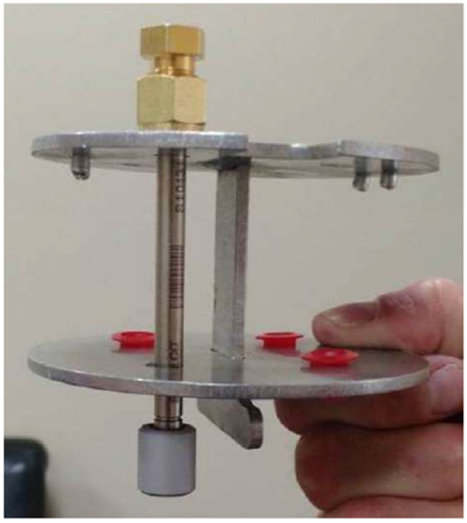
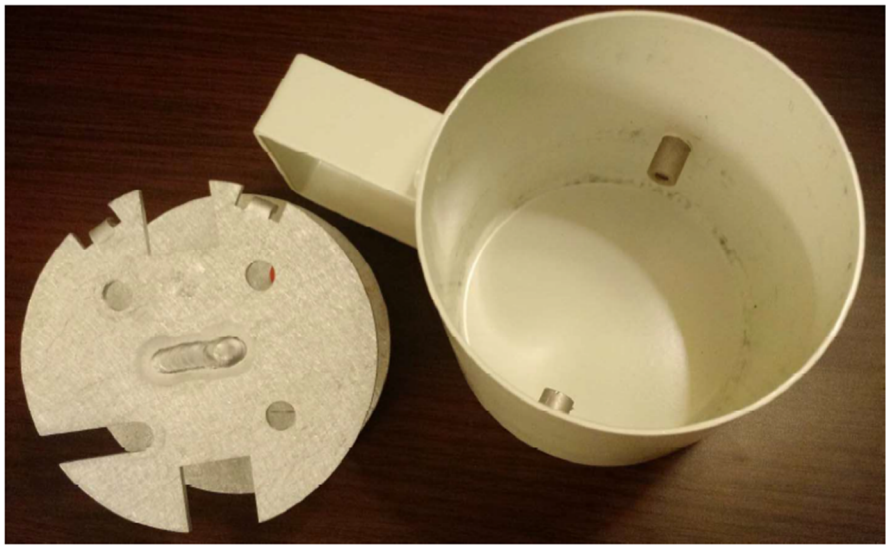


Figure 5-4. Mechanism to lock tube carriage into sample shelter



5.3 ELEVATED INSTALLATION PROCEDURES

Elevated installations shall be designed to:

- Maintain vertical orientation of the sampler
- Ensure unobstructed airflow to the inlet
- Allow safe and repeatable deployment and recovery at 14-day intervals
- Preserve the established monitoring perimeter

Where installation height exceeds the standard 1.5 to 3-meter range due to the presence of sound barriers or other airflow obstructions, shelters may be mounted at heights up to approximately 12 feet above ground surface.

Potential mounting configurations include:

- Extendable mast assemblies designed for environmental monitoring applications

  A vertically extending mast system capable of being raised to the required monitoring height and secured in a fixed, rigid upright position during the sampling period. For deployment and recovery, the mast is lowered to ground level, allowing safe tube deployment without requiring personnel to climb. Mast assemblies are widely used in perimeter air monitoring systems.

- Retractable pole assembly with platform

  A fixed elevated pole system equipped with an integrated or adjacent stabilized platform that allows personnel to access the sampler at the mounted height for sample deployment and recovery. The pole remains stationary during the

sampling period and the platform provides controlled access while maintaining the sampler in a secure upright position.

- Hinged-base pole systems for ground-level access

  A rigid vertical pole mounted to a hinged based plate that allows the entire assembly to pivot downward for deployment and recovery. These systems are widely used in regulatory meteorological monitoring towers. During the sampling period, the pole is secured in a fixed upright position with locking hardware to maintain vertical alignment and stability.

Ladder-only access should be avoided. If ladders are required, OSHA-compliant ladder safety procedures shall be followed and deployment and recovery activities shall be performed in two-person field teams. The mounting method used at each station shall be document on the Field Data Sheet.

6.0 SAMPLE RECOVERY AND SHIPPING

6.1 SAMPLE RECOVERY AND RE-DEPLOYMENT

Samples shall be recovered on Day 14 (±1 day). The rule allows for +/- 1 day but stresses that refineries should strive for a 14-day sample period. Sample recovery should be conducted in the same location sequence as deployment and ideally at the same time of day. Return to each station with 2 kits, the empty one from the prior deployment and the new one that contains clean tubes. When recovering samples and re-deploying new tubes, take the following steps: Recovery shall follow the same sequence as deployment.

Where shelters are installed at elevated heights (e.g., up to approximately 12 feet above ground surface due to sound barrier adjustments), deployment and recovery shall be conducted using the controlled access methods described in Section 5.3.

Upon recovery:

1. Remove carriage.
2. Remove diffusion cap.
3. Replace brass fitting.
4. Seal the end of the used sample tube with the brass fitting that came with the tube. Tighten the fitting finger tight and then give it a ¼ turn using the wrenches. Do not over tighten as this could damage the ferrule inside the fitting and compromise the seal.
5. Verify the tube ID and location against the Field Data Sheet/COC. Record the date and stop time.
6. Place the tube back inside a glass storage jar, replace the lid, and place the jar in the original cooler. Do not put used tubes into the cooler with unused tubes or unused tubes into the cooler with used tubes.
7. Ensure the diffusion cap is not unusually dirty. It is unlikely, but, if necessary, replace the diffusion cap with a new one. Three extras will be provided with each shipment.
8. Deploy a clean tube, as well as blanks or duplicates as necessary, at the station following the deployment procedures in section 5.2.

6.1.1 Sample Condition Inspection and Handling

Upon retrieval of each sample, field personnel shall inspect the sample tube and associated components for signs of damage or abnormal conditions, including but not limited to:

- Physical damage (e.g., bent tubes, cracked fittings)
- Missing or loose caps
- Visible contamination or debris
- Improper diffusion cap placement

Any observed abnormalities shall be documented on the Field Data Sheet.
If a sample is determined to be compromised, the following actions shall be taken:

- Flag the sample in field documentation and chain-of-custody records
- Notify the project manager
- Submit the sample to the laboratory with appropriate qualification notes

To prevent cross-contamination:

- Clean, powder-free nitrile gloves shall be worn during all sample handling
- Gloves shall be changed between handling recovered samples and deploying new media
- Sample tubes shall not be opened or handled outside designated procedures

6.2 FIELD QA/QC

Once the samples from all locations have been recovered and new samples have been deployed, before leaving the facility, the following quality assurance/quality control (QA/QC) checks should be completed:

1. Check the sample tube serial numbers of newly deployed tubes on the COC against the shipment log to ensure that all ID's have been correctly transcribed. If any tubes do not match the provided shipment log, check against the prior round's log to ensure that no tubes were mistakenly re-deployed. If any samples were mistakenly re-deployed, return to the sampling site and replace with a fresh tube noting on the prior log the time which the collected tube was re-deployed along with its location.
2. Check collected sample tube serial numbers against the COC ensuring that all samples have been collected for analysis.

When checks for both rounds of sampling have been completed, proceed to sample packaging and shipping procedures in section 6.3.

6.3 SAMPLE PACKAGING AND SHIPPING

Once the samples from all locations have been recovered and new samples have been deployed, recovered samples should be shipped to the analytical laboratory as soon as possible. If shipping is not done on the same day as sample recovery, place the samples into a refrigerator for storage and ensure the ice packs are frozen before being placed into the shipping cooler. Observe the following shipping instructions:
Recovered samples shall be shipped to the analytical laboratory as soon as practicable.

1. Place frozen ice packs into cooler.
2. Select a green tamper seal (Figure 6-1) and record the seal number on the Field Data Sheet/COC. Sign the document in the "Relinquished By" box and enter the date and time. Indicate the selected shipping agency in the "Received by" section.
3. Make a copy of the document and keep in a project file. Put the original in a Ziploc (or equivalent) plastic back and place it on top of the jars inside the cooler.

4. Close and lock the cooler lid and fasten the tamper seal through the metal eye on the front of the cooler.
5. Since the sample coolers will be sealed and the Field Data Sheet/COC will be within the cooler, it will not be possible for the shipping agency to physically sign the document. Therefore, simply indicating the shipping agency name in this section is acceptable.
6. The shipment shall include one sample tube from each monitoring location, one duplicate sample tube, and one trip blank tube. Affix return shipping label that arrived with in the sample kit to outside of case. Ship the samples via FedEx priority overnight shipping (i.e. delivery by 10am) to the LAB address, which will be printed on the included shipping label:

Shipment shall include:
• One tube per monitoring location
• One duplicate
• One blank

6.4 LABORATORY QUALITY ASSURANCE

The analytical laboratory performing analysis under EPA Method 325B shall maintain current accreditation under ISO/IEC 17025 for the applicable analytical methods. Documentation of accreditation status, including scope of accreditation and certifying body, shall be maintained and available upon request.

The laboratory shall provide:
- Method detection limits and reporting limits for benzene
- Laboratory QA/QC results
- Blank evaluation results
- Duplicate precision evaluation
- Data flags where applicable

Data will be reviewed for completeness, QA/QC conformance, and consistency prior to reporting.

6.5 Laboratory Analysis

All samples will be analyzed by a qualified laboratory in accordance with EPA Method 325B (Volatile Organic Compounds from Fugitive and Area Sources – Sampler Preparation and Analysis).
Analytical procedures include:
- Thermal desorption of sorbent tubes
- Gas chromatography (GC) with appropriate detection method
- Quantification of benzene and, where applicable, additional VOCs (e.g., BTEX compounds)

The laboratory will:
- Apply compound-specific uptake rates provided for the sampling media
- Report concentrations in units of µg/m³ or ppb, as appropriate
- Provide method detection limits and reporting limits
- Perform QA/QC procedures including calibration checks, blanks, and duplicates

Laboratory standard operating procedures (SOPs) for analysis will be maintained and available upon request.

7.0 METEOROLOGICAL DATA COLLECTION

Meteorological data will be obtained from a properly sited near-site meteorological station or the nearest representative National Weather Service station (USEPA station is present near airport). Wind data will be used to support interpretation of fence-line monitoring results and potential source attribution.

Hourly meteorological data must be collected for each sample period. Temperature and barometric pressure must be submitted to the laboratory to be used as part of the 325B analysis. Wind data, including wind speed and direction, is not required unless a facility uses a site-specific plan or an alternative test method, but it can provide useful information and is thus recommended. Meteorological data may be collected from a US Weather Service meteorological station within 25 miles of the facility or an onsite station. An onsite station must follow the siting requirements in Section 8.3 of Method 325A and the calibration and standardization procedures for meteorological measurements in EPA–454/B–08–002.

Figure 6-1. Tamper Seal

7.1 METEOROLOGICAL STATION LOCATION

The meteorological station shall be located at or near the MIPC Chelsea Facility and shall meet EPA siting guidelines.

Section 8.1.4 of Method 325A states:
Identify the closest available meteorological station. Identify potential locations for one or more on-site or near-site meteorological station(s) following the guidance in EPA-454/B-08-002. The meteorological station sensors should satisfy EPA siting guidelines to the extent possible regarding distance away from structures or other potential interferences.

A brief summary of siting requirements is outlined in Section 8.3 of Method 325A.
A meteorological station is required at or near the facility you are monitoring. A number of commercially available meteorological stations can be used. Information on meteorological instruments can be found in EPA-454/R-99-005. Some important considerations for siting of meteorological stations are detailed below.

- Place meteorological stations in locations to represent conditions affecting the transport and dispersion of pollutants in the area of interest. Complex terrain may require the use of more than one meteorological station.
- Deploy wind instruments over level, open terrain at a height of 10 meters (33 feet). If possible, locate wind instruments at a distance away from nearby structures that is equal to at least 10 times the height of the structure.
- Protect meteorological instruments from thermal radiation and adequately ventilate them using aspirated shields. The temperature sensor must be located at a distance away from any nearby structures that is equal to at least four times the height of the structure. Temperature sensors must be located at least 30 meters (98 feet) from large paved areas.
- Collect and record meteorological data, including wind speed, wind direction, temperature and barometric pressure on an hourly basis. Calculate average unit vector wind direction, sigma theta, temperature and barometric pressure per sampling period to enable calculation of concentrations at standard conditions.
- Identify and record the location of the Meteorological Station by its GPS coordinate.

Wind instruments shall be installed at approximately 10 meters height where feasible and located away from obstructions. Temperature sensors must be shielded and adequately ventilated. The meteorological station location shall be recorded by GPS coordinates.

7.2 METEOROLOGICAL DATA SUBMITTAL AND ANALYSES

At the conclusion of each sampling period:

- Temperature and pressure data shall be provided to the laboratory for Method 325B analysis.
- Wind data shall be used to generate wind roses and support data interpretation.

7.3 DATA INTERPRETATION AND EVENT EVALUATION

Prior to interpretation of any monitoring result, trigger event, or exceedance, the following evaluations will be conducted:

- Review of meteorological conditions, including wind speed, wind direction, and atmospheric stability
  - Review of site activity logs, including remediation and operational activities
  - Review of QA/QC data, including blanks, duplicates, and laboratory flags
  - Data validation to confirm completeness and usability
- Trigger events identified by continuous monitoring will not be interpreted in isolation. Compound-specific canister data, meteorological conditions, and site activity information will be collectively evaluated to support interpretation and potential source attribution.

8.0 RELEVANT PROCESS AND OFFSITE DATA COLLECTION

In order to estimate if elevated concentrations are due to operations on the facility or situations that occur offsite (see Section 12.3 of Method 325A), relevant process data and information related to offsite situations will be collected and analyzed for the study period. While a detailed site-by-site analysis of operating conditions and offsite situations relative to observed benzene

concentrations will not be conducted, the collection of relevant data will support identification of any general correlation(s) between process conditions, operations, and event occurrences relevant to survey results. Supporting information may include daily field activity checklists, routine field screening data (e.g., PID and benzene meter readings), facility records, and other operational logs maintained during investigation and remediation activities, including:

- Daily or event-based site activity logs documenting remediation operations
- Continuous monitoring system logs and trigger event records

PROCESS AND OFFSITE DATA COLLECTION

The facility shall provide:

- A general description of the facility process units present, along with a description of other processes at the site (especially if they may emit benzene).
- A list of the emission points along with location and estimated benzene emission levels (e.g. data from 2015 TRI).
- A list of periods of process downtime and duration of downtime during study period.
- Maintenance events
- Startup and shutdown records

Offsite sources of benzene shall also be documented where known.

9.0 Reporting Requirements

Monitoring data will be compiled and reported following each sampling period. Reporting will include:

- Validated concentration data for benzene and any additional analyzed VOCs
- QA/QC results, including blanks and duplicate evaluations
- Identification of any data qualifiers or limitations

Data Turnaround Time:
Laboratory analytical results are expected within approximately 7–14 days following sample receipt.

Data Availability:
Data will be provided in electronic format (e.g., Excel and PDF) and may be summarized in technical memoranda as needed.

Data Retention:
All monitoring data, field records, and laboratory reports will be retained in project files in accordance with applicable regulatory requirements.

Notification Procedures:
If elevated concentrations or trigger events are identified, the project team will be notified promptly, and results will be evaluated in the context of ongoing site activities.

10.0 Corrective Action Plan for Exceedances

In the event that monitoring results indicate a trigger exceedance (continuous monitoring system) or elevated concentrations (passive or canister sampling data) the following corrective actions will be conducted:

- Verification of trigger event and instrument performance (for continuous monitoring systems)
- Review and validate analytical data and QA/QC results
- Evaluate recent site activities and operational conditions

- Assess meteorological conditions during the sampling period
- Identify potential on-site or off-site sources contributing to elevated concentrations

If necessary:

- Implement operational adjustments to reduce emissions
- Increase frequency or resolution of monitoring
- Coordinate with regulatory agencies as appropriate

All findings and actions will be documented in project records.

Trigger-based evaluations will be prioritized for short-term variability assessment, while passive sampling results will be interpreted as time-integrated supplemental data.

11.0 Plan Modification Protocol

This monitoring plan may be modified as necessary based on field conditions, monitoring results, or regulatory feedback.
Any modifications will include:

- Documentation of the proposed change
- Technical justification for the modification
- Internal review and approval by the project team

Where required, modifications will be submitted to the Pennsylvania Department of Environmental Protection (PADEP) for review and approval prior to implementation.

Key elements subject to further development include:

- Trigger thresholds and averaging periods
- Response actions associated with trigger exceedances
- Final analyte list
- Continuous monitor siting and configuration

These elements will be developed and presented to DEP for review and concurrence prior to implementation of the continuous monitoring program.

Attachment A - EPA Method 325A

Method 325A—Volatile Organic Compounds from Fugitive and Area Sources:

Sampler Deployment and VOC Sample Collection

1.0 Scope and Application

1.1 This method describes collection of volatile organic compounds (VOCs) at or inside a facility property boundary or from fugitive and area emission sources using passive (diffusive) tube samplers (PS). The concentration of airborne VOCs at or near these potential fugitive- or area-emission sources may be determined using this method in combination with Method 325B. Companion Method 325B (Sampler Preparation and Analysis) describes preparation of sampling tubes, shipment and storage of exposed sampling tubes, and analysis of sampling tubes collected using either this passive sampling procedure or alternative active (pumped) sampling methods.

1.2 This method may be used to determine the average concentration of the select VOCs using the corresponding uptake rates listed in Method 325B, Table 12.1. Additional compounds or

alternative sorbents must be evaluated as described in Addendum A of Method 325B or by one of the following national/ international standard methods: ISO 16017-2:2003(E), ASTM D6196-03 (Reapproved 2009), or BS EN 14662-4:2005 (all incorporated by reference—see §63.14), or reported in the peer-reviewed open literature.

1.3 Methods 325A and 325B are valid for the measurement of benzene. Supporting literature (References 1-8) indicates that benzene can be measured by flame ionization detection or mass spectrometry over a concentration range of approximately 0.5 micrograms per cubic meter (µg/m^3) to at least 500 µg/m^3 when industry standard (3.5 inch long x 0.25 inch outside diameter (o.d.) x 5 mm inner diameter (i.d.)) inert-coated stainless steel sorbent tubes packed with Carbograph™ 1 TD, Carbopack™ B, or Carbopack™ X or equivalent are used and when samples are accumulated over a period of 14 days.

1.4 This method may be applied to screening average airborne VOC concentrations at facility property boundaries or monitoring perimeters over an extended period of time using multiple sampling periods (e.g., 26 x 14-day sampling periods). The duration of each sampling period is normally 14 days.

1.5 This method requires the collection of local meteorological data (wind speed and direction, temperature, and barometric pressure). Although local meteorology is a component

of this method, non-regulatory applications of this method may use regional meteorological data. Such applications risk that the results may not identify the precise source of the emissions.

2.0 Summary of the Method

2.1 Principle of the Method. The diffusive passive sampler collects VOC from air for a measured time period at a rate that is proportional to the concentration of vapor in the air at that location.

2.1.1 This method describes the deployment of prepared passive samplers, including determination of the number of passive samplers needed for each survey and placement of samplers along or inside the facility property boundary depending on the size and shape of the site or linear length of the boundary.

2.1.2 The rate of sampling is specific to each compound and depends on the diffusion constants of that VOC and the sampler dimensions/characteristics as determined by prior calibration in a standard atmosphere (Reference 1).

2.1.3 The gaseous VOC target compounds migrate through a constant diffusion barrier (e.g., an air gap of fixed dimensions) at the sampling end of the diffusion sampling tube and adsorb onto the sorbent.

2.1.4 Heat and a flow of inert carrier gas are then used

to extract (desorb) the retained VOCs back from the sampling end of the tube and transport/transfer them to a gas chromatograph (GC) equipped with a chromatographic column to separate the VOCs and a detector to determine the quantity of target VOCs.

2.1.5 Gaseous or liquid calibration standards loaded onto the sampling ends of clean sorbent tubes must be used to calibrate the analytical equipment.

2.1.6 This method requires the use of field blanks to ensure sample integrity associated with shipment, collection, and storage of the passive samples. It also requires the use of field duplicates to validate the sampling process.

2.1.7 At the end of each sampling period, the passive samples are collected, sealed, and shipped to a laboratory for analysis of target VOCs by thermal desorption gas chromatography, as described in Method 325B.

2.2 Application of Diffusive Sampling.

2.2.1 This method requires deployment of passive sampling tubes on a monitoring perimeter encompassing all known emission sources at a facility and collection of local meteorological data. It may be used to determine average concentration of VOC at a facility's "fenceline" using time integrated passive sampling (Reference 2).

2.2.2 Collecting samples and meteorological data at progressively higher frequencies may be employed to resolve

shorter term concentration fluctuations and wind conditions that could introduce interfering emissions from other sources.

2.2.3 This passive sampling method provides a low cost approach to screening of fugitive or area emissions compared to active sampling methods that are based on pumped sorbent tubes or time weighted average canister sampling.

2.2.3.1 Additional passive sampling tubes may be deployed at different distances from the facility property boundary or from the geometric center of the fugitive emission source.

2.2.3.2 Additional meteorological measurements may also be collected as needed to perform preliminary gradient-based assessment of the extent of the pollution plume at ground level and the effect of “background” sources contributing to airborne VOC concentrations at the location.

2.2.4 Time-resolved concentration measurements coupled with time-resolved meteorological monitoring may be used to generate data needed for source apportionment procedures and mass flux calculations.

3.0 Definitions

(See also Section 3.0 of Method 325B.)

3.1 Fenceline means the property boundary of a facility or internal monitoring perimeter established in accordance with the requirements in Section 8.2 of this method.

3.2 Passive sampler (PS) means a specific type of sorbent

tube (defined in this method) that has a fixed dimension air (diffusion) gap at the sampling end and is sealed at the other end.

3.3 Passive sampling refers to the activity of quantitatively collecting VOC on sorbent tubes using the process of diffusion.

3.4 PS_i is the annual average for all PS concentration results from location i.

3.5 PS_{i3} is the set of annual average concentration results for PS_i and two sorbent tubes nearest to the PS location i.

3.6 PS_{ip} is the concentration from the sorbent tube at location i for the test period or episode p.

3.7 Sampling period is the length of time each passive sampler is exposed during field monitoring. The sampling period for this method is 14 days.

3.8 Sorbent tube (Also referred to as tube, PS tube, adsorbent tube, and sampling tube) is an inert coated stainless steel tube. Standard PS tube dimensions for this method are 3.5-inch (89 mm) long x 0.25-inch (6.4 mm) o.d. with an i.d. of 5 mm, a cross-sectional area of 19.6 mm^2 and an air gap of 15 mm. The central portion of the tube is packed with solid adsorbent material contained between 2 x 100-mesh stainless steel gauzes and terminated with a diffusion cap at the sampling end of the tube. These axial passive samplers are installed under a

protective hood during field deployment.

Note: Glass and glass- (or fused silica-) lined stainless steel sorbent tubes (typically 4 mm i.d.) are also available in various lengths to suit different makes of thermal desorption equipment, but these are rarely used for passive sampling because it is more difficult to adequately define the diffusive air gap in glass or glass-line tubing. Such tubes are not recommended for this method.

4.0 Sampling Interferences

4.1 General Interferences. Passive tube samplers should be sited at a distance beyond the influence of possible obstructions such as trees, walls, or buildings at the monitoring site. Complex topography and physical site obstructions, such as bodies of water, hills, buildings, and other structures that may prevent access to a planned PS location must be taken into consideration. You must document and report siting interference with the results of this method.

4.2 Background Interference. Nearby or upwind sources of target emissions outside the facility being tested can contribute to background concentrations. Moreover, because passive samplers measure continuously, changes in wind direction can cause variation in the level of background concentrations from interfering sources during the monitoring period. This is why local meteorological information, particularly wind

direction and speed, is required to be collected throughout the monitoring period. Interfering sources can include neighboring industrial facilities, transportation facilities, fueling operations, combustion sources, short-term transient sources, residential sources, and nearby highways or roads. As PS data are evaluated, the location of potential interferences with respect to PS locations and local wind conditions should be considered, especially when high PS concentration values are observed.

4.3 Tube Handling. You must protect the PS tubes from gross external contamination during field sampling. Analytical thermal desorption equipment used to analyze PS tubes must desorb organic compounds from the interior of PS tubes and exclude contamination from external sampler surfaces in the analytical/sample flow path. If the analytical equipment does not comply with this requirement, you must wear clean, white, cotton or powder-free nitrile gloves to handle sampling tubes to prevent contamination of the external sampler surfaces. Sampling tubes must be capped with two-piece, brass, 0.25 inch, long-term storage caps fitted with combined polytetrafluoroethylene ferrules (see Section 6.1 and Method 325B) to prevent ingress of airborne contaminants outside the sampling period. When not being used for field monitoring, the capped tubes must be stored in a clean, air-tight, shipping container to prevent the

collection of VOCs (see Section 6.4.2 of Method 325B).

4.4 Local Weather Conditions and Airborne Particulates. Although air speeds are a constraint for many forms of passive samplers, axial tube PS devices have such a slow inherent uptake rate that they are largely immune to these effects (References 4,5). Passive samplers must nevertheless be deployed under non-emitting weatherproof hoods to moderate the effect of local weather conditions such as solar heating and rain. The cover must not impede the ingress of ambient air. Sampling tubes should also be orientated vertically and pointing downwards, to minimize accumulation of particulates.

4.5 Temperature. The normal working range for field sampling for sorbent packing is 0 – 40°C (References 6,7). Note that most published passive uptake rate data for sorbent tubes is quoted at 20 °C. Note also that, as a rough guide, an increase in temperature of 10 °C will reduce the collection capacity for a given analyte on a given sorbent packing by a factor of 2, but the uptake rate will not change significantly (Reference 4).

5.0 Safety

This method does not purport to include all safety issues or procedures needed when deploying or collecting passive sampling tubes. Precautions typical of field air sampling projects are required. Tripping, falling, electrical, and

weather safety considerations must all be included in plans to deploy and collect passive sampling tubes.

6.0 Sampling Equipment and Supplies, and Pre-Deployment Planning

This section describes the equipment and supplies needed to deploy passive sampling monitoring equipment at a facility property boundary. Details of the passive sampling tubes themselves and equipment required for subsequent analysis are described in Method 325B.

6.1 Passive Sampling Tubes. The industry standard PS tubes used in this method must meet the specific configuration and preparation requirements described in Section 3.0 of this method and Section 6.1 of Method 325B.

Note: The use of PS tubes packed with various sorbent materials for monitoring a wide variety of organic compounds in ambient air has been documented in the literature (References 4-10). Other sorbents may be used in standard passive sampling tubes for monitoring additional target compound(s) once their uptake rate and performance has been demonstrated following procedures in Addendum A to Method 325B. Guidance on sorbent selection can also be obtained from relevant national and international standard methods such as ASTM D6196-03 (Reapproved 2009) (Reference 14) and ISO 16017-2:2003(E) (Reference 13) (both incorporated by reference—see §63.14).

6.2 Passive or Diffusive Sampling Cap. One diffusive sampling cap is required per PS tube. The cap fits onto the sampling end of the tube during air monitoring. The other end of the tube remains sealed with the long-term storage cap. Each diffusive sampling cap is fitted with a stainless steel gauze, which defines the outer limit of the diffusion air gap.

6.3 Sorbent Tube Protection Cover. A simple weatherproof hood, suitable for protecting passive sampling tubes from the worst of the weather (see Section 4.4) consists of an inverted cone/funnel constructed of an inert, non-outgassing material that fits over the diffusive tube, with the open (sampling) end of the tube projecting just below the cone opening. An example is shown in Figure 6.1 (Adapted from Reference 13).

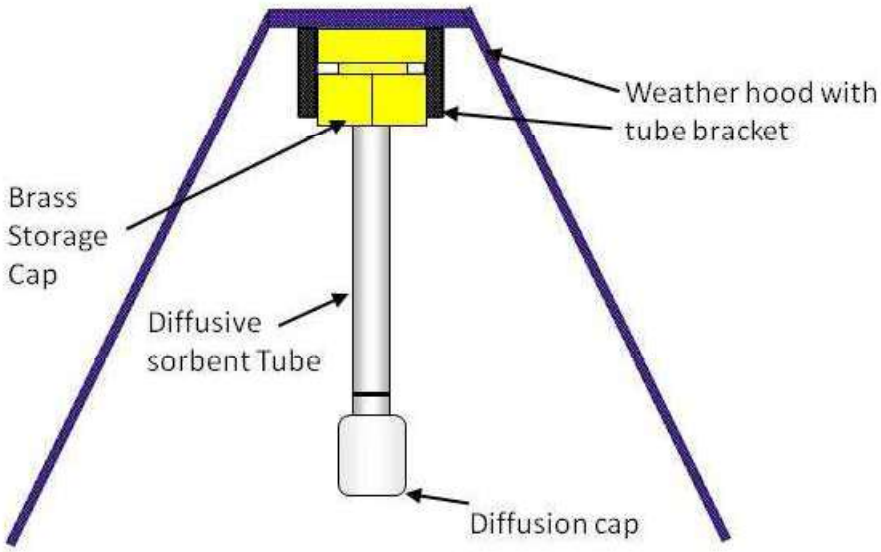


Figure 6.1. PS Tube with Weather Protector

6.4 Thermal Desorption Apparatus. If the analytical thermal desorber that will subsequently be used to analyze the passive sampling tubes does not meet the requirement to exclude outer surface contaminants from the sample flow path (see Section 6.6 of Method 325B), then clean, white, cotton or powder-free nitrile gloves must be used for handling the passive sampling tubes during field deployment.

6.5 Sorbent Selection. Sorbent tube configurations, sorbents or other VOC not listed in this method must be evaluated according to Method 325B, Addendum A or ISO 16017-2:2003(E) (Reference 13) (incorporated by reference—see §63.14). The supporting evaluation and verification data described in Method 325B, Addendum A for configurations or compounds different from the ones described in this method must meet the performance requirements of Method 325A/B and must be submitted with the test plan for your measurement program.

7.0 Reagents and Standards

No reagents or standards are needed for the field deployment and collection of passive sampling tubes. Specifications for sorbents, gas and liquid phase standards, preloaded standard tubes, and carrier gases are covered in Section 7 of Method 325B.

8.0 Sample Deployment, Recovery, and Storage

Pre-deployment and planning steps are required before field deployment of passive sampling tubes. These activities include but are not limited to conducting a site visit, determining suitable and required monitoring locations, and determining the monitoring frequency to be used.

8.1 Conducting the Site Visit.

8.1.1 Determine the size and shape of the facility footprint in order to determine the required number of monitoring locations.

8.1.2 Identify obstacles or obstructions (buildings, roads, fences), hills and other terrain issues (e.g., bodies of water or swamp land) that could interfere with air parcel flow to the sampler or that prevent reasonable access to the location. You may use the general guidance in Section 4.1 of this method during the site visit to identify sampling locations. You must evaluate the placement of each passive sampler to determine if the conditions in this section are met.

8.1.3 Identify to the extent possible and record potential off-site source interferences (e.g., neighboring industrial facilities, transportation facilities, fueling operations, combustion sources, short-term transient sources, residential sources, nearby highways).

8.1.4 Identify the closest available meteorological station. Identify potential locations for one or more on-site or

near-site meteorological station(s) following the guidance in EPA-454/B-08-002 (Reference 11) (incorporated by reference—see §63.14).

8.2 Determining Sampling Locations (References 2, 3).

8.2.1 The number and placement of the passive samplers depends on the size, the shape of the facility footprint or the linear distance around the facility, and the proximity of emission sources near the property boundaries. Aerial photographs or site maps may be used to determine the size (acreage) and shape of the facility or the length of the monitoring perimeter. Place passive samplers on an internal monitoring perimeter on or inside the facility boundary encompassing all emission sources at the facility at different angles circling the geometric center of the facility or at different distances based on the monitoring perimeter length of the facility.

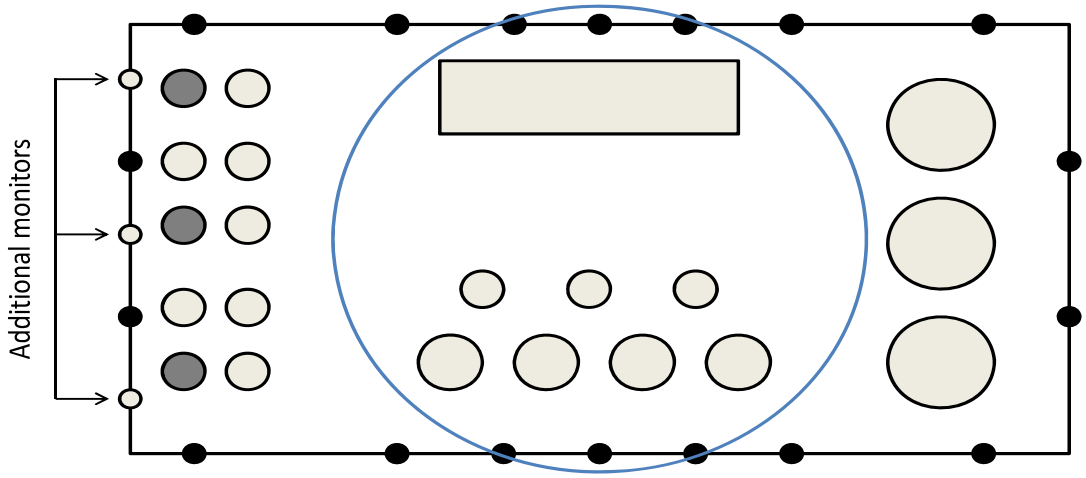
Note: In some instances, permanent air monitoring stations may already be located in close proximity to the facility. These stations may be operated and maintained by the site, or local or state regulatory agencies. If access to the station is possible, a PS may be deployed adjacent to other air monitoring instrumentation. A comparison of the pollutant concentrations measured with the PS to concentrations measured by site instrumentation may be used as an optional data quality

indicator to assess the accuracy of PS results.

8.2.1.1 The monitoring perimeter may be located between the property boundary and any potential emission source near the property boundary, as long as the distance from the source to the monitoring perimeter is at least 50 meters (162 feet). If a potential emissions source is within 50 meters (162 feet) of the property boundary, the property boundary shall be used as the monitoring perimeter near that source.

8.2.1.2 Samplers need only be placed around the monitoring perimeter and not along internal roads or other right of ways that may bisect the facility.

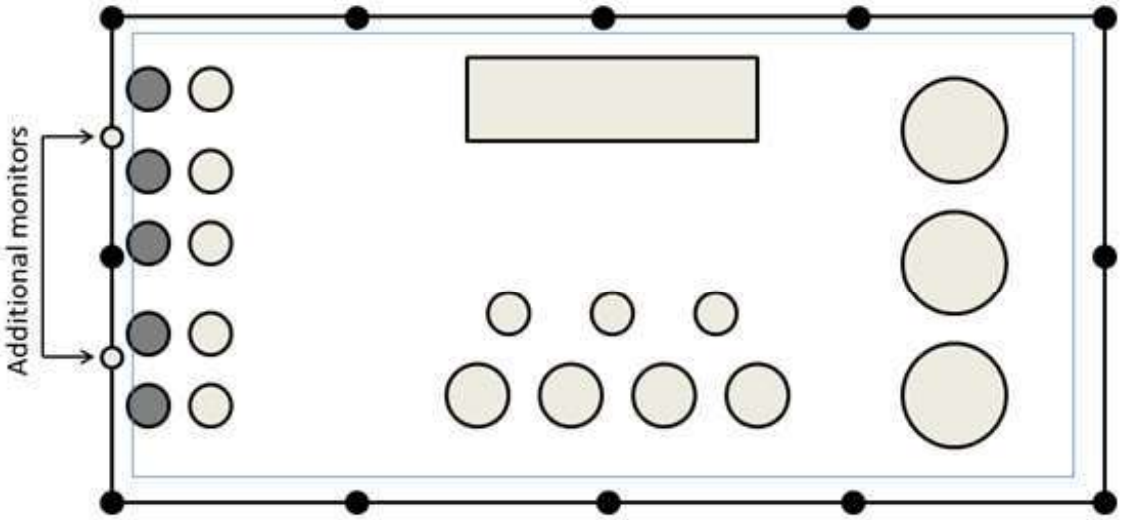
8.2.1.3 Extra samplers must be placed near known sources of VOCs if the potential emission source is within 50 meters (162 feet) of the boundary and the source location is between two monitors. Measure the distance (x) between the two monitors and place another monitor halfway between (x/2) the two monitors. For example, in Figure 8.1, the facility added three additional monitors (i.e., light shaded sampler locations) and in Figure 8.2, the facility added two additional monitors to provide sufficient coverage of all area sources.



Refinery (20% Angle)

Note: Shaded sources are within 50 meters of the property boundary and are located between two monitors. Additional coverage required by this method was accomplished by placing the monitors halfway between two existing monitors.

Figure 8.1. Facility with a Regular Shape Between 750 and 1,500 Acres in Area



Refinery (24,000 Feet Perimeter)

Note: Shaded sources are within 50 meters of the property boundary and are located between two monitors. Additional coverage required by this method was accomplished by placing the monitors halfway between two existing monitors.

Figure 8.2. Facility with a Boundary Length of 24,000 feet

8.2.2 Option 1 for Determining Sampling Locations.

8.2.2.1 For facilities with a regular (circular, triangular, rectangular, or square) shape, determine the geographic center of the facility.

8.2.2.1.1 For facilities with an area of less than or equal to 750 acres, measure angles of 30 degrees from the center point for a total of twelve 30 degree measurements evenly spaced (±1 degree).

8.2.2.1.2 For facilities covering an area greater than 750 acres but less than or equal to 1,500 acres, measure angles of 20 degrees from the center point for a total of eighteen 20 degree measurements evenly spaced (±1 degree). Figure 8.1 shows the monitor placement around the property boundary of a facility with an area between 750 and 1,500 acres. Monitor placements are represented with black dots along the property boundary.

8.2.2.1.3 For facilities covering an area greater than 1,500 acres, measure angles of 15 degrees from the center point for a total of twenty-four 15 degree measurements evenly spaced (±1 degree).

8.2.2.1.4 Locate each sampling point where the measured angle intersects the outer monitoring perimeter.

8.2.2.2 For irregularly shaped facilities, divide the area into a set of connecting subarea circles, triangles or rectangles to determine sampling locations. The subareas must be

defined such that a circle can reasonably encompass the subarea. Then determine the geometric center point of each of the subareas.

8.2.2.2.1 If a subarea is less than or equal to 750 acres (e.g., Figure 8.3), measure angles of 30 degrees from the center point for a total of twelve 30 degree measurements (±1 degree).

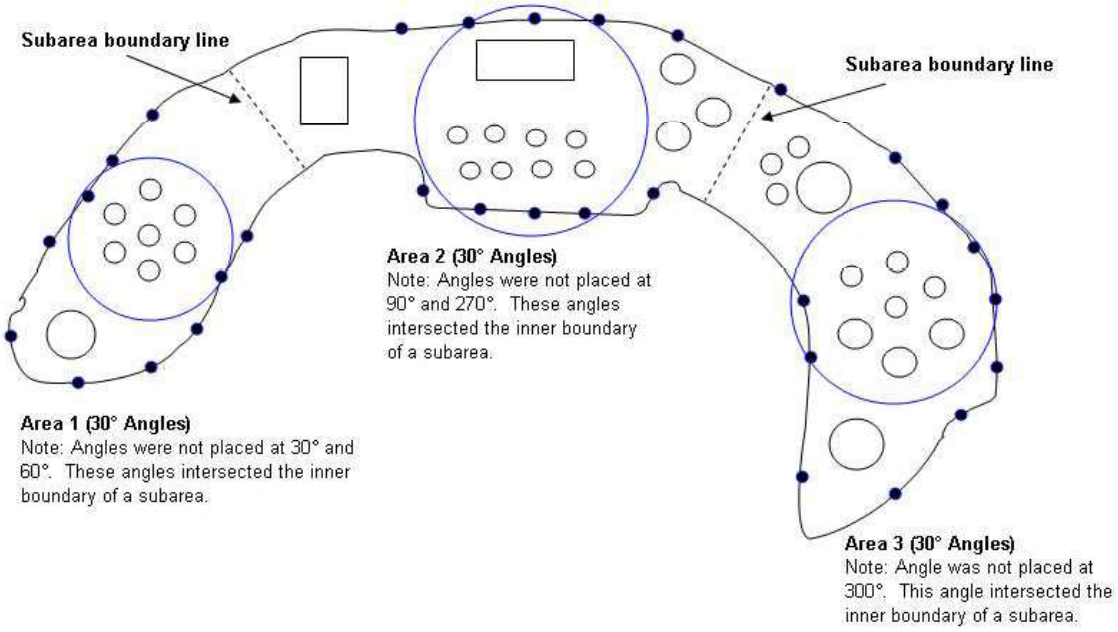


Figure 8.3. Facility Divided into Three Subareas

8.2.2.2.2 If a subarea is greater than 750 acres but less than or equal to 1,500 acres (e.g., Figure 8.4), measure angles of 20 degrees from the center point for a total of eighteen 20 degree measurements (±1 degree).

8.2.2.2.3 If a subarea is greater than 1,500 acres, measure angles of 15 degrees from the center for a total of twenty-four 15 degree measurements (±1 degree).

8.2.2.2.4 Locate each sampling point where the measured angle intersects the outer monitoring perimeter. Sampling points need not be placed closer than 152 meters (500 feet) apart (or 76 meters (250 feet) if known sources are within 50 meters (162 feet) of the monitoring perimeter), as long as a minimum of 3 monitoring locations are used for each subarea.

8.2.2.2.5 Sampling sites are not needed at the intersection of an inner boundary with an adjacent subarea. The sampling location must be sited where the measured angle intersects the subarea's outer monitoring perimeter.

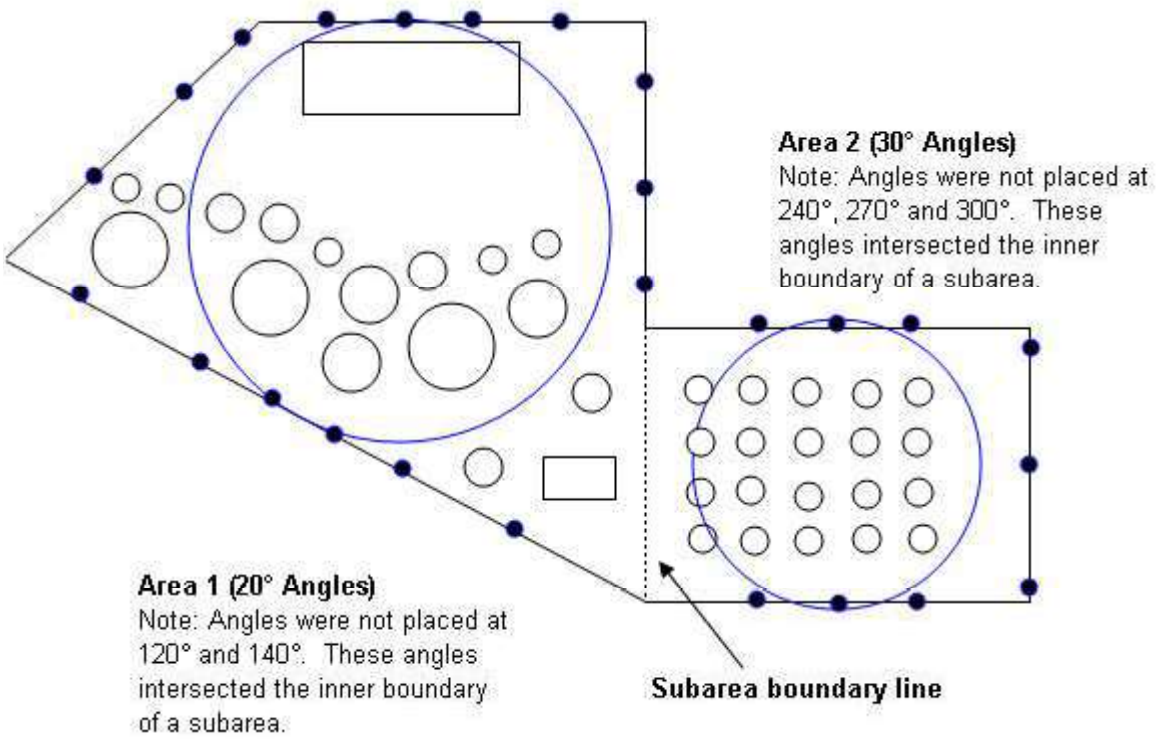


Figure 8.4. Facility Divided into Two Subareas

8.2.3 Option 2 for Determining Sampling Locations.

8.2.3.1 For facilities with a monitoring perimeter length

of less than 7,315 meters (24,000 feet), a minimum of twelve sampling locations evenly spaced ± 10 percent of the location interval is required.

8.2.3.2 For facilities with a monitoring perimeter length greater than 7,315 meters (24,000 feet), sampling locations are spaced 610 ± 76 meters (2,000 ± 250 feet) apart.

8.3 Siting a Meteorological Station. A meteorological station is required at or near the facility you are monitoring. A number of commercially available meteorological stations can be used. Information on meteorological instruments can be found in EPA-454/R-99-005 (Reference 11) (incorporated by reference—see §63.14). Some important considerations for siting of meteorological stations are detailed below.

8.3.1 Place meteorological stations in locations that represent conditions affecting the transport and dispersion of pollutants in the area of interest. Complex terrain may require the use of more than one meteorological station.

8.3.2 Deploy wind instruments over level, open terrain at a height of 10 meters (33 feet). If possible, locate wind instruments at a distance away from nearby structures that is equal to at least 10 times the height of the structure.

8.3.3 Protect meteorological instruments from thermal radiation and adequately ventilate them using aspirated shields. The temperature sensor must be located at a distance away from

any nearby structures that is equal to at least four times the height of the structure. Temperature sensors must be located at least 30 meters (98 feet) from large paved areas.

8.3.4 Collect and record meteorological data, including wind speed, wind direction, temperature and barometric pressure on an hourly basis. Calculate average unit vector wind direction, sigma theta, temperature and barometric pressure per sampling period to enable calculation of concentrations at standard conditions. Supply this information to the laboratory.

8.3.5 Identify and record the location of the meteorological station by its GPS coordinate.

8.4 Monitoring Frequency.

8.4.1 Sample collection may be performed for periods up to 14 days.

8.4.2 A site screening protocol that meets method requirements may be performed by collecting samples for a year where each PS accumulates VOC for a 14-day sampling period. Study results are accumulated for the sampling periods (typically 26) over the course of one calendar year. To the extent practical, sampling tubes should be changed at approximately the same time of day at each of the monitoring sites.

8.5 Passive Sampler Deployment.

8.5.1 Clean (conditioned) sorbent tubes must be prepared

and packaged by the laboratory as described in Method 325B and must be deployed for sampling within 30 days of conditioning.

8.5.2 Allow the tubes to equilibrate with ambient temperature (approximately 30 minutes to 1 hour) at the monitoring location before removing them from their storage/shipping container for sample collection.

8.5.3 If there is any risk that the analytical equipment will not meet the requirement to exclude contamination on outer tube surfaces from the sample flow path (see Section 6.6 of Method 325B), sample handlers must wear clean, white, cotton or powder-free nitrile gloves during PS deployment and collection and throughout any other tube handling operations.

8.5.4 Inspect the sampling tubes immediately prior to deployment. Ensure that they are intact, securely capped, and in good condition. Any suspect tubes (e.g., tubes that appear to have leaked sorbent) should be removed from the sampling set.

8.5.5 Secure passive samplers so the bottom of the diffusive sampling cap is 1.5 to 3 meters (4.9 to 9.8 feet) above ground using a pole or other secure structure at each sampling location. Orient the PS vertically and with the sampling end pointing downward to avoid ingress of particulates.

Note: Duplicate sampling assemblies must be deployed in at least one monitoring location for every 10 monitoring locations during each field monitoring period.

8.5.6 Protect the PS from rain and excessive wind velocity by placing them under the type of protective hood described in Section 6.1.3 or equivalent.

8.5.7 Remove the storage cap on the sampling end of the tube and replace it with a diffusive sampling cap at the start of the sampling period. Make sure the diffusion cap is properly seated and store the removed storage caps in the empty tube shipping container.

8.5.8 Record the start time and location details for each sampler on the field sample data sheet (see example in Section 17.0.).

8.5.9 Expose the sampling tubes for the required sampling period-normally 14-days.

8.5.10 Field blank tubes (see Section 9.3 of Method 325B) are stored outside the shipping container at representative sampling locations around the site, but with both long-term storage caps kept in place throughout the monitoring exercise. Collect at least two field blanks sorbent samples per sampling period to ensure sample integrity associated with shipment, collection, and storage.

8.6 Sorbent Tube Recovery and Meteorological Data Collection. Recover deployed sampling tubes and field blanks as follows:

8.6.1 After the sampling period is complete, immediately

replace the diffusion end cap on each sampled tube with a long-term storage end cap. Tighten the seal securely by hand and then tighten an additional quarter turn with an appropriate tool. Record the stop date and time and any additional relevant information on the sample data sheet.

8.6.2 Place the sampled tubes, together with the field blanks, in the storage/shipping container. Label the storage container, but do not use paints, markers, or adhesive labels to identify the tubes. TD-compatible electronic (radio frequency identification (RFID)) tube labels are available commercially and are compatible with some brands of thermal desorber. If used, these may be programmed with relevant tube and sample information, which can be read and automatically transcribed into the sequence report by the TD system.

Note: Sampled tubes must not be placed in the same shipping container as clean conditioned sampling tubes.

8.6.3 Sampled tubes may be shipped at ambient temperature to a laboratory for sample analysis.

8.6.4 Specify whether the tubes are field blanks or were used for sampling and document relevant information for each tube using a Chain of Custody form (see example in Section 17.0) that accompanies the samples from preparation of the tubes through receipt for analysis, including the following information: Unique tube identification numbers for each sampled

tube; the date, time, and location code for each PS placement; the date, time, and location code for each PS recovery; the GPS reference for each sampling location; the unique identification number of the duplicate sample (if applicable); and problems or anomalies encountered.

8.6.5 If the sorbent tubes are supplied with electronic (e.g., RFID) tags, it is also possible to allocate a sample identifier to each PS tube. In this case, the recommended format for the identification number of each sampled tube is AA-BB-CC-DD-VOC, where:

AA = Sequence number of placement on route (01, 02, 03. . .)

BB = Sampling location code (01, 02, 03 . . .)

CC = 14-day sample period number (01 to 26)

DD = Sample code (SA = sample, DU = duplicate, FB = field blank)

VOC = 3-letter code for target compound(s) (e.g., BNZ for benzene or BTX for benzene, toluene, and xylenes)

Note: Sampling start and end times/dates can also be logged using RFID tube tags.

9.0 Quality Control

9.1 Most quality control checks are carried out by the laboratory and associated requirements are in Section 9.0 of Method 325B, including requirements for laboratory blanks, field blanks, and duplicate samples.

9.2 Evaluate for potential outliers the laboratory results

for neighboring sampling tubes collected over the same time period. A potential outlier is a result for which one or more PS tube does not agree with the trend in results shown by neighboring PS tubes—particularly when data from those locations have been more consistent during previous sampling periods. Accidental contamination by the sample handler must be documented before any result can be eliminated as an outlier. Rare but possible examples of contamination include loose or missing storage caps or contaminated storage/shipping containers. Review data from the same and neighboring monitoring locations for the subsequent sampling periods. If the anomalous result is not repeated for that monitoring location, the episode can be ascribed to transient contamination and the data in question must be flagged for potential elimination from the dataset.

9.3 Duplicates and Field Blanks.

9.3.1 Collect at least one co-located/duplicate sample for every 10 field samples to determine precision of the measurements.

9.3.2 Collect at least two field blanks sorbent samples per sampling period to ensure sample integrity associated with shipment, collection, and storage. You must use the entire sampling apparatus for field blanks including unopened sorbent tubes mounted in protective sampling hoods. The tube closures

must not be removed. Field blanks must be placed in two different quadrants (e.g., 90° and 270°) and remain at the sampling location for the sampling period.

10.0 Calibration and Standardization

Follow the calibration and standardization procedures for meteorological measurements in EPA-454/B-08-002 March 2008 (Reference 11) (incorporated by reference—see §63.14). Refer to Method 325B for calibration and standardization procedures for analysis of the passive sampling tubes.

11.0 Analytical Procedures

Refer to Method 325B, which provides details for the preparation and analysis of sampled passive monitoring tubes (preparation of sampling tubes, shipment and storage of exposed sampling tubes, and analysis of sampling tubes).

12.0 Data Analysis, Calculations and Documentation

12.1 Calculate Annual Average Fenceline Concentration. After a year's worth of sampling at the facility fenceline (for example, 26 14-day samples), the average (PS_i) may be calculated for any specified period at each PS location using Equation 12.1.

$$PS_i = \frac{\sum PS_{ip}}{N} \qquad \text{Eq. 12.1}$$

Where:

PS_i = Annual average for location i.

PS_{ip} = Sampling period specific concentration from Method 325B.

i = Location of passive sampler (0 to 360°).

p = The sampling period.

N = The number of sampling periods in the year (e.g., for 14-day sampling periods, from 1 to 26).

Note: PS_{ip} is a function of sampling location-specific factors such as the contribution from facility sources, unusual localized meteorological conditions, contribution from nearby interfering sources, the background caused by integrated far-field sources and measurement error due to deployment, handling, siting, or analytical errors.

12.2 Identify Sampling Locations of Interest. If data from neighboring sampling locations are significantly different, then you may add extra sampling points to isolate background contributions or identify facility-specific "hot spots."

12.3 Evaluate Trends. You may evaluate trends and patterns in the PS data over multiple sampling periods to determine if elevated concentrations of target compounds are due to operations on the facility or if contributions from background sources are significant.

12.3.1 Obtain meteorological data including wind speed and wind direction or unit vector wind data from the on-site meteorological station. Use this meteorological data to determine the prevailing wind direction and speed during the periods of elevated concentrations.

12.3.2 As an option you may perform preliminary back trajectory calculations (http://ready.arl.noaa.gov/HYSPLIT.php) to aid in identifying the source of the background contribution to elevated target compound concentrations.

12.3.3 Information on published or documented events on- and off-site may also be included in the associated sampling period report to explain elevated concentrations if relevant. For example, you would describe if there was a chemical spill on site, or an accident on an adjacent road.

12.3.4 Additional monitoring for shorter periods (See section 8.4) may be necessary to allow better discrimination/resolution of contributing emission sources if the measured trends and associated meteorology do not provide a clear assessment of facility contribution to the measured fenceline concentration.

12.3.5 Additional records necessary to calculate sampling period average target compound concentration can be found in Section 12.1 of Method 325B.

13.0 Method Performance

Method performance requirements are described in Method 325B.

14.0 Pollution Prevention

[Reserved]

15.0 Waste Management

[Reserved]

16.0 References

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17.0 Tables, Diagrams, Flowcharts and Validation Data

Method 325 A/B

EXAMPLE FIELD TEST DATA SHEET (FTDS)
AND
CHAIN OF CUSTODY

I. GENERAL INFORMATION

SITE NAME:
_____
SITE LOCATION ADDRESS:
_____
CITY: _____STATE: _____ ZIP: _____

II. SAMPLING DATA

Sample ID (Tube) #	Sorbent	Sample or blank	Start Date	Start Time	Stop Date	Stop Time	Location (gps)	Ambient Temp. (°F)	Barometric Pressure (in. Hg)

III. CUSTODY INFORMATION

COLLECTED BY: _____
Relinquished to Shipper -
Name: _____ Date: _____ Time _____
Received by Laboratory -
Name _____ Date: _____ Time _____
Sample condition upon receipt:
_____
Analysis Required:
_____
_____
Comments:
_____
_____
_____

Figure 17.1. Example Field Data Form and Chain of Custody