PRECISION
ENVIRONMENTAL SERVICES, INC.
831 RT. 67, LOT 38 A
BALLSTON SPA, NY 12020
TEL: 518-885-4399
FAX: 518-885-4416
CERTIFIED WOMEN-OWNED BUSINESS ENTERPRISE

25 YEARS
1991 - 2016

March 11, 2022

Via Electronic Mail: Rachel.savarie@dec.ny.gov

Rachel K. Savarie, P.E.
Project Manager – Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, Albany, New York 12233-7014

RE: SVI & Monitoring Well Sampling Work Plan
Lubricant Packaging Co.
17 Industrial Place, Middletown, NY (Orange County)
NYSDEC Site No.: 336034

Ms. Savarie:

Precision Environmental Services, Inc. (PES) submits this work plan for your acceptance. The New York State Department of Environmental Conservation (Department) requests PES sample fourteen (14) existing monitoring wells and conduct sub-slab vapor intrusion (SVI) sampling at the 79 Industrial Place property. These planned activities are detailed herein, and a site location map is provided as Figure 1. Work completed by PES will be completed in accordance with Prime Contract C100614.

HASP & Coronavirus
PES previously prepared a site-specific health and safety plan (HASP) which we will use during the completion of this plan work scope. The HASP addresses all necessary work-related safety precautions and procedures for the sample activities. Additionally, PES will follow all Federal, State and Local government Novel Coronavirus Disease awareness and preparedness guidelines during all field work activities.

Monitoring Well Sampling
PES will gauge and sample fourteen (14) existing monitoring wells (LMW-01 through LMW-05, LMW-08, LMW-11 through LMW-14 and MW-06, MW-09, MW-206 and MW-209. Locations are presented on Figure 2. A water level indicator will be used to gauge depth to water and depth to bottom of well at each location. The probe will be decontaminated between monitoring wells using an Alconox wash followed by rinse. All measurements will be recorded on a monitoring data sheet.

PES will purge each well of 3 to 5 well volumes prior to sampling. These water samples will be analyzed for volatile organic compounds (VOC) using EPA Method 8260C. Laboratory analysis will include one duplicate sample and a matrix spike and matrix spike duplicate sample. All samples will be stored on ice and delivered to Pace Analytical under proper chain of custody (COC) for standard turnaround time analysis. The laboratory will provide PES with a Category B data package, including an electronic data deliverable (EDD).

Sub-Slab Vapor Intrusion Sampling – 79 Industrial Place

All SVI sample activities will be performed following the New York State Department of Health (DOH), *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. This guidance reference will be reviewed and followed by PES staff, specifically as it pertains to procedures required to thoroughly and accurately complete indoor air quality sampling for analysis. PES has included a Standard Operating Procedure (SOP) for SVI studies as Attachment A.

Based on the Department provided *Offsite Soil Vapor Intrusion Investigation Report,* dated June 11, 2019, prepared by CDM Smith, PES understands the sub-slab air sample locations are permanent vapor points. Sample locations are as follows and presented on Figure 3:

- Sub-Slab (SS)-Soil Vapor (SV)-04 and Indoor Air (IA)-04
- SS-SV-05 and IA-05
- SS-SV-06 and IA-06
- SS-SV-07 and IA-07
- Ambient Outdoor Air (AA)-02
- Blind duplicate collected from one of the SS-SV locations

Following tracer gas seal testing these samples will be collected in laboratory supplied canisters equipped with 24-hour laboratory calibrated regulators. In keeping with the DOH Guidance PES will first complete an Indoor Air Quality Questionnaire and Building Inventory (Attachment B), followed by performance of the pre, during and post sample collection process steps. All information will be documented in a field book. Once sample collection is complete, PES will deliver the sample canisters to Pace Analytical for analysis.

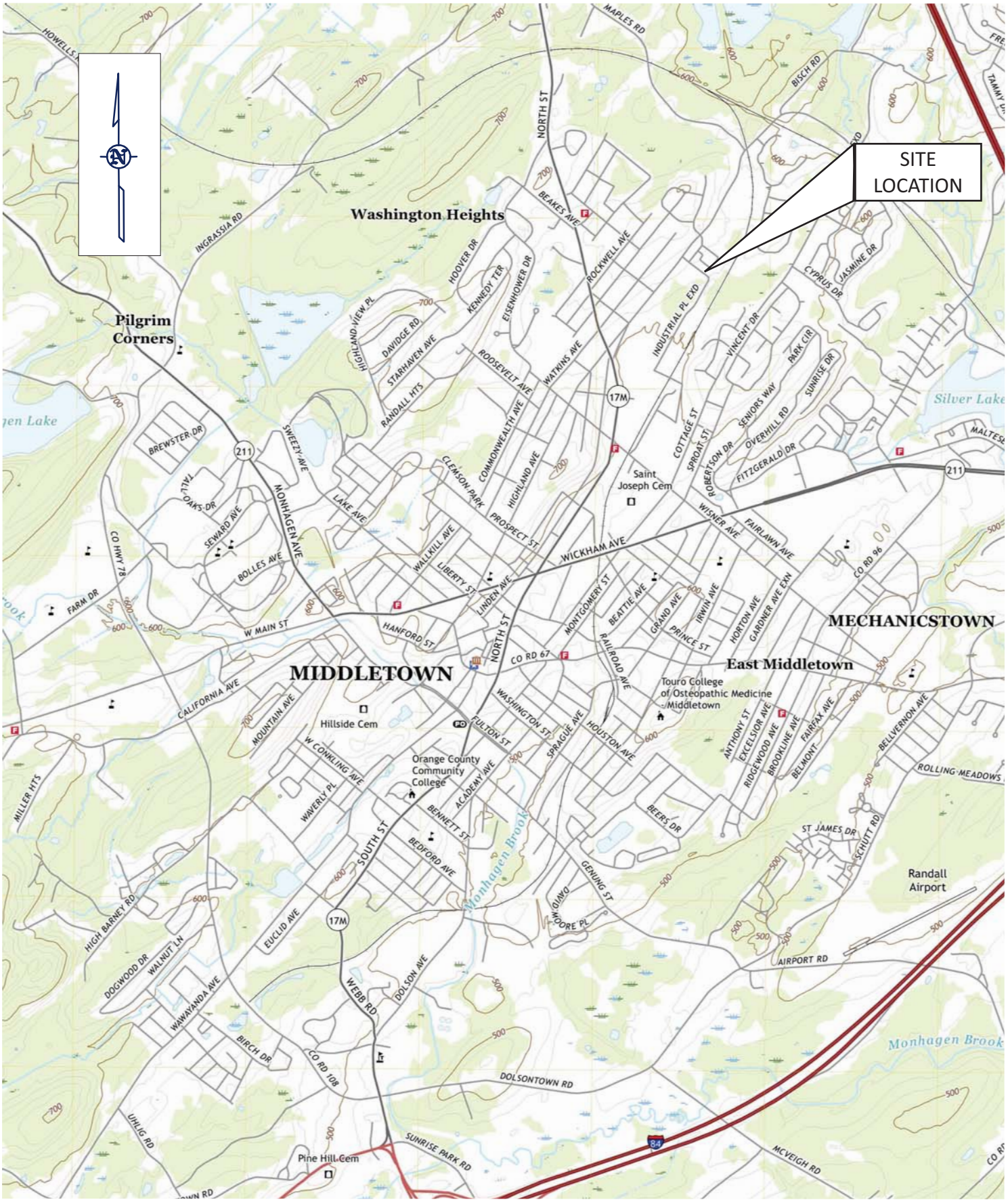
All sample data collected as part of the groundwater and SVI investigation will be validated by an independent third party subcontracted by PES. They will provide a Data Useability Summary Report (DUSR) and enter data in the Department's EQuIS data management platform. All work detailed above will be coordinated with Department access agreement property owners and their tenants, as necessary. Should you have any questions regarding the above report, please feel free to contact the undersigned at 518-885-4399.

Sincerely.
PRECISION ENVIRONMENTAL SERVICES, INC.

Brian Neumann
Project Manager

Attachments:
Figures
PES SVI SOP
DOH Questionnaire

Figures



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CERTIFIED WOMEN-OWNED BUSINESS ENTERPRISE

Lubricant Packaging Co.
17 Industrial Place, Middletown, NY

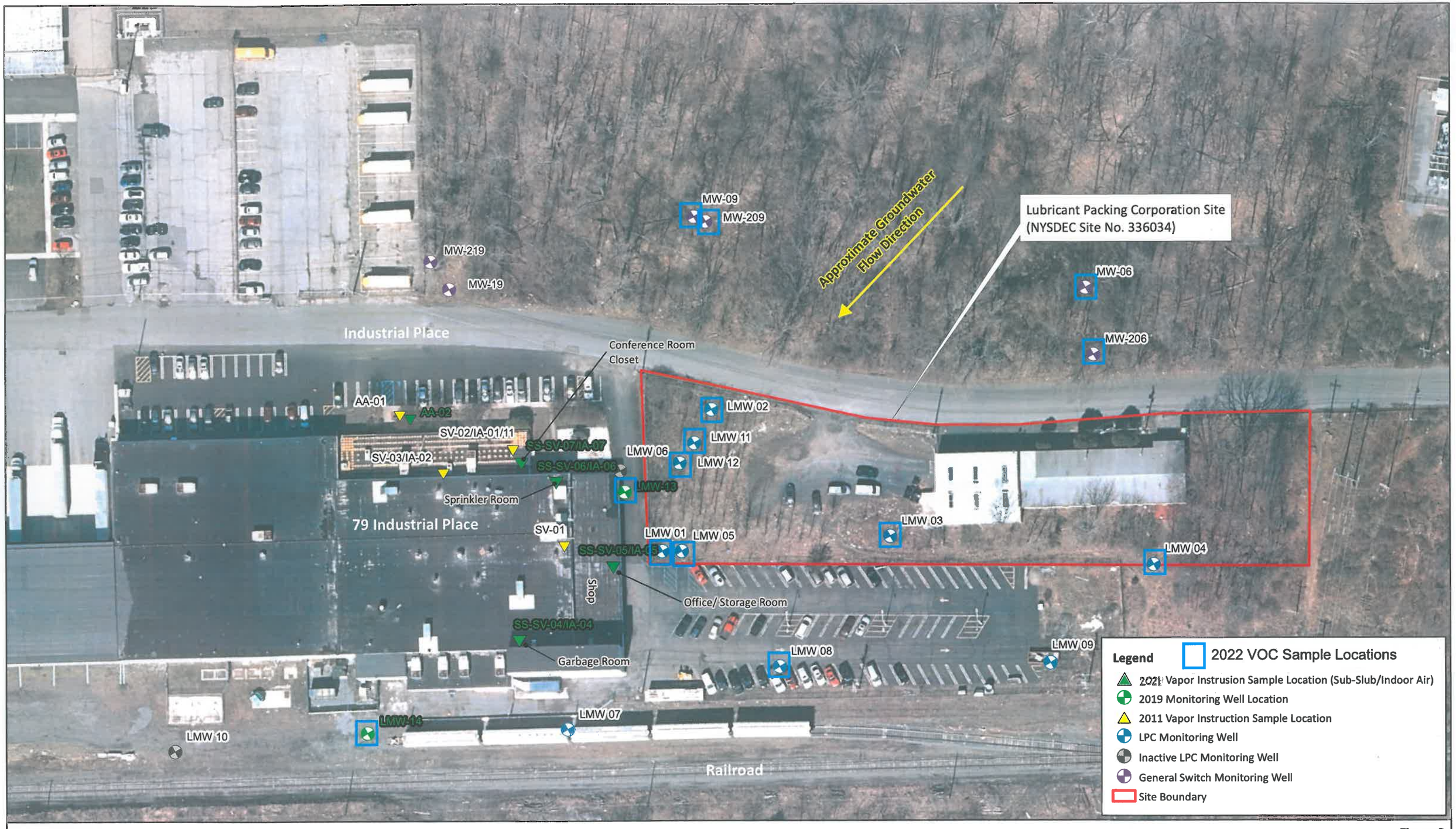
Date: Jan 2021

Map Courtesy of Google

SITE LOCATION MAP

NYSDEC Site #: 336034

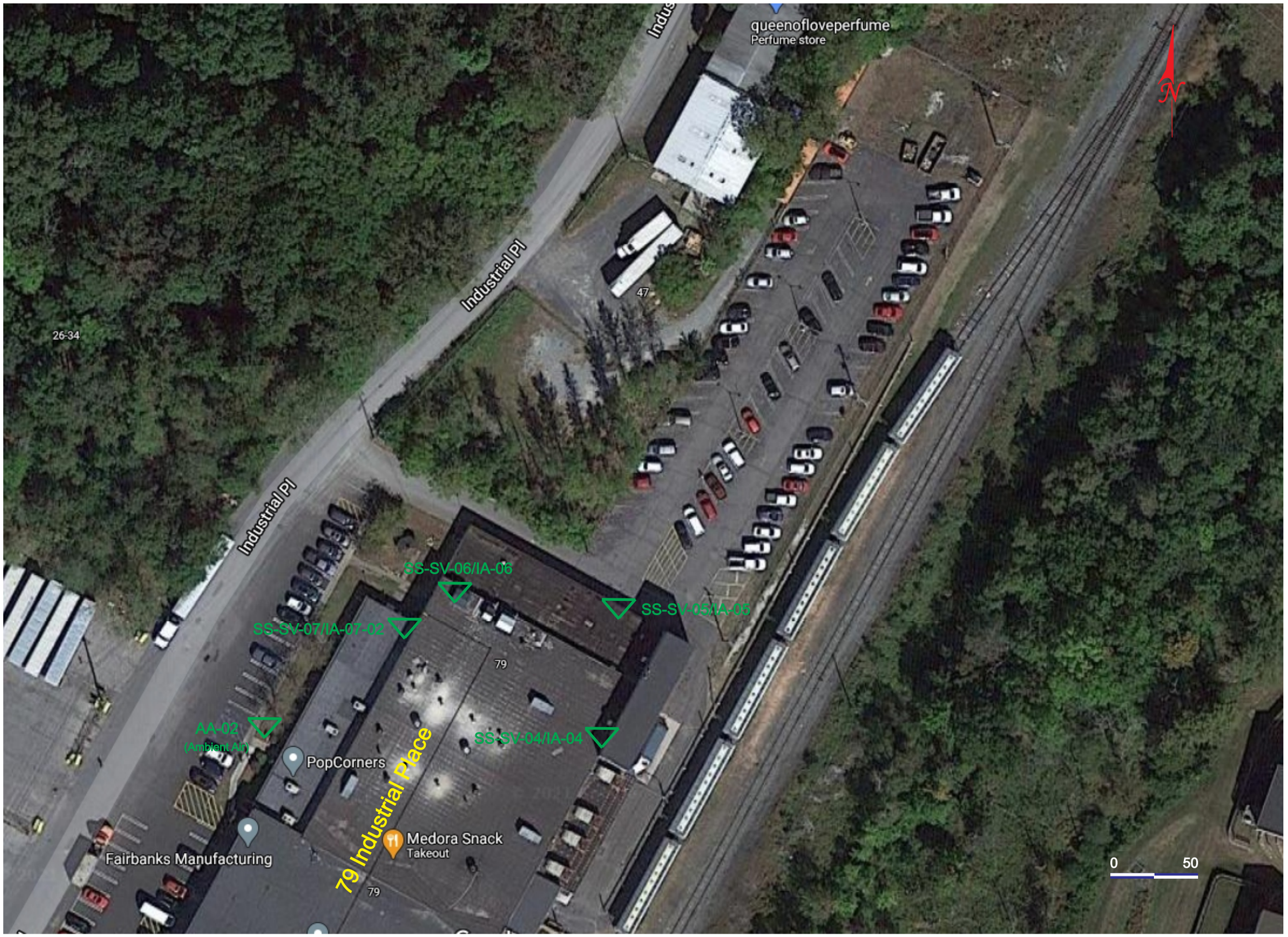
Figure: 1



Sample Location Map

Figure 2
79 Industrial Place
Middletown, New York

ESTRADAL C:\Users\estradal\Documents\PROJECTS\NYSDEC Projects\Lubricant Packaging\Fig1_Sample_Loc_Map.mxd 7/17/2019



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SUB SLAB VAPOR INTRUSION SAMPLE LOCATIONS

LUBRICANT PACKAGING COMPANY

SITE #: 336034	
LOCATION: 17 INDUST. PLACE, MIDDLETOWN, NY	
DATE: 1.27.21	**REVISED BY: JJJ**
FIGURE: 3	**SCALE: AS SHOWN**

LEGEND

AA-02 ▽ Vapor Intrusion Sample Collection Location

NOTES:

- BASE MAP COMPOSED FROM 2011 AERIAL IMAGERY PROVIDED COURTESY GOOGLE MAPS
- ALL LOCATIONS ARE APPROXIMATE

Attachment A – SVI SOP

PRECISION
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SOIL VAPOR INTRUSION STUDY STANDARD OPERATING PROCEDURES

Sub-Slab Vapor Sampling, Indoor Air Sampling, and Ambient Air Sampling

1.0 Sub-Slab Vapor Sampling and Analysis Using USEPA Method TO-15

I. Scope and Application

This document describes the procedures to install a sub-slab sampling port and collect sub-slab vapor samples for the analysis of volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Method TO-15 (TO-15). The TO-15 method uses a 6-liter SUMMA® passivated stainless steel canister. An evacuated SUMMA canister (less than 28 inches of mercury [Hg]) will provide a recoverable whole-gas sample of approximately 5.5 liters when allowed to fill to a vacuum of 2 inches of Hg. The whole-air sample is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS) system to provide compound detection limits of 0.5 parts per billion volume (ppbv).

The following sections list the necessary equipment and detailed instructions for installing sub-slab vapor probes and collecting samples for VOC analysis.

II. Personnel Qualifications

PES field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site-specific training, first-aid, and cardiopulmonary resuscitation (CPR), as needed. PES field sampling personnel will be well versed in the relevant standard operating procedures (SOPs) and possess the required skills and experience necessary to successfully complete the desired field work. PES personnel responsible for leading sub-slab vapor sample collection activities must have previous sub-slab vapor sampling experience.

III. Equipment List

The equipment typically required to install a temporary sub-slab vapor probe is presented below:

- Electric impact drill;
- 1/2-inch diameter (minimum) concrete drill bit for impact drill;
- 1/4-inch tubing (Teflon®, polyethylene, or similar);
- ppb RAE PID;
- Hydrated bentonite/beeswax/modelling clay; and

The equipment required for vapor sample collection is presented below:

- Stainless steel SUMMA® canisters (order at least one extra, if feasible);
- Flow controllers with in-line particulate filters and vacuum gauges; flow controllers are pre-calibrated to specified sample duration (e.g., 30 minutes, 8 hours, 24 hours) or flow rate (e.g., 200 milliliters per minute [mL/min]); confirm with the laboratory that the flow controller comes with an in-line particulate filter and pressure gauge (order at least one extra, if feasible);
- 1/4-inch ID tubing (Teflon®, polyethylene, or similar);
- Twist-to-lock/swagelock fittings;
- Stainless steel “T” fitting (if collecting duplicate [i.e., split] samples);
- Portable vacuum pump (hand pump or peristaltic pump) capable of producing very low flow rates (e.g., 100 to 200 mL/min);
- Tracer gas source (e.g., helium) and monitoring equipment;
- Tracer gas shroud equipment (e.g. plastic sheeting, plastic pail, rubber plugs)

- ppb RAE PID;
- Appropriate-sized open-end wrench (typically 9/16-inch);
- Chain-of-custody (COC) form;
- Sample collection log; and
- Field notebook.

IV. Cautions

Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens, wear/apply fragrances, or smoke cigarettes/cigars before and/or during the sampling event.

Care should also be taken to ensure that the flow controller is pre-calibrated to the proper sample collection time (confirm with laboratory). Sample integrity is maintained if the sampling event is shorter than the target duration, but sample integrity can be compromised if the event is extended to the point that the canister reaches atmospheric pressure.

Care must be taken to properly seal around the vapor probe at slab surface to prevent leakage of atmosphere into the soil vapor probe during purging and sampling. Temporary points are fit snug into the pre-drilled hole using Teflon® tape and a hydrated bentonite/beeswax/modelling clay seal at the surface.

V. Health and Safety Considerations

Field sampling equipment must be carefully handled to minimize the potential for injury and the spread of hazardous substances. For sub-slab vapor probe installation, drilling with an electric concrete impact drill should be done only by personnel with prior experience using such a piece of equipment.

VI. Procedures

Temporary Vapor Probe Installation

Temporary sub-slab soil vapor probes are installed using an electric drill and manual placement of tubing. The drill will be advanced to approximately 3 inches beneath the bottom of the slab. A 1/2-inch OD hole is installed through the slab. The tubing is then inserted into the hole. The tubing is purged prior to collection of a vapor sample. Probe locations are resealed after sampling is complete.

1. Remove, only to the extent necessary, any covering on top of the slab (e.g., carpet).

2. Drill a 1/2-inch diameter (minimum) hole through the concrete slab using the electric drill.

3. Advance the drill bit approximately 3 inches into the sub-slab material to create an open cavity.

4. Insert approximately 1/4-inch diameter tubing approximately 1.5 inches into the sub-slab material. Wrap the tubing with teflon tape as necessary to create snug fit between tubing and concrete borehole. Do not advance the tubing further than 2-inches

below the slab. Leave approximately 2 feet of tubing exposed above the slab.

5. Prepare the surface seal and apply (hydrated bentonite/beeswax/modelling clay) at slab surface around the tubing.

Sub-Slab Vapor Sample Collection

Preparation of SUMMA®-Type Canister and Collection of Sample

1. Record the following information in the field notebook, if appropriate (contact the local airport or other suitable information source [e.g., site-specific measurements, weatherunderground.com] to obtain the information):

    a. wind speed and direction;
    b. ambient temperature;
    c. barometric pressure; and
    d. relative humidity.

2. At a minimum tracer gas samples should be collected from at least 10% of the sub-slab vapor probes to verify the surface seal integrity around the vapor probe. The tracer gas application is performed by installing a shroud above the probe and filling the airspace within the shroud with a tracer gas (typically helium). Additional information about tracer gas usage is included on Page 14.

    a. First prepare a 1' x 1' layer of 6-mil thick plastic sheeting with a perforation in the center to allow the vapor probe to pass through, reduce the drying rate of the probe surface seal.
    b. Place the plastic sheeting on the surface above the vapor probe exposing the center of the surface seal and probe through the perforation. Seal the plastic to the slab by installing a ring of hydrated bentonite/beeswax/modelling clay around, but not in contact with, the probe surface seal.
    c. Cut three holes in a 2.5 quart plastic pail. One to allow the 1/4-inch tubing through the bottom, one 3/8-inch diameter hole on the side near the bottom, and another 3/8-inch diameter hole on the opposite side from the other 3/8-inch hole but near the top of the pail.
    d. Turn the pail upside down above the vapor probe. Insert the vapor probe tubing through the hole in the bottom of the pail, slide the pail down the tubing, and cover the vapor probe with the pail creating a shroud. Seal the shroud to the plastic utilizing hydrated bentonite/beeswax/modelling clay.
    e. Enrich the atmosphere with the helium by introducing the gas through the upper hole in the side of the shroud being careful not to increase the pressure within the shroud.
    f. Utilize a helium detector to monitor the helium level within the lower hole in the side of the shroud. Introduce enough helium to enrich the atmosphere within the shroud to pure helium levels and document the concentration achieved.
    g. Seal the two holes on the sides of the shroud with 3/8-inch rubber plugs.

3. Verify the purge flow rate by connecting a portable vacuum pump to a 1L tedlar bag and fill the bag with ambient air at a flow rate of 0.1 – 0.2 L/min. At these rates the bag should fill in 5-10 minutes. Once the flow rate is verified, connect the portable vacuum pump to the sample tubing. Purge 1 to 3 volumes (single purge volume = $Pi\ r^2 h$) of air from the vapor probe and sampling line to a 1L tedlar bag using the portable pump. A single purge volume from a 24-inch segment of 1/4-inch tubing is equal to 0.02L. Measure and document VOC and tracer gas levels from the purged air with a PID and helium detector. Helium concentration within the purged air must be <10%, otherwise the

probe surface seal must be enhanced. Purge the excess from the tedlar bag at an outdoor upwind location.

4. Remove the brass plug from the SUMMA® canister and connect the flow controller with in-line particulate filter and vacuum gauge to the SUMMA® canister. Do not open the valve on the SUMMA® canister. Record in the field notebook and on the COC form the flow controller number with the appropriate SUMMA® canister number.

5. Connect the polyethylene sample collection tubing to the flow controller and the SUMMA® canister valve. Record in the field notebook the time sampling began and the canister pressure.

6. Connect the other end of the polyethylene tubing to the sub-slab sampling port.

7. Open the SUMMA® canister valves. Record in the field notebook the time sampling began and the canister pressure.

8. Step back and take a photograph of the SUMMA® canister and surrounding area.

Termination of Sample Collection

1. Arrive at the SUMMA® canister location at least 10 to 15 minutes prior to the end of the required sampling interval.

2. Record the final vacuum pressure. Stop collecting the sample by closing the SUMMA® canister valves. The canister should have a minimum amount of vacuum (approximately 2 inches of Hg or slightly greater).

3. Record the date and local time (24-hour basis) of valve closing in the field notebook, sample collection log, and COC form.

4. As done during the preparation in Steps 2 and 3, enrich the shroud (if one is present) with the tracer gas, purge the vapor probe to a tedlar bag, and screen the purged air for the tracer gas to confirm the integrity of the probe surface seal was maintained. Document the helium concentration detected in the shroud and helium and VOC concentrations in the purged air.

5. Remove the particulate filter and flow controller from the SUMMA® canister, reinstall the brass plug on the canister fitting, and tighten with the appropriate wrench.

6. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The SUMMA® canister does not require preservation with ice or refrigeration during shipment.

7. Complete the appropriate forms and sample labels as directed by the laboratory (e.g., affix card with a string).

8. Complete the COC form and place the requisite copies in a shipping container. Close the shipping container and affix a custody seal to the container closure. Ship the container to the laboratory via overnight carrier (e.g., Federal Express) for analysis.

Vapor Monitoring Point Abandonment

Once the vapor samples have been collected, a temporary vapor monitoring point will be abandoned by removing the sampling materials and filling the resulting hole with concrete. Replace the surface covering (e.g., carpet) to the extent practicable.

VII. Waste Management

No specific waste management procedures are required.

VIII. Data Recording and Management

Measurements will be recorded in the field notebook at the time of measurement with notations of the project name, sample date, sample start and finish time, sample location (e.g., GPS coordinates, distance from permanent structure [e.g., two walls, corner of room]), canister serial number, flow controller serial number, initial vacuum reading, and final pressure reading. Field sampling logs and COC records will be transmitted to the Project Manager.

IX. Quality Assurance

Vapor sample analysis will be performed using USEPA TO-15 methodology. This method uses a quadrupole or ion-trap GC/MS with a capillary column to provide optimum detection limits. The GC/MS system requires a 1-liter gas sample (which can easily be recovered from a 6-liter canister) to provide a 0.5-ppbv detection limit. The 6-liter canister also provides several additional 1-liter samples in case subsequent re-analyses or dilutions are required. This system also offers the advantage of the GC/MS detector, which confirms the identity of detected compounds by evaluating their mass spectra in either the SCAN or SIM mode.

X. References

DiGiulio et. al. 2003. Draft Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA TO-15 to Support Vapor Intrusion Investigations. http://www.cdphe.state.co.us/hm/indoorair.pdf (Attachment C).

New York State Department of Health (NYSDOH). 2006. "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" October 2006.

2.0 Indoor Air Sampling and Analysis Using USEPA Method TO-15

I. Scope and Application

This standard operating procedure (SOP) describes the procedures to collect indoor air samples for the analysis of volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method TO-15 (TO-15). The TO15 method uses a 6-liter SUMMA® passivated stainless steel canister. An evacuated SUMMA® canister (<28 inches of mercury [Hg]) will provide a recoverable whole-gas sample of approximately 5.5 liters when allowed to fill to a vacuum of 2 inches of Hg. The whole-air sample is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS) system to provide compound detection limits of 0.5 parts per billion volume (ppbv).

The following sections list the necessary equipment and provide detailed instructions for placing the sampling device and collecting indoor air samples for VOC analysis.

II. Personnel Qualifications

PES field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site-specific training, first aid, and cardiopulmonary resuscitation (CPR), as needed. PES field sampling personnel will be well versed in the relevant SOPs and possess the required skills and experience necessary to successfully complete the desired field work. PES personnel responsible for leading indoor air sample collection activities must have previous indoor air sampling experience.

III. Equipment List

The equipment required for indoor air sample collection is presented below:

- ppb RAE PID;
- 6-liter, stainless steel SUMMA® canisters (order at least one extra, if feasible);
- Flow controllers with in-line particulate filters and vacuum gauges (flow controllers are pre-calibrated by the laboratory to a specified sample duration [e.g., 8-hour, 24-hour]). Confirm with lab that flow controller comes with in-line particulate filter and pressure gauge (order an extra set for each extra SUMMA® canister, if feasible);
- Stainless steel “T” fitting (for connection to SUMMA® canisters and Teflon® tubing to collect split [i.e., duplicate] samples);
- Appropriate-sized open-end wrench (typically 9/16-inch);
- Chain-of-custody (COC) form;
- Building survey and product inventory form;
- Sample collection log;
- Field notebook;
- Camera;
- Lock and chain for unsecure locations; and
- Ladder, tripod, or similar to hold canister above the ground surface (optional).

IV. Cautions

Care must be taken to minimize the potential for introducing interferences during the sampling event. As such, care must be taken to keep the canister away from heavy pedestrian traffic areas (e.g., main entranceways, walkways). If the canister is not to be overseen for the entire sample duration, precautions should be taken to maintain the security of the sample (e.g., do not place in areas regularly accessed by the public, fasten the sampling device to a secure object using lock and chain, label the canister to indicate it is part of a scientific project, place the canister in secure housing that does not disrupt the integrity/validity of the sampling event). Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens, wear/apply fragrances, or smoke cigarettes before and/or during the sampling event.

Care should also be taken to ensure that the flow controller is pre-calibrated to the proper sample collection time (confirm with laboratory). Sample integrity is maintained if the sampling event is shorter than the target duration, but sample integrity can be compromised if the event is extended to the point that the canister reaches atmospheric pressure.

V. Health and Safety Considerations

Field sampling equipment must be carefully handled to minimize the potential for injury and the spread of hazardous substances.

VI. Procedures

Initial Building Survey

1. Complete the appropriate building survey form and product inventory form (e.g., state-specific form).

2. Survey the area for the apparent presence of items or materials that may potentially produce or emit constituents of concern and interfere with analytical laboratory analysis of the collected sample. Record relevant information on survey form and document with photographs.

3. Using the PID, screen indoor air in the location intended for sampling and the vicinity of potential VOC sources to preliminarily assess for the potential gross presence of VOCs.

4. Record date, time, location, and PID readings in the field notebook.

5. Items or materials that contain constituents of concern and/or exhibit elevated PID readings shall be considered probable sources of VOCs. Removal of these items is dependent on NYS DOH direction.

6. Set a time with the owner or occupant to return for placement of SUMMA® canisters.

Preparation of SUMMA®-Type Canister and Collection of Sample

1. Record the following information in the field notebook (contact the local airport or other suitable information source [e.g., weatherunderground.com] to obtain the following information):

    a. ambient temperature;
    b. barometric pressure; and
    c. relative humidity.

2. Choose the sample location in accordance with the sampling plan. If a breathing zone sample is required, place the canister on a ladder, tripod, or other similar stand to locate the canister orifice 3 to 5 feet above ground or floor surface. If the canister will not be overseen for the entire sampling period, secure the canister as appropriate (e.g., lock and chain). Canister may be affixed to wall/ceiling support with nylon rope or placed on a stable surface. In general, areas near windows, doors, air supply vents, and/or other potential sources of "drafts" shall be avoided.

3. Record SUMMA® canister serial number and flow controller number in the field notebook and COC form. Assign sample identification on canister ID tag, and record in the field notebook, sample collection log, and COC form.

4. Remove the brass dust cap from the SUMMA® canister. Attach the flow controller with in-line particulate filter and vacuum gauge (leave swage-lock cap on the vacuum gauge during this procedure) to the SUMMA® canister with the appropriate-sized wrench. Tighten with fingers first, then gently with the wrench.

5. Open the SUMMA® canister valve to initiate sample collection. Record the date and local time (24-hour basis) of valve opening in the field notebook, sample collection log, and COC form. Collection of duplicate/split samples will include attaching a stainless steel "T" to split the indoor air stream to two SUMMA® canisters, one for the original investigative sample and one for the duplicate/split sample.

6. Record the initial vacuum pressure in the SUMMA® canister in the field notebook and COC form. If the initial vacuum pressure does not register less than -28 inches of Hg, then the SUMMA® canister is not appropriate for use and another canister should be used.

7. Step back and take a photograph of the SUMMA® canister and surrounding area.

Termination of Sample Collection

1. Arrive at the SUMMA® canister location at least 10 to 15 minutes prior to the end of the sampling interval (e.g., 8-hour).

2. Stop collecting the sample when the canister vacuum reaches approximately 2 inches of Hg (leaving some vacuum in the canister provides a way to verify if the canister leaks before it reaches the laboratory) or when the desired sample time has elapsed.

3. Record the final vacuum pressure. Stop collecting the sample by closing the SUMMA® canister valve. Record the date, local time (24-hour basis) of valve closing in the field notebook, sample collection log, and COC form.

4. Remove the particulate filter and flow controller from the SUMMA® canister, reinstall brass plug on canister fitting, and tighten with wrench.

5. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The SUMMA® canister does not require preservation with ice or refrigeration during shipment.

6. Complete the appropriate forms and sample labels as directed by the laboratory (e.g., affix card with string).

7. Complete COC form and place requisite copies in shipping container. Close shipping container and affix custody seal to container closure. Ship to laboratory via overnight carrier (e.g., Federal Express) for analysis.

VII. Waste Management

No specific waste management procedures are required.

VIII. Data Recording and Management

PID measurements taken during the initial building survey will be recorded in the field notebook, with notations of project name, sample date, sample time, and sample location (e.g., description and GPS coordinates if available). A building survey form and product inventory form will also be completed for each building within the facility being sampled during each sampling event.

Measurements will be recorded in the field notebook at the time of measurement, with notations of project name, sample date, sample start and finish times, sample location (e.g., description and GPS coordinates if available), canister serial number, flow controller number, initial vacuum reading, and final vacuum reading. Field notebooks and COC records will be transmitted to the Project Manager.

IX. Quality Assurance

Indoor air sample analysis will be performed using USEPA Method TO-15. This method uses a quadrupole or ion-trap GC/MS with a capillary column to provide optimum detection limits. The GC/MS system requires a 1-liter gas sample (which can easily be recovered from a 6-liter canister) to provide a 0.5 ppbv detection limit. The 6-liter canister also provides several additional 1-liter samples in case subsequent re-analyses or dilutions are required. This system also offers the advantage of the GC/MS detector, which confirms the identity of detected compounds by evaluating their mass spectra in either the SCAN or SIM mode.

3.0 Ambient Air Sampling and Analysis Using USEPA Method TO-15

I. Scope and Application

This standard operating procedure (SOP) describes the procedures to collect ambient air samples for the analysis of volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method TO-15 (TO-15). The TO-15 method uses a passivated stainless steel canister to collect a whole-air sample that is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS).

The following sections list the necessary equipment and provide detailed instructions for placing the sampling device and collecting ambient air samples for VOC analysis.

II. Personnel Qualifications

PES field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site-specific training, first aid, and cardiopulmonary resuscitation (CPR), as needed. PES field sampling personnel will be well versed in the relevant SOPs and possess the required skills and experience necessary to successfully complete the desired field work. PES personnel responsible for leading ambient air sample collection activities must have previous ambient air sampling experience.

III. Equipment List

The equipment required for ambient air sample collection is presented below:

- 6-liter, stainless steel SUMMA® canisters (order at least one extra, if feasible);
- Flow controllers with in-line particulate filters and vacuum gauges (flow controllers are pre-calibrated by the laboratory to a specified sample duration [e.g., 8-hour, 24-hour]). Confirm with lab that flow controller comes with in-line particulate filter and pressure gauge (order an extra set for each extra SUMMA® canister, if feasible);
- Appropriate-sized open-end wrench (typically 9/16-inch);
- Chain-of-custody (COC) form;
- Sample collection log;
- Field notebook;
- Camera;
- Lock and chain for unsecure locations; and
- Ladder or similar to hold canister above the ground surface (optional).

IV. Cautions

Care must be taken to minimize the potential for introducing interferences during the sampling event. As such, care must be taken to keep the canister away from heavy pedestrian traffic areas (e.g., main entranceways, walkways). If the canister is not to be overseen for the entire sample duration, precautions should be taken to maintain the security of the sample (e.g., do not place in areas regularly accessed by the public, fasten the sampling device to a secure object using lock

and chain, label the canister to indicate it is part of a scientific project, place the canister in secure housing that does not disrupt the integrity/validity of the sampling event). Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens, wear/apply fragrances, or smoke cigarettes before and/or during the sampling event.

Care should also be taken to ensure that the flow controller is pre-calibrated to the proper sample collection time (confirm with laboratory). Sample integrity is maintained if the sampling event is shorter than the target duration, but sample integrity can be compromised if the event is extended to the point that the canister reaches atmospheric pressure.

V. Health and Safety Considerations

Field sampling equipment must be carefully handled to minimize the potential for injury and the spread of hazardous substances.

VI. Procedures

Preparation of SUMMA®-Type Canister and Collection of Sample

1. Record the following information in the field notebook (contact the local airport or other suitable information source [e.g., weatherunderground.com] to obtain the following information):

    a. ambient temperature;
    b. barometric pressure; and
    c. relative humidity.

2. Choose the sample location in accordance with the sampling plan. If a breathing zone sample is required, place the canister on a ladder, tripod, or other similar stand to locate the canister orifice 3 to 5 feet above ground or floor surface. If the canister will not be overseen for the entire sampling period, secure the canister as appropriate (e.g., lock and chain).

3. Record SUMMA® canister serial number and flow controller number in the field notebook and COC form. Assign sample identification on canister ID tag, and record in the field notebook, sample collection log, and COC form.

4. Remove the brass dust cap from the SUMMA® canister. Attach the flow controller with in-line particulate filter and vacuum gauge (leave swage-lock cap on the vacuum gauge during this procedure) to the SUMMA® canister with the appropriate-sized wrench. Tighten with fingers first, then gently with the wrench.

5. Open the SUMMA® canister valve to initiate sample collection. Record the date and local time (24-hour basis) of valve opening in the field notebook, sample collection log, and COC form.

6. Record the initial vacuum pressure in the SUMMA® canister in the field notebook and

COC form. If the initial vacuum pressure does not register less than -28 inches of Hg, then the SUMMA® canister is not appropriate for use and another canister should be used.

7. Step back and take a photograph of the SUMMA® canister and surrounding area.

Termination of Sample Collection

1. Arrive at the SUMMA® canister location at least 10 to 15 minutes prior to the end of the sampling interval (e.g., 8-hour).

2. Stop collecting the sample when the canister vacuum reaches approximately 2 inches of Hg (leaving some vacuum in the canister provides a way to verify if the canister leaks before it reaches the laboratory) or when the desired sample time has elapsed.

3. Record the final vacuum pressure. Stop collecting the sample by closing the SUMMA® canister valve. Record the date, local time (24-hour basis) of valve closing in the field notebook, sample collection log, and COC form.

4. Remove the particulate filter and flow controller from the SUMMA® canister, reinstall brass plug on canister fitting, and tighten with wrench.

5. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The SUMMA® canister does not require preservation with ice or refrigeration during shipment.

6. Complete the appropriate forms and sample labels as directed by the laboratory (e.g., affix card with string).

7. Complete COC form and place requisite copies in shipping container. Close shipping container and affix custody seal to container closure. Ship to laboratory via overnight carrier (e.g., Federal Express) for analysis.

VII. Waste Management

No specific waste management procedures are required.

VIII. Data Recording and Management

Measurements will be recorded in the field notebook at the time of measurement, with notations of project name, sample date, sample start and finish times, sample location (e.g., description and GPS coordinates if available), canister serial number, flow controller number, initial vacuum reading, and final vacuum reading. Field notebooks and COC records will be transmitted to the Project Manager.

IX. Quality Assurance

Ambient air sample analysis will be performed using USEPA Method TO-15. This method uses a quadrupole or ion-trap GC/MS with a capillary column to provide optimum detection limits. The GC/MS system requires a 1-liter gas sample (which can easily be recovered from a 6-liter canister) to provide a 0.5 ppbv detection limit. The 6-liter canister also provides several additional 1-liter samples in case subsequent re-analyses or dilutions are required. This system also offers the advantage of the GC/MS detector, which confirms the identity of detected compounds by evaluating their mass spectra in either the SCAN or SIM mode.

4.0 Standard Operating Procedure: Administering Tracer Gas

When collecting subsurface vapor samples as part of a vapor intrusion evaluation, a tracer gas serves as a quality assurance/quality control device to verify the integrity of the vapor probe seal. Without the use of a tracer, verification that a soil vapor sample has not been diluted by surface air is difficult.

Depending on the nature of the contaminants of concern, a number of different compounds can be used as a tracer. Typically, sulfur hexafluoride (SF6) or helium are used as tracers because they are readily available, have low toxicity, and can be monitored with portable measurement devices. Butane and propane (or other gases) could also be used as a tracer in some situations. Helium is the preferred tracer gas and will generally be used unless site conditions require use of an alternate tracer gas.

The protocol for using a tracer gas is straightforward: simply enrich the atmosphere in the immediate vicinity of the area where the probe intersects the surface with the tracer gas and measure a vapor sample from the probe for the presence of high concentrations (> 10%) of the tracer. A cardboard box, plastic pail, or plastic bag can serve to keep the tracer gas in contact with the probe during the testing.

There are two basic approaches to testing for the tracer gas:

1. Include the tracer gas in the list of target analytes reported by the laboratory; or

2. Use a portable monitoring device to analyze a sample of soil vapor for the tracer prior to and after sampling for the compounds of concern. (Note that tracer gas samples can be collected via syringe, Tedlar bag, etc. They need not be collected in SUMMA® canisters or minicans.)

The advantage of the second approach is that the real-time tracer sampling results can be used to confirm the integrity of the probe seals prior to formal sample collection.

Because minor leakage around the probe seal should not materially affect the usability of the soil vapor sampling results, the mere presence of the tracer gas in the sample should not be a cause for alarm. Consequently, portable field monitoring devices with detection limits in the low ppm range are more than adequate for screening samples for the tracer. If high concentrations (> 10%) of tracer gas are observed in a sample, the probe seal should be enhanced to reduce the infiltration of ambient air.

During the initial stages of a subsurface vapor sampling program, tracer gas samples should be collected at each of the sampling probes. If the results of the initial samples indicate that the probe seals are adequate, the Project Manager can consider reducing the number of locations at which tracer gas samples are used. At a minimum, at least 10% of the subsequent samples should be supported with tracer gas analyses. When using permanent soil vapor probes as part of a long-term monitoring program, annual testing of the probe integrity is recommended.

Attachment B - Indoor Air Quality Questionnaire and Building Inventory

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where?_____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented? _____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented? _____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type? _____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

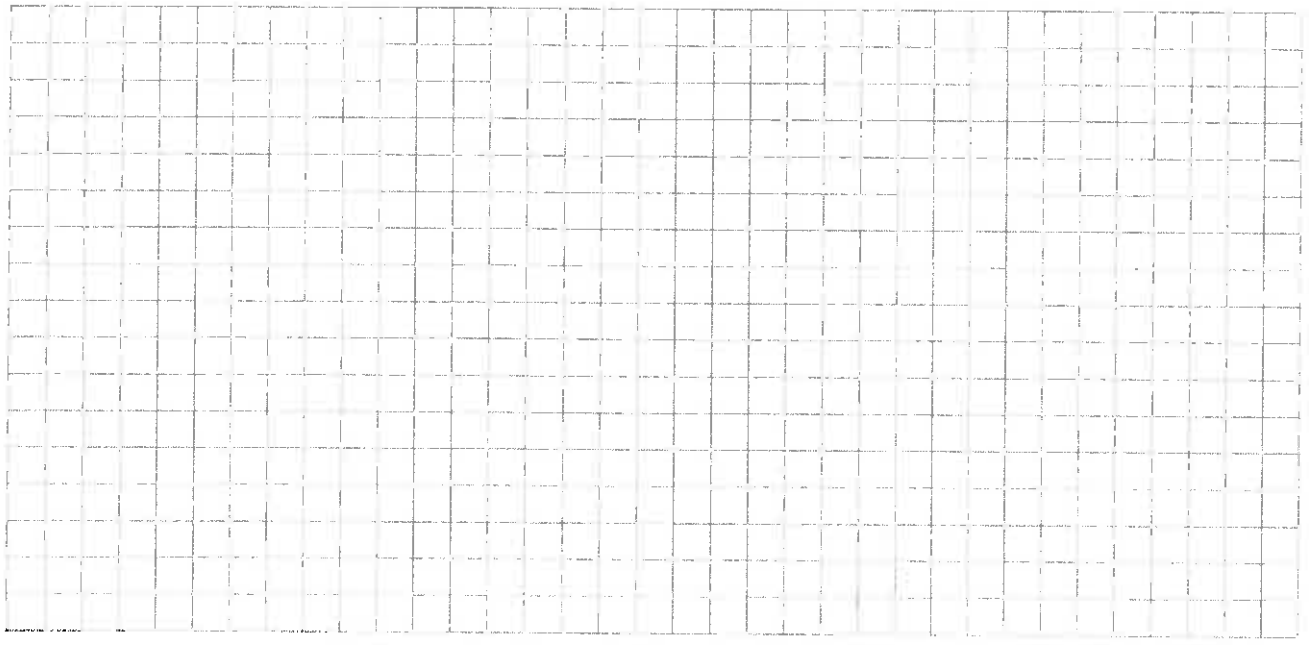
c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

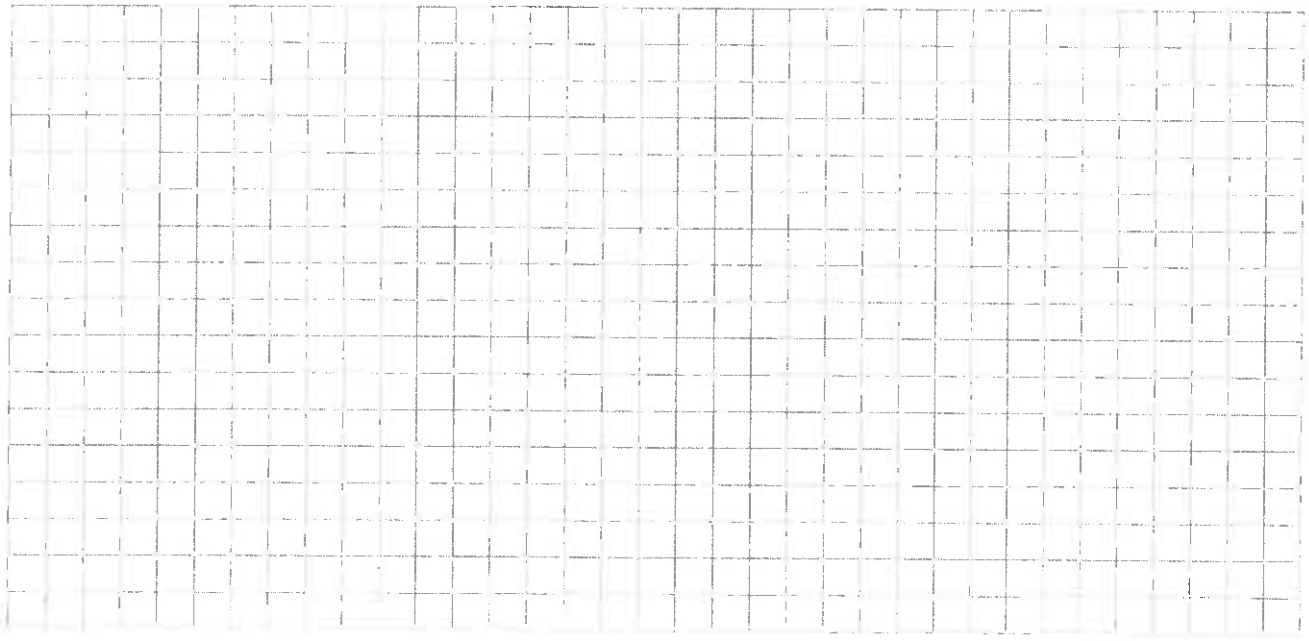
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



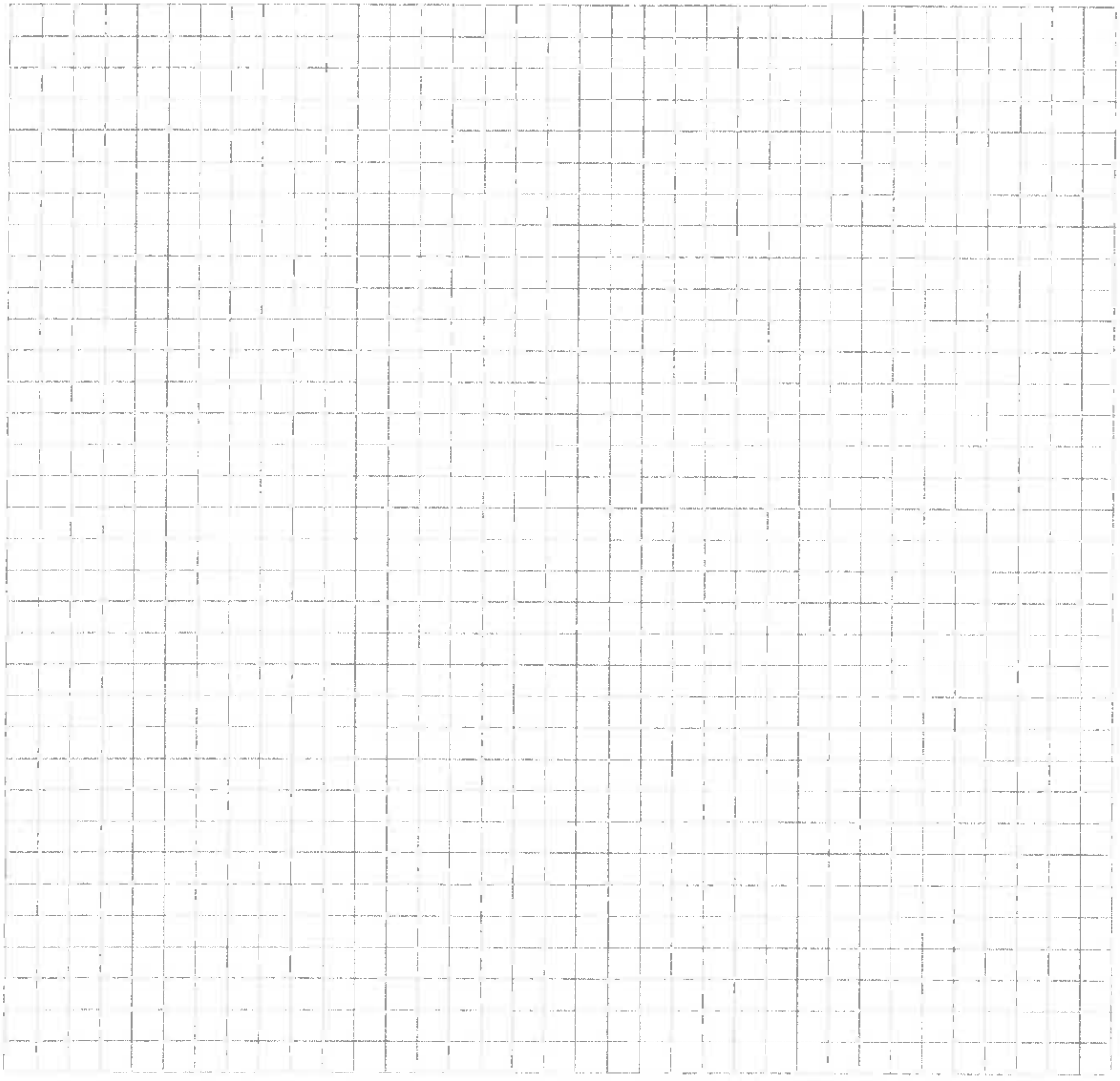
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.