REPSG
React Environmental
Professional Services Group, Inc.

April 16, 2013

Jeannette DeBartolomeo
Environmental Compliance Specialist
MDE-OCP
1800 Washington Blvd.
Suite 620
Baltimore, MD 21230

RE: Soil Vapor Sampling
2794 & 2802 Northeast Road
Northeast Maryland

Dear Ms. Debartolomeo:

REPSG proposes the completion of a soil vapor intrusion and indoor air investigation within the interiors of the off-Site residential dwellings located at 2794 NE Road and 2802 NE Road, located to the east of the Site. The purpose of these investigations is to assess both the potential for future soil vapor intrusion at the off-Site residential dwellings as well as the current level, if any, of vapor intrusion at the off-Site residential dwellings.

This soil vapor intrusion investigation will include the installation, sampling, and analysis of two (2) permanent sub-slab soil vapor points for the full volatile organic compounds (VOCs) list by EPA Method TO-15. One (1) sample point will be advanced at each address, with sample points installed within the basements of the Site structures, beneath the building slab down to a depth of 4-5 feet below grade. The size of the sampling point will be 4-inches in diameter and will be advanced using a core drill. The core drill is an electrical drill which uses water to cut through the slab. Once the slab is cut the point will be advanced with a stainless steel hand auger to remove the soils, then the point will be set. We will review the location with each homeowner prior to performing the work in order to confirm an exact location.

The sample point locations will be biased towards preferential pathways, such as floor drains. Prior to sample collection, a helium gas tracer will be utilized in order to verify the integrity of the seal around the annular space of the soil gas probe and to determine whether or not ambient air could potentially contaminate the soil gas sample. When used correctly, the use of tracer gas can ensure that a given soil sample is representative of sub-surface conditions.

P.O. Box 5377
6901 Kingsessing Avenue, Suite 201
Philadelphia, PA 19142-0377

215 729.3220
215 729.1557 (Fax)
www.repsg.com

In addition, one (1) indoor air sample will be collected from within the basement of each structure. All soil vapor and indoor air samples will be collected using 6-liter summa canisters equipped with 24-hour collection regulators. REPSG's standard operating procedures for sub-slab soil vapor sampling and the use of helium gas tracers will be followed.

The installation and sampling of the sub-slab vapor point will take one day. After sampling is completed the vapor point will be properly abandoned and the surface will be restored back to the condition that existed prior to the commencement of work.

Sincerely,

Brenda MacPhail Kellogg

Brenda MacPhail Kellogg
React Environmental Professional Services Group, Inc.

REPSG
React Environmental
Professional Services Group, Inc.

Standard Operating Procedure for Sub-Slab Soil Vapor Sampling

The following is the standard operating procedure used by React Environmental Professional Services Group, Inc. (REPSG) for the purpose of sub-slab soil vapor sampling.

Scope and Application:

The use of sub-slab soil vapor sampling is to collect samples from beneath the floor of existing structures and to ensure that representative samples are collected as per state and federal regulations.

Equipment Requirements:

- **Summa Canister (6 liter or 1 liter)**
- **Flow Controller**
- **¼" Tubing**
- **Wrenches**
- **High Grade Sand**
- **Bentonite**
- **Concrete**
- **Helium Detector**
- **Purge Pump**
- **Garbage Bag**
- **Hand Auger(s)**
- **PID**
- **Miscellaneous Hand Tools**

Decontamination Procedures:

All sampling equipment (Summa canisters and regulators) are decontaminated prior to use by a certified laboratory.

Sampling Procedure:

1. Upon arrival at site, a site walk should be conducted and the indoor air sampling form should be completed. If any questions or concerns are noted, Project Manager should be contacted on once, before sampling is conducted. Please see Note 1 below.

2. Mark the sampling locations for the Field Technician. Sub slab soil vapor samples should be collected at 4-5 feet below grade. (Take note to ensure no water has entered the boring, as this will damage summa canister and sample will not be collected.)

3. The steel probe or hand auger is driven to desired depth.

4. Excavated soils should be screened at six-inch intervals, using a PID, and any evidence of olfactory or visual signs of contamination.

5. Approximately 1-2" of high grade sand should be poured into the hole, to use as a base for the vapor point and anchor.

6. Once the sand has been poured, vapor point and anchor are placed into the hole.

7. Gas sampling tubing will be attached to the vapor point that is placed into the ground on a base of sand.

8. Once inside the borehole, cover the vapor point, anchor and attached tubing with high grade sand, until approximately 3-4" below grade.

9. Seal the rest of the borehole with bentonite. Be sure to wet the bentonite in order to create a good seal.

10. At this point, the vapor point should be helium tested. Please refer to Helium Testing SOP, linked in Note 5 below.

11. Once the helium testing is complete, purge the existing air from the tubing using an air pumping device.

12. Remove cap from the summa canister using a wrench and connect the tubing to the end of the summa canister.

13. Open the canister valve by turning the knob counter clockwise, one full turn

14. After letting the canister sit for the desired length of time, close the canister by turning the knob clockwise.
    Make sure to not allow canister to read "zero" on the gauge. The lab likes a reading of -5 Hg (+/- 1) for their use.

15. Remove the tubing from the summa canister and replace cap onto end of summa canister.

16. Dispose of tubing appropriately in accordance with all State and Federal Regulations.

17. Personnel must be sure to completely fill out special air sampling Chain of Custody with pertinent information.. Please see Note 2 below.

Sample Preservation and Transport:

1. Samples will be delivered within allowable holding times, with an appropriate chain of custody, to a state certified laboratory for analysis.

References:

PADEP Bureau of Land Recycling and Waste Management: Document No. 253-0300-100
Final Draft Guidance on Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, July 29, 2003.

ASTM Designation: D 5311-92; Standard Practice for "Soil Gas Monitoring in the Vadose Zone."

Environmental Protection Agency 06/01/96; Standard Operating Procedure 2024;"Soil Gas Sampling."

Pace Analytical Services, Inc.; "Instructions for Canister Grab Sampling"

NJDEP Vapor Intrusion Technical Guidance- January 2013, version 3.0

NJDEP Field Sampling Procedures Manual (August 2005) Chapter 9

REPSG
React Environmental
Professional Services Group, Inc.

Standard Operating Procedure for Helium Gas Tracer

The following is the standard operating procedure used by React Professional Services Group, Inc. (REPSG) for the use of a Helium Gas Tracer.

Scope and Application:

The use of helium gas tracing when collecting soil vapor samples is used to verify the integrity of the seal around the annular space of the soil gas probe and to determine whether or not ambient air could potentially contaminate the soil gas sample. If used correctly, the use of tracer gas can ensure that a given soil sample is representative of sub-surface conditions.

Equipment Requirements:

- Shroud (ie. Garbage Bag)
- High Grade Sand or Bentonite
- Duct Tape
- Helium Tank
- Tubing
- Purge Pump(pump should be variable in terms of purge rates per minute)
- Multi-Gas Detector
- Photo-Ionizing Detector(PID)
- Summa Canister

Method Summary:

1. Refer to "Sub-Slab Soil Vapor Sampling SOP" for instruction on how to install vapor points. The helium detection aspect of the sampling is used once the vapor point has been installed and sealed.

2. Once the vapor point has been set, and the bentonite/concrete has been allowed sufficient time to set, cover the entire area with the shroud. A garbage bag is often used as the shroud.

3. A small hole is made in the side of the shroud to allow the tubing from the vapor point to be connected to the helium detector. The area around the hole should be sealed via duct tape or other material.

4. At this point, sand, bentonite or another material should be spread over the edge of the shroud in an effort to prevent any tracer gas to escape from the shroud.

5. The helium detector should be turned on and readings should be taken.

6. The helium gas is pumped into the shroud, via tubing connected to the helium tank, for one minute.

7. Once the gas is turned off, the helium detector should be allowed to run for another two minutes to check for trace gas in the vapor point.

8. If tracer gas is detected in concentrations less than 10%, then the vapor point is sealed sufficiently and samples can be collected. If concentrations in excess of 10% are detected, the vapor point will need to be resealed. If resealing the point does not work, then a new point may need to be installed.

9. If helium concentrations are below acceptable limits, a purge pump is used to purge the line. Purge pumps with variable pump rates are best, with the optimal rate typically being 200mL/min, but no more.

10. The purge pump is connected to the vapor point tubing and our point is purged for the required amount of time based upon the equation below.

$$\frac{D^2 P_d (9.27)}{P_r} = P_t$$

Where:
D=Diameter of probe (inches)
P_d = Probe depth (feet)
P_r = Pump rate (liters/minute)
P_t = Purge time for one probe volume

11. The equation above is for **ONE** probe volume. The probe needs to be purged for three probe volumes immediately before samples are collected.

12. Samples should be collected via the details found in the "Sub-Slab Soil Vapor Sampling" SOP

References:

PADEP Bureau of Land Recycling and Waste Management: Document No. 253-0300-100
Final Draft Guidance on Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, July 29, 2003.

ASTM Designation: D 5311-92; Standard Practice for “Soil Gas Monitoring in the Vadose Zone.”

Environmental Protection Agency 06/01/96; Standard Operating Procedure 2024;”Soil Gas Sampling.”

Pace Analytical Services, Inc.; “Instructions for Canister Grab Sampling”

NJDEP Vapor Intrusion Technical Guidance- January 2013, version 3.0

NJDEP Field Sampling Procedures Manual (August 2005) Chapter 9

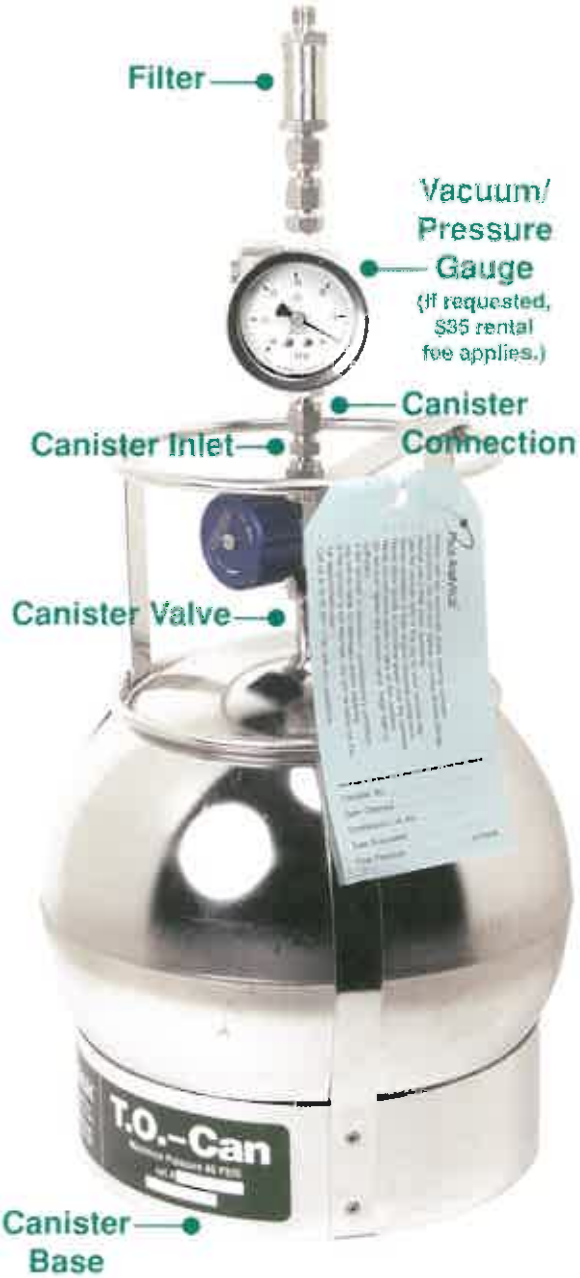
Pace Analytical®
The Right Chemistry, The Right Solution®

AIR CANISTERS

Instructions for Canister Sampling with Pneumatic Flow Controllers

1. Inspect your canister shipment upon arrival. Compare the contents with the packing slip and notify Pace Analytical of any discrepancy or damage.
2. Familiarize yourself with this diagram and the equipment you received. The flow controller will be set for the appropriate sampling rate in the laboratory and should not require adjustment.
3. Remove the brass caps from the flow controller and canister. Connect the flow controller to the canister by inserting the "canister connection" into the "canister inlet" and hand tighten the Swagelok® nut—being careful not to cross the threads. Using two open end wrenches (1/2" & 9/16") tighten the nut no more than 1/8 turn past finger tight. DO NOT use adjustable end wrenches or pliers.
4. The fittings are Swagelok® compression fittings. Do not use Teflon™ tape or other sealants; they are not necessary. DO NOT OVER-TIGHTEN any connection. Over-tightening will cause leaks, not fix them.
5. The canister and controller are now ready for ambient air sampling. If you intend to sample a remote location or source, you will need to attach a sampling line. This should be 1/4" O.D. tubing of virgin Teflon™* or cleaned 316 stainless steel.
6. If arranged with your canister order, we have provided a Swagelok® nut and set of nylon ferrules for connecting a sample line. Slide the nut, the back ferrule, then the front ferrule onto the tubing. Insert the tubing into the canister inlet and slide the ferrules into the fitting.
7. Secure with the nut being careful not to cross the threads. When using nylon ferrules, a snug finger tight should be sufficient for a leak free connection.
8. To begin sampling, simply open the canister valve. (There are two types of valves: rotary and toggle valves.) One full turn is sufficient. Note the vacuum gauge reading. The vacuum reading should be near the uncorrected barometric pressure.
9. If you requested a vacuum guage, you can watch the decline in the vacuum to gauge the sampling rate. A one hour sample should drop in vacuum at a rate of 0.5" Hg per minute (i.e., 30"/60 min.).
10. Remember, this is a rough estimate. The sampling rate is normally set in the laboratory. Occasionally, the controller will lose calibration in shipment. If necessary, contact your Pace Analytical project manager for assistance.
11. After sampling is complete, close the canister valve. DO NOT OVER-TIGHTEN the rotary valve as this will damage the valve.
12. Disassemble the components in reverse order of the above assembly instructions. Return all components to the original shipping containers and package them as received.
13. Verify that all parts are packed for return by referencing the packing slip. The project will be charged for all missing or damaged components.
14. Complete a Chain of Custody Record and return with the sample to Pace Analytical for analysis. Please reference the canister ID on the chain of custody.

Six Liter Canister



PACE ANALYTICAL SERVICES
AIR LAB
(612) 607-6386
www.pacelabs.com

Pace Analytical®
The Right Chemistry. The Right Solution.

AIR CANISTERS

Canister Use Policy

Pace Analytical Summa Canisters are provided for analyses to be performed by Pace Analytical Services only and must be returned to Pace Analytical for analysis. Provision of canisters for sample collection assumes that each canister will be used. For canisters that are returned unused with no analyses specified, the client will be assessed a minimum rental charge of fifty dollars per canister ($50/canister). Because these cans must also be cleaned and re-certified, an additional Clean & Cert charge of fifty dollars per canister ($50/canister) will also be assessed. The one-week canister rental begins upon client receipt of canisters. For each additional week that the canisters remain in the client's possession, a rental charge of fifty dollars per week ($50/week) could be assessed.

Pace Analytical will provide canister shipment by 2nd day air. Overnight shipment is available upon request, however the client will be charged the additional shipping costs. Shipping charges for similar delivery service back to Pace Analytical will be the responsibility of the client.

Pace Analytical will hold canister samples for two days after receipt of report in the event that reruns are necessary. It is the responsibility of the client to recognize the need and request reanalysis within the hold period. If the client requests longer storage of samples, weekly rental charges listed above will apply.

Canister Usage Terms and Conditions

1. Pace Analytical will provide canisters that are in good condition, evacuated and certified clean. The client is responsible for proper use and handling of the canisters and associated equipment and should return them to Pace Analytical in good condition. Any damage from misuse, neglect, loss or accident will be the responsibility of the client. The client will be charged for any repairs or replacements that may be necessary. Charges will include parts and labor.

2. Any canisters received by the client that are damaged should be returned immediately. Do not attempt to sample with a damaged canister. The canister return should be accompanied with an explanation of the damage and how it was discovered. Pace Analytical will provide additional canisters to replace those damaged in shipment.

3. The surface of the canister is not to be defaced in any way. Use of ink markers, adhesive labels or tape is prohibited. Each canister is provided with a bar-coded serial number, which should be used for sample identification. Each canister also has a label attached to the handle, which also can be used. Cleaning of the canister surface will carry a surcharge of twenty-five dollars per cleaning ($25/cleaning).

4. Do not disassemble any fittings that are provided with the canisters or associated sampling equipment. Disassembly may adversely affect the integrity of the sampling system and result in repair charges cited above.

5. Canisters are intended for use in sampling volatile organic compounds in air. Any other uses are prohibited. Reactive compounds such as sulfur compounds and acid gases will damage the interior of the can. Particulate and similar contaminates hinder reliable cleaning of the canister. These and similar occurrences destroy the integrity of the canister. The client will be assessed the full replacement cost of canisters damaged in this way.

6. The client assumes full responsibility for each canister and associated sampling equipment at the time of delivery to the designated address. Responsibility continues with the client until the canisters are delivered to Sample Receiving at Pace Analytical Services' Minnesota Laboratory. Damages and other charges, if necessary, will be assessed and included on the analytical invoice.