

Item #4

INDOOR AIR / SUB-SLAB VAPOR SAMPLE COLLECTION PROCEDURES SCOPE OF WORK

This set of procedures outlines the general steps for collection of concurrent indoor air and sub-slab vapor samples in accordance with the New Jersey Department of Environmental Protection (NJDEP) *Vapor Intrusion Guidance* (VIG).

Prior to all sampling activities, the following general procedures are to be followed:

- Sampling personnel should avoid activities immediately before and during the sampling that may contaminate the sample (e.g., using markers, fueling vehicles, etc.).
- Every effort shall be made to remove likely background sources of indoor air contamination from the building several days prior to the indoor air sampling.
- Record weather information (temperature, barometric pressure, relative humidity, wind speed, and wind direction) and indoor temperature and humidity at the beginning of the sampling event. Record substantial changes to these conditions that may have occurred over the past 24 to 48 hours and that do occur during the course of sampling. The information may be measured with onsite equipment or obtained from a reliable source of local measurements (e.g., a local airport).
- Analyze the Indoor Air / Sub-Slab and Ambient Air Samples by the following Analytical Method: NJDEP-SRWM Low Level (LL) USEPA Method TO-15, March 2007 (NJDEPLLTO-15- 3/2007). Currently only three laboratories are certified to perform this method and they are:

- Test America – Burlington

Contact: Donald Dawicki, (802) 660-1990
30 Community Drive, Suite 11
South Burlington, VT 05403

- Integrated Analytical Laboratories

Contact: Lauren Jenkins, (973) 361-4252 x 273
273 Franklin Road
Randolph, NJ 07869

- EMSL Analytical, Inc.

Contact: Scott Ross, (800) 220-3675 x 2538
200 US Route 130 North
Cinnaminson, NJ 08077

Indoor air and ambient (outdoor) air samples are to be set-up as follows:

- For the indoor air sample, identify the sampling location(s) on a floor plan that also identifies locations of HVAC equipment, chemical storage areas, garages, doorways, stairways, sumps, drains, utility perforations, north direction, and separate footing sections. For the ambient air sample, select a location upwind of the building or other area that is being evaluated. If possible, select a location upwind or near the HVAC air intake for the building being sampled.
- Use an evacuated Summa[®] passivated (or equivalent) stainless-steel canister to collect each sample. The canisters will be provided by the laboratory, along with flow controllers equipped with an in-line particulate filter and vacuum gauge. Each flow controller will be pre-calibrated by the laboratory for the desired flow rate or duration of sample collection (in this case, 24 hours). The sampling flow rate should always be less than 0.2 liter per minute (lpm).
- Place the canisters at the sampling locations. Samples should be collected from breathing height (e.g., 3 to 5 feet above ground). Either mount the canister on a stable platform or attach a length of inert tubing to the flow controller inlet and support it such that the sample inlets will be at the proper height. Measures should also be taken to avoid impact by weather events.
- Remove the protective brass plug from each canister. Connect the pre-calibrated flow controller to each canister.
- Record the identification numbers for the canisters and flow controllers. Record the initial canister pressures on the vacuum gauge (check equipment-specific instructions for taking this measurement). Canisters with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of-custody form for each sample.
- Completely open the valve on the vacuum pressure in each canister. Record the time that each valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge.
- Photograph each canister and the area surrounding the canisters. Additionally, for the ambient air sample, document on a field form an outdoor plot sketch that indicates the building being sampled, streets, sampling location, location of potential outdoor air sources, north direction and paved areas. Also record pertinent observations, such as, odors, readings from field instrumentation, and significant activities in the vicinity that result in air emissions.

- Complete the “*Indoor Air Building Survey and Sampling Form*” (see Item #5), provide the homeowner with a copy of the survey and discuss potential background sources with the homeowner (see Chapter 7.1 and 8 of the NJDEP Vapor Intrusion Guidance Document, October 2005). Accurate collection of information for completion of these forms is critical and includes discussions with the property owner to assess building characteristics, potential indoor air contaminant sources, and miscellaneous items such as “do you dry clean clothes or smoke?” The chemical inventory should document all chemical items in the sampling level of the building (at a minimum) and include gaining permission to open all cabinets and closets. Ingredients of chemicals should be recorded as well as quantity.
- Stop sample collection after the scheduled duration of sample collection (24 hours), but make sure that the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and should be collected again in a new canister.
- Record the final vacuum pressure and close the canister valves. Record the date and time that sample collection was stopped.
- Remove the flow controller from each canister and replace the protective brass plugs.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canisters as directed by the laboratory.
- Place the canisters and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for each canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew should retain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory within one business day of sample collection and via overnight delivery (when shipping). If pressure reading of canister is “zero” when logged in by the laboratory the sample shall not be analyzed and will be recollected

Sub-slab soil gas samples will be collected as follows.

Temporary sampling probes should be installed using the following procedures:

- Identify sampling location(s) on a floor plan that also identifies any slab breaches (e.g., utility penetrations, sumps, drains, and cracks) and locations of HVAC equipment.
- Insert a section of new food-grade (inert) Teflon® or other appropriate tubing through an approximate 3/8-inch hole drilled through the slab. If necessary, advance the drill bit 2 to 3 inches into the sub-slab material to create an open cavity. Use the bit to measure the slab thickness.
- Install the tubing inlet to the specified sampling depth at or near the bottom of the slab.
- Seal the annular space between the hole and tubing using 100% beeswax or another inert, non-shrinking sealing compound.

Sub-slab soil gas samples should be collected using the following procedures:

- Purge the tubing using a vacuum pump or gas-tight syringe (~60 cc). Calculate the volume of air ($\text{volume} = \pi r^2 h$) in the tubing and purge three tubing volumes prior to sample collection at a rate no greater than 0.2 liter per minute (lpm).
- Use an evacuated 1-Liter Summa® passivated (or equivalent) canister to collect the sub-slab vapor sample. The canister will be provided by the laboratory, along with a flow controller equipped with an in-line particulate filter and a vacuum gauge. The flow controller will be pre-calibrated by the laboratory for the desired flow rate for the duration of 5 minutes for sample collection. The sampling flow rate should always be less than 0.2 lpm.
- Remove the protective brass plug from canister. Connect the pre-calibrated flow controller to the canister.
- Record the identification numbers for the canister and flow controller. Record the initial canister pressure on the vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of-custody form for each sample.
- Connect the tubing from the sub-slab vapor sampling probe to the flow controller.

- Completely open the valve on the canister. Record the time that the valve is opened (beginning of sampling) and the canister pressure on the vacuum gauge.
- Photograph the canister and the area surrounding the canister.
- Stop sample collection after the scheduled duration of sample collected, but when the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure.
- Record the final vacuum pressure and close the canister valve. Record the date and time that sample collection was stopped.
- Remove the flow controller from the canister and replace the protective brass plug.
- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.
- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.
- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.
- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew should retain a copy of the chain-of-custody for the project file.
- Deliver or ship the samples to the laboratory within one business day of sample collection and via overnight delivery (when shipping).
- For temporary probes, remove the probe and seal the slab hole with cement. Repair flooring, if any.