

DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
SITE INVESTIGATION & RESTORATION BRANCH

STANDARD OPERATING PROCEDURE
Procedure Sub Slab and Indoor Air Sampling

GENERAL PROVISIONS:

DNREC-SIRB has created this standard operating procedure (SOP) as a default procedure to be followed for both sub-slab and indoor air sampling. Any deviation from this procedure will require DNREC-SIRB's approval.

PREPARATIONS FOR INDOOR AIR SAMPLING:

Note: Prior to collection of indoor air samples, the following consideration should be made:

a) A pre-sampling inspection

- Perform pre-sampling inspection prior to each sampling event to identify conditions that may affect or interfere with the proposed testing.
- The inspection should evaluate the type of structure, floor layout, physical conditions, and airflows of the building(s) being studied.
- Perform a product inventory to identify potential sources of interference
- Use a photo ionization detector (PID) to screen containers for potential interference
- If possible/available, record product name and manufacturer.

b) Eliminate potential interference

Potential interference from products or activities releasing volatile chemicals may need to be controlled. Removing the source from the indoor environment prior to testing is the most effective means of reducing the interference. 24 hours prior to sampling, avoid the following activities:

- opening any windows, fireplace dampers, openings, or vents
- Operating ventilation fans unless special arrangements are made
- Smoking in the house
- Painting
- Using wood stoves, fireplaces or other auxiliary heating equipment (e.g., kerosene heaters)
- Operating or storing automobiles in an attached garage

- Allowing containers of gasoline or oil to remain within the house, except for fuel oil tanks
- Cleaning, waxing, or polishing furniture or floors with petroleum- or oil-based products
- Using air fresheners or odor eliminators

c) Select Sampling locations

Air samples should be collected from an adequate number of locations to understand likely sources of volatile chemicals and to assess potential exposure to occupants in various locations.

- In private residences, air samples should be collected from the basement, first floor living space, and from outdoors.
- In schools and office buildings, samples should be collected during normally occupied periods to be representative of typical exposure.
- In special circumstances it may be necessary to collect air samples at other times in order to minimize disruptions to normal building activities.
- Sample collection intakes should be located to approximate the breathing zone for building occupants (three feet above the floor level where occupants are normally seated or sleep).
- Collect samples for at least a one-hour period to ensure that an air sample is representative of the conditions being tested.
- Sampling personnel should avoid lingering in the immediate area of the sampling device while samples are being collected to avoid undue influence from sampling
- longer duration sampling periods may be appropriate if the goal of the sampling is to represent average concentrations over longer time periods then

SAMPLING PROCEDURE:

This procedure applies to both sub slab and indoor air sampling with the exception that for indoor air sampling, the samplers should be set up with an 8-hour flow controller to provide an 8-hour time weighted average (TWA) concentration.

- 1) Install sub-slab probes from 1/4" (0.64cm) outer diameter (OD) by 1/8" (0.32cm) using a stainless steel tubing extending 1" (2.5cm) below the concrete slab.
- 2) Use a rotary hammer to create a 13/8" OD hole into the slab. Initial depth of penetration will be equivalent to the length of the stainless steel tubing to ensure that the probes are flush with the upper surface of the slab.

- 3) Clean the inside of the outer hole with a damp cloth prior to creating a ½” “inner” diameter hole through the remainder of the concrete.
- 4) Then use drill bit to penetrate through the sub-slab material (1” or 2.5cm) to create an open cavity to prevent potential obstruction of probes during sampling.
- 5) The outer diameter hole should be cleaned once more with a damp cloth to increase to increase the potential of a good seal during cement application.
- 6) Probe tubing should then be inserted into the inner diameter hole allowing couplings to rest at the base of the outer diameter hole.
- 7) The annular space should be sealed with cement grout. The grout should be allowed to cure for at least 24 hours before sampling.
- 8) Connect Vapor probes to ¼” (0.64cm) OD Teflon lined polyethylene tubing. The tubing should then be connected to a three-way valve leading to the summa canister and a vacuum pump/ tracer gas detector
- 9) A small portable vacuum pump should be used to purge the probe and sampling lines for a calculated five well volumes.
- 10) A tracer gas should be used as an indicator, to evaluate whether the sample has been influenced by surface air intrusion at the sampling point.
- 11) After the purge is completed, the valve should be turned to allow flow into the summa canister. Then disconnect the pump and tracer gas detector.
- 12) Prior to the sampling event, contact the laboratory to confirm the required sampling size necessary to obtain the desired reporting limit.
- 13) Samples should be collected by closing the in-line valve on the pump end of the “T” fitting and opening the summa canister. Attach a particulate filter to the inlet port.
- 14) Seal the hole upon completion of the sampling.
- 15) Minimize sampling error by avoiding actions such as: fueling vehicles, using permanent marking pens, or wearing perfume that could cause sample interference.

QUALITY ASSURANCE AND CONTROL

- Summa canister should be pre-cleaned and individually certified.
- Where sample tubing is required, the tube should be Teflon-lined polyethylene, and the hose fittings should be stainless steel.

- Field sample QA/QC should be verified by sampling handling procedures including chain of custody, holding times and temperatures.
- A DNREC Hazardous Site Cleanup Act (HSCA) approved laboratory will used to perform the vapor analyses.
- A tracer must be used to evaluate whether the sample has been influenced by surface air intrusion. Helium gas can be used to check the integrity of the sampling methodology by covering a two foot square area around the sample point with a polyethylene bag. Connect the sample tubing to the purge pump through the plastic bag and the tracer gas hose should also penetrate the plastic bag. Seal the bag with tape.
- In lieu of the polyethylene bag, use a five gallon bucket in areas where the bag cannot be taped to a solid surface.
- Bentonite should be placed in the sampling point in a diameter slightly larger than the diameter of the opening of the bucket. Place a heavy weight on the bucket to ensure and maintain a tight seal.
- Drill two holes through the bottom of the bucket, one for the sampling tubing, and the other for the tracer gas tubing. Prior to sampling, seal each hole with silicone sealant to sampling.
- Initiate the flow of the tracer gas when the purge is started.
- Control the tracer gas flow to maintain atmospheric pressure around the sampling connections
- Stop the procedure if signs of tracer gas appear in the purge, stop the procedure and take appropriate corrective actions to identify the source of the leak. Then repeat the tracer gas procedure to verify that the corrective action were successful.
- One ambient air should be collected to evaluate background VOC concentrations.

APPLICABILITY:

This procedure applies to all employees of the Site Investigation & Restoration Branch, SIRB contractors and any other HSCA consultants.