

Maine Department of Environmental Protection - Bureau of Remediation and Waste Management
August 2nd 2009
Draft Indoor Air Sample Protocol

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF REMEDIATION

DRAFT INDOOR AIR SAMPLE PROTOCOL
With Indoor Air Sample Information Collection Form

August 2, 2009

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Indoor Air Sampling Introduction¹

Indoor air sampling for specific volatile organic compounds (VOC) can be performed to assist in determining if a contaminant is adversely affecting indoor air quality in a building. In general, certain conditions should be met and certain procedures should be followed to ensure integrity of the test results and to limit variables that may effect the success and interpretation of the data. This protocol is intended to ensure that air sampling data is collected in a consistent and useful manner during corrective action. The protocol outlines the steps to be followed when conducting indoor air sampling for VOCs in a residential setting however it may be modified for use in other situations. The resulting data obtained will provide a conservative indication of health risks posed to building occupants; however it is understood that under emergency response actions it may not be appropriate to complete the 24-hour pre-sampling inspection procedures outlined below. The Department recommends that an indoor air sampling work plan be submitted for comment prior to sampling unless the sampling is being conducted as part of an emergency response action.

Pre-sample Inspection

A pre-sample inspection and product inventory should be performed prior to sampling in order to identify and remove potential interfering sources of VOCs that may make data interpretation difficult. The Department recommends completing the pre-sample inspection at least 24 hours prior to sampling. If the target VOCs are petroleum-related, interfering sources can include gasoline cans, gasoline powered equipment, paints and cleaning supplies containing petroleum distillates. If the target VOC is non-petroleum, such as tetrachloroethylene, other products or conditions that may be sources of these compounds, such as recently dry cleaned clothes, should be identified. Field screening of potential sources may help to document if the sources are contributing to indoor air VOC concentrations and may help determine which sources should be removed prior to sampling. Removing potential sources of VOCs from the indoor environment prior to testing is the most effective means of reducing interferences. Document potential interferences not eliminated prior to sample collection on the Indoor Air Sample Form.

If interfering sources are removed, the Department recommends ventilation of the building prior to testing to eliminate residual contamination from the interfering sources. Ventilate by opening windows and doors for a period of 10 to 20 minutes. Ventilation of the building should be minimized in the 24 hours prior to and during sampling. The Department does not recommend building ventilation where no interfering VOC sources are observed or if potential VOC sources can not be removed from the building. **The inability to eliminate potential interferences may be justification for not sampling. The primary objective of the indoor air test is to obtain a representative sample that provides a conservative indication of the health risk posed to the occupants by the VOC associated with the spill.**

¹ Protocol adapted from New Hampshire DES, Vapor Intrusion Guidance – Appendices C&D, July, 2006

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Indoor Air Sample Considerations

When collecting indoor air samples, it is advisable to sample under conditions that are the most likely to represent conservative or worst case conditions. Samples should be collected from the lowest level of the structure where vapors are expected to enter (typically the basement or crawl space), a common area living space/work space on the first floor, and an outdoor location representative of background outdoor ambient air. The Department recommends that indoor air samples be collected concurrent with soil gas samples, where appropriate, to assess attenuation and to compare ratios of contaminants in the soil gas (sub slab and/or near slab) to ratios of contaminants in indoor air.

The Department recommends the collection of time integrated indoor air samples for risk assessment purposes as part of the vapor intrusion pathway assessment. The sample duration should be reflective of the site specific exposure scenario that represents the true time-integrated average concentration that an inhabitant may be exposed to. If evaluating low concentration long term exposure for a residential scenario, a 24-hour sample duration should provide a representative sample. For non residential sampling, such as a work place scenario, an 8-hour sampling duration may be more appropriate. Ideally the duration and frequency of sampling should cover the range of conditions that may influence concentrations (i.e., seasonal, atmospheric, hydrogeologic, etc.). For collection of time integrated samples for VOC analysis used for risk assessment purposes, the Department recommends the use of pre-evacuated stainless steel canisters.

When conducting indoor air sampling, complete the Indoor Air Sample Form and the Field Data Sheet. All indoor air sample results submitted to Department should be reported in units of $\mu\text{g}/\text{m}^3$.

Many variables can influence indoor air sampling including air exchange rates, operation of the building HVAC system, hydrogeologic and meteorological conditions, household activities and chemical usage. All of these variables combine to create site-specific exposure conditions that should be considered in evaluating the indoor air sample results from a home. To account for these variations the following measures should be considered:

- Perform sampling in the lowest level of the structure where vapors are likely to enter, typically the basement or crawl space.
- Perform living area sampling in a room that is used regularly in the lowest level of the structure suitable for occupancy such as a living room, den or playroom.
- Avoid kitchens and laundry rooms where use of personal products and other chemical products may interfere with sample results.
- Close windows and outside doors and keep them closed as much as possible during sampling except for normal entry and exiting.

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- Place indoor samplers on stands approximately 1 meter above the floor in a central part of the room away from heaters, heating vents, high humidity, exterior walls, drafts (vents, open doors, and windows, air conditioners, fans) and obstructions to air flow.
- Place the source area sampler near the spill or where vapors may be entering the home (most likely in the basement) approximately 1 meter above the floor.
- All sampling equipment should be placed away from family traffic patterns and out of reach of pets and children.
- Only operate air conditioning units that recirculate interior air.
- Samplers should not be placed close to attached garages, ash trays or other possible VOC sources that might provide results that do not reflect contamination related to the spill/vapor source under investigation.
- Remove or tightly seal obvious indoor sources of petroleum constituents and other VOC sources during indoor air sampling, such as fuels, paints, cleaning solvents and mothballs.
- Document household characteristics, resident activities and potential ambient sources that may influence indoor air sampling results by completing the "Indoor Air Sampling Form".
- Complete a sketch of sampling locations, floor plan and indoor source locations.

The residents of the home should be given the instructions listed below to follow 24 hours prior to and during the sampling event:

- **Do not** open any windows, fireplace openings or vents.
- **Do not** operate ventilation fans unless special arrangements are made.
- **Do not** smoke in the home.
- **Do not** use paints or varnishes.
- **Do not** use wood stove, fireplace or auxiliary heating equipment, e.g., kerosene heaters.
- **Do not** operate or store automobiles in an attached garage.
- **Do not** store containers of gasoline or oil within the house or attached garage (except for fuel oil tanks).

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- **Do not** clean or polish furniture or floors with petroleum or oil-based products.
- **Do not** use air fresheners or odor eliminators.
- **Do not** engage in hobbies that use materials containing VOCs.
- **Do not** use cosmetics including hair spray, nail polish, nail polish removers, etc.
- **Do not** apply pesticides.

Quality Control/Quality Assurance

Follow the manufacturer's guidelines for use of sampling equipment and holding times. Field blanks, trip blanks and duplicate samples should be kept with and submitted with the samples. Analyze samples as soon as possible after sampling. Record general weather conditions during sampling including ambient temperature. Maintain chain-of-custody forms.

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Indoor Air Sample Form

DEP Site # _____

DEP Site Name _____

Address _____

Occupant Information

Name _____

Address _____

Telephone No (H)(____) _____

(W)(____) _____

Number and Age of Occupant _____

Does anyone smoke inside the building? _____

Building Characteristics

Type of building: (circle) Residential/Industrial/School/Commercial/Multi-use/Other? _____

If residential, what type (circle) Single family/Condo/Multi-family/Other? _____

If the property is commercial, indicate the business ? _____

How many floors does the building have? _____

Does the building have a (circle) Basement/Crawl space/Slab-on-grade/Other? _____

Is the basement used as a living/work space area? _____

What type of foundation does the building have (circle) Field stone/Poured concrete/Concrete block Other? _____

Describe the heating system and type of fuel used? _____

Is there an attached garage? _____

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Spill/Contaminant Source Information

Type of petroleum/VOC release? _____

When did the release occur? _____

What areas of the building have been impacted by the release? _____

Are there any odors? _____ If so describe the odors: _____

Where can release odors be detected? _____

Sampling Information

Sample Date _____

Sampler Type Sorbent SUMMA (Please circle one)

Analysis Method Mass APH TO-15Standard TO-15LL TO-15-SIM Other: (Please circle one)

DEP program or Consulting Firm _____

Contact Person _____

Telephone No (____) _____

Laboratory _____

Telephone No (____) _____

Table 1: Sorbent Tube Sampler Information

Sample ID#	Floor	Room	Tube ID#	Pump ID#	Volume (liters)	Duration (minutes)	Comments

Table 2: Canister Sampler Information

Sample ID#	Floor	Room	Canister ID#	Initial On-site Pressure*	Pressure* On-site Following Sample Collection	Pressure Received at the Laboratory

*Indicate pressure in units of inches of mercury.
Please provide a sketch of spill area and location of sampler unit(s).

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Building Screening and Inspection Information

List products or items which may be considered potential sources of VOCs such as paint cans, gasoline cans, gasoline powered equipment, cleaning solvents, furniture polish, moth balls, fuel tank, woodstove, fireplace, etc.

Date and time of pre-sampling inspection _____

Table 3: Sampling Inspection Product Inventory

Potential VOC source	Present (Y/N)	Location	Field screening Results (ppm)	Product Description and Condition	Removal Date and Time
Paints or paint thinners					
Gas powered equipment					
Gasoline storage cans					
Cleaning solvents					
Furniture polish					
Moth balls					
Fuel tank					
Wood stove					
Fireplace					
Perfumes/colognes					
Other:					
Other:					
Other:					

Table 4: Potential vapor migration entry point information

Potential Vapor entry points	Present (Y/N)	Field screening results (ppm)	Comments
Foundation penetrations in floor or walls			
Cracks in foundation floor or walls			
Sump			
Floor drain			
Other			
Other			

Was the building aired out prior to sample collection? _____

How long was the airing out process? _____

Were vapor control methods in effect while the samples were being collected?

Windows open? Yes / No Ventilation fans? Yes / No Vapor barriers? Yes / No

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Vapor phase carbon treatment system? Yes / No SSDS? Yes/No Other site control
measures_____

Weather Conditions during Sampling

Outside temperature (°F) _____ Inside temperature (°F)_____

Prevailing wind speed and direction_____

Describe the general weather conditions (e.g. sunny, cloudy, rain) _____

Significant precipitation (0.1 inches or more) within 12 hours of the sampling event? _____

General Comments and Sketch Area

Is there any information you feel is important related to this site and the samples collected which would facilitate an accurate interpretation of the indoor air quality? Sketch floor plan, sample locations, location of background sources.
