TABS ON CONTAMINATED SITES

Contaminated Sites Program - Federal Sites

This is one in a series of Technical Assistance Bulletins (TABs) prepared by Environment Canada-Ontario Region for Federal Facilities operating in Ontario.

TAB #1

Jar Headspace Analytical Screening Procedure

DESCRIPTION:
The Jar Headspace Procedure is a quick and simple field screening procedure used to determine the presence of volatile organic compounds in soil or water, before a full site assessment is conducted. The procedure involves collecting a soil or water sample, placing it in an air-tight container and then analyzing the headspace vapour using a portable analytical instrument. The "headspace" is the area between the sample and the top of the container.

GENERAL EQUIPMENT AND MATERIALS

- A portable Photoionization Detector (PID), or a portable Flame Ionization Detector (FID).
- A glass jar (e.g. mason jar).
- 2 square sheets of aluminum foil to cover the jar.

SAMPLE COLLECTION EQUIPMENT

For Soil Samples
- A hand auger or trowel: for surface samples of soil piles.
- A split spoon sampler: for subsurface samples when drilling wells and boreholes.
- A backhoe: for excavation prior to sample collection.

For Water Samples
- A clean bail for ground-water samples from monitoring wells.
- A glass container for surface samples.

RECOMMENDED PROCEDURE

1) Fill a clean glass jar, half-way, with the sample to be analyzed. Quickly cover the open top with one or two sheets of clean aluminum foil and subsequently apply the screw cap to tightly seal the jar. Sixteen oz. (500 ml) oil or "mason" type jars are preferred. Jars having a capacity of 8 oz. (250 ml) or less may not be used. If the sample is collected from a split spoon, it should be transferred to the jar for headspace analysis immediately after opening the split-spoon. If the sample is collected from an excavation or soil pile, it should be collected from freshly exposed soil.

2) Allow headspace development for at least 20 minutes. Vigorously shake jars for 15 seconds both at the beginning and end of the headspace development period. Where ambient temperatures are below 0^{o}C, headspace development should be within a heated vehicle or building. Ambient temperature during headspace analysis should be recorded and reported.

3) Headspace analysis should be completed on the same working day that the sample is collected.

4) Subsequent to headspace development, remove the screw lid to expose the foil seal. Quickly puncture the foil seal with the instrument sampling probe, to a point about one-half of the headspace depth. Exercise caution to avoid uptake of water droplets or soil particulates.

Syringe withdrawal of a headspace sample with subsequent injection into an instrument probe or septum-fitted inlet, is also an acceptable alternative, contingent upon verification of the accuracy of the methodology using a test gas standard.

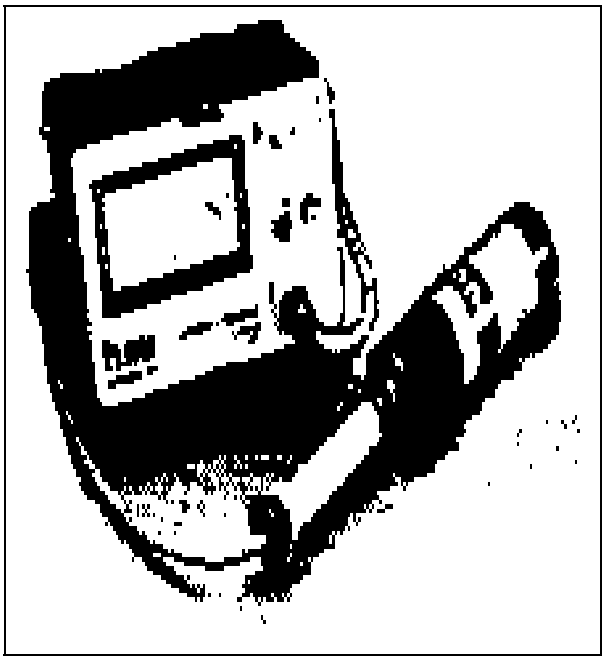
5) Following the probe insertion through the foil seal and/or injection to the probe, record the highest meter response as the jar headspace concentration. Using the foil seal/probe insertion method, the maximum response should occur between two and five seconds. Erratic meter responses may occur at high organic vapor concentrations or conditions of elevated headspace moisture, in which case headspace data should be discounted.

***Note**: Instrumentation with digital displays (LED/LCD) may not be able to discern the maximum headspace response unless equipped with a "maximum hold" feature or strip-chart recorder.*

INSTRUMENT CALIBRATION

Calibration Frequency: 1-3 times per day or prior to the start of sample analysis.

PID and FID field instruments shall be calibrated to yield "total organic vapours" in parts per million (V/V) relative to a benzene equivalent. PID instruments should be operated with a minimum 10.2 eV probe, or for best results, use an 11.7 eV probe. Operation, maintenance, and calibration shall be performed in accordance with the manufacturer's specification.



A PID, such as the one above, costs approximately $10,000 or may be rented.

SOURCES

Minnesota Pollution Control Agency (1990). *Jar Headspace Analytical Screening Procedure*.

United States Environmental Protection Agency (1990). *Field Measurements: Dependable Data When You Need It.*

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