

SOP S-15

**STANDARD OPERATING PROCEDURE FOR VAPOR DIFFUSION
SAMPLING IN SEDIMENTS AT THE WEST KINGSTON TOWN DUMP/ URI
DISPOSAL AREA SITE**

Woodard & Curran, Inc.

Author: Erika Flemming-Coull
Reviewed By: Karl D. Kasper

Issued by: Woodard & Curran Inc.
SOP No.: S-15
Revision: 1
Date: August 2002
Page 1 of 3

TITLE: **VAPOR DIFFUSION SAMPLING IN SEDIMENTS (VOLATILE ORGANIC COMPOUNDS)**

PURPOSE: This guideline describes methods for the installation of water-to-vapor diffusion samplers (vapor diffusion samplers) at the groundwater/surface water interface in sediments. Vapors from volatile organic compounds in groundwater, surface water, and saturated sediments diffuse into the samplers through polyethylene layers, and provide qualitative information on the relative concentrations of VOCs at the groundwater/surface water interface.

SCOPE: This method can be used to identify possible areas of contaminated groundwater discharge to surface waters.

REQUIREMENTS: PRELIMINARY ACTIVITIES – The location of each vapor diffusion sampling location will be identified by W&C in the site-specific workplan. The area of potential contaminated groundwater discharge should be identified, and the sample locations should be equally spaced in a grid, or similar format, for effective coverage. Grid spacing will depend upon site conditions and other available site-related information, and should be identified in the site-specific workplan.

Equipment needed:

- Sealable polyethylene bags (2 per location).
- Cable ties.
- 40-ml glass vials with covers.
- Survey flags or stakes.
- Site-specific field sampling plan.
- Field logbook.
- Decontamination equipment and supplies.

- Personal protective equipment as required by the site-specific HASP.
- Shovel or hand auger.
- 100 foot tape measure.

PROCEDURE:

The following steps will be followed when installing vapor diffusion samplers.

1. Construct vapor diffusion samples in accordance with the following procedure:
 - Place a clean uncapped 40-ml glass vial into one sealable polyethylene bag. Place cap in vial with polyethylene bag.
 - Remove excess air from the bag and seal the bag.
 - Place the 40-ml vial and polyethylene bag inside a second sealable polyethylene bag.
 - Remove the excess air from the second bag and seal the bag.
 - For duplicate samples, place two sealed 40-ml vials (inside of a first bag) into the second polyethylene bag.
2. Secure vapor diffusion samplers to survey flags or stakes using cable ties.
3. Label the survey flag/stake with the sample ID.
4. Part the sediments to the depth stated in the workplan using the shovel blade or hand auger.
5. Insert the vapor diffusion bag into the sediments, with the bottle opening facing down into the sediments.
6. Cover the vapor diffusion sampler with the sediments removed from the hole. Take care not to damage the polyethylene bags.
7. Make sure the sampler is secure in the sediments.
8. Measure the distance to the next sample location and repeat steps 6 and 7.
9. At each sample location, make detailed notes in log book concerning sample ID, sample location, depth of vapor diffusion sampler insertion, date and time of insertion, and other observations. Identify sample locations on a site map.
10. Allow the vapor diffusion samplers to remain in the sediments for a minimum of 14 days to allow VOC concentrations in groundwater to re-equilibrate.
11. A GPS receiver may be used to survey sample locations.

The following steps will be followed when removing the vapor diffusion samplers from the sediment:

1. Slowly pull survey flags/stakes from the sediment to remove the vapor diffusion sampler.
2. Cut and remove the outer polyethylene bag from the sampler, while leaving the inner polyethylene bag intact. Discard the outer bag.
3. Screw the cap to the 40-ml vial onto the vial by moving the cap inside the bag and onto the top of the vial threads, taking care not to break the seal on the polyethylene bag.
4. Place sealed vapor diffusion sampler in a secure location for analysis.
5. Place vial in cooler with ice for shipment to lab.

References:

Church, P.E., Lyford, F.P., and Clifford, Scott, 2000, Distribution of selected volatile organic compounds determined with water-to-vapor diffusion samplers at the interface between ground water and surface water, Centredale Manor Site, North Providence, Rhode Island, September 1999: USGS Open-File Report 00-276, 9 pp.

Church, P.E., Lyford, F.P., and Clifford, Scott, 2002a, Volatile organic compounds, specific conductance, and temperature in the bottom sediments of Mill Pond, Ashland, Massachusetts, April 2001: USGS Open-File Report 02-35, 11 pp.

Church, P.E., Lyford, F.P., and Clifford, Scott, 2002b, Distribution of volatile organic compounds in sediments near Sutton Brook Disposal Area, Tewksbury, Massachusetts, May 2001: USGS Open-File Report 02-138, 17 pp.

Vroblesky, D.A., Rhodes, L.C., Robertson, J.F., and Harrigan, J.A., 1996, Locating VOC contamination in a fractured-rock aquifer at the ground-water/surface-water interface using passive vapor collectors: *Ground Water*, v. 34, no. 2, p. 223-230.