



Passive Diffusion Samplers Success Story

East Multnomah County, Oregon Cleanup Project

Methods for ground water sampling continue to evolve. Passive diffusion samplers are used to collect water samples from ground water aquifers for analysis of specific chemical compounds. The Interstate Technology & Regulatory Council (ITRC) developed guidance and overview documents to address passive diffusion ground water sampling, particularly for long-term monitoring. The following project provides an example of the effectiveness and cost saving benefits of using ITRC guidance documents to implement passive diffusion sampling.

Project Summary

In the northeastern section of Multnomah County, near Portland, Oregon, passive diffusion samplers are being used to sample trichloroethylene (TCE) contaminated ground water associated with the degreasing of machined parts. The area was historically used for agriculture; however, it was recently transformed into an industrial/commercial development that created a dissolved solvent plume in the underlying Troutdale Sandstone Aquifer (TSA) and the Troutdale Gravel Aquifer (TGA). The eastern portion of the City of Portland Columbia South Shore Well Field was approximately a half mile down-gradient from the initial area of contamination. There were also nine separate public water supply wells and a number of private single family domestic wells within one mile of the contaminated ground water area. The original remedy estimated that the 22 well ground water pump and treat system would take approximately 20 years to clean up at a cost of 10 to 12 million dollars.

Ground Water Sampling

In 2001, the Oregon Department of Environmental Quality (DEQ) adjusted the minimum ground water extraction rates based on a significant decline in contaminant concentrations and the areal extent of the plume. To reduce costs and streamline the sampling process, the Oregon DEQ:

- Relied on ITRC's *Technology Overview of Passive Sampler Technologies* (DSP-4, March 2006) document that provides an overview of 12 passive sampling technologies; and
- Replaced the conventional sampling method with passive diffusion samplers.



Installation of passive diffusion samplers at the East Multnomah County Cleanup Project

Benefits of Using ITRC Products:

- By using passive diffusion samplers, the annual sampling labor costs were cut in half, saving close to \$11,000 per year in labor and supplies or a 47% cost savings.
- The capital costs for using passive diffusion samplers were one-third that of conventional methods, costing \$12,000 less than the conventional sampling methods and saving almost 71%.



ITRC Resources

The scientific validity and cost effectiveness of using the passive diffusion sampling technology to sample volatile organic compounds (VOCs) in ground water is well documented. However, lack of awareness and misconceptions hinder the use of this technology for monitoring ground water quality at remediation sites around the country. The benefits of passive diffusion samplers include the following:

- Relatively easy to use
- Eliminates purge-water production; therefore, little or no disposal cost
- Reduces field sampling variability, resulting in highly reproducible data
- Decreases field labor and project management costs for long-term monitoring
- Allows rapid field sample collection
- Can sample discrete intervals in a well
- Practical for use where access is difficult or where discretion is desirable
- Can be deployed in a series to provide a vertical contaminant profile
- Can be deployed in most wells
- Have no depth limit

ITRC continues to work with state regulatory agencies to encourage the appropriate use of passive diffusion samplers as a cost-effective means of collecting ground water samples that represent the water quality of the aquifer.

How Passive Diffusion Samplers Work

- Horizontal ground water flow near the passive diffusion sampler bag allows small organic compounds from the ground water to diffuse into and out of the bag through molecular holes.
- Concentrations in the passive diffusion sampler bag equilibrate with ambient water quality over time.
- The passive diffusion sample represents an integration of contaminant concentrations that have most recently moved through the well.
- No purging or disposal of purge water is necessary, which can dramatically reduce field sampling costs.



Passive diffusion sampler being placed in a monitoring well