

STATE SURVEY AND RESPONSES

A questionnaire prepared by the Diffusion/Passive Sampler ITRC team was sent to the ITRC State Points of Contact (POCs) on March 1, 2006. Responses were received from 16 states, some answering in more detail than others. The survey form as it was delivered to the POCs is included below. The state responses to the question are broken into the three monitoring categories: (1) compliance, (2) characterization, and (3) long-term or surveillance monitoring. The yes and no responses are illustrated in the chart which follows the survey. It is clear that no direct prohibitions exist in statutes, regulations, or guidance. To the contrary, the team has identified that passive samplers have been used in every state in the nation and many foreign countries. In addition to the chart, a number of states provided more detailed explanation of their states use and acceptance of passive samplers.

E-MAIL SUBJECT LINE: ITRC SURVEY REQUEST – Diffusion Sampler

To: ITRC State Points of Contact

From: Kim Ward – NJ Diffusion Sampler Team & Steve Hill, Team Program Advisor

Date: March 1, 2006

SURVEY REQUEST: This request intends to identify state regulatory barriers to the consideration and deployment of passive sampler technologies for the collection of groundwater samples.

TEAM BACKGROUND/GOAL: The team's goal is to evaluate, document, and provide guidance for the appropriate deployment of passive groundwater sampling technologies. A passive sampler can acquire a sample from a discrete well interval without pumping or purge techniques. All of the passive sampler technologies rely on the sampling device being exposed to the media in ambient equilibrium during the sampler deployment period.

Since 2001 the team has completed

1. DSP-1, 2001, *Users Guide for Polyethylene-Based Passive Diffusion Sampler to Obtain VOC Concentrations in Wells*
2. DSP-2, 2004, *Diffusion Sampler Resource Guide*, CD, Version 3
3. DSP-3, 2004, *Technical and Regulatory Guidance for Using Polyethylene Diffusion Samplers to Monitor VOCs in Groundwater*
4. DSP-4, February 2006, *Technology Overview of Passive Sampler Technologies*

PROGRAMS/STAFF TO TARGET FOR SURVEY: Staff who review sampling plans or the use of innovative technologies within your department should be consulted during the completion of these brief survey questions.

TIMEFRAME FOR COMPLETION: The survey is to be delivered to the state ITRC POCs March 1 and returned on April 14, 2006.

HOW THE INFORMATION WILL BE USED: The team will use this information to evaluate the extent statutes, regulations, or guidance prohibit the use of innovative sampling technologies, specifically passive samplers, to collect water samples and provide reliable

analytical information. This information will be summarized in DSP-5, *Protocol for Use of Five Passive Samplers to Sample for a Variety of Contaminants in Groundwater*. This protocol will be sent to the ITRC state POCs for draft review in the 3rd quarter of 2006.

STATE TEAM MEMBERS: Team leader, Kim Ward, New Jersey, DEP; Hugh Reick, Arizona, DEQ; Jim Bernard, Virginia, DEQ, and James Taylor, California, Regional Water Quality Control Board—Central Valley Region, are current members of the team.

FOR ADDITIONAL DETAILS ON TEAM: The 2006 team product DSP-5, *Protocol for Use of Five Passive Samplers to Sample for a Variety of Contaminants in Groundwater* (Tech Reg eq.) is the 5th and final document the team will develop. These same passive samplers are evaluated in DSP-4 (2006) and are classified on the basis of sampler mechanism and nature of the collected sample. The technology overview was available for POC courtesy during the fall of 2005. If you need more background on these passive sampling technologies, the final DSP-4 can be downloaded at www.itrcweb.org in Guidance Documents.

Please reply to this e-mail with your answers to the following questions. Please be sure Kim Ward and Steve Hill are included in your response:

- Kim Ward, Team Leader, Kim.Ward@dep.state.nj.us (609 584-4277) and
- Steve Hill, ITRC Program Advisor, srhill1@mindspring.com (208-442-4383)

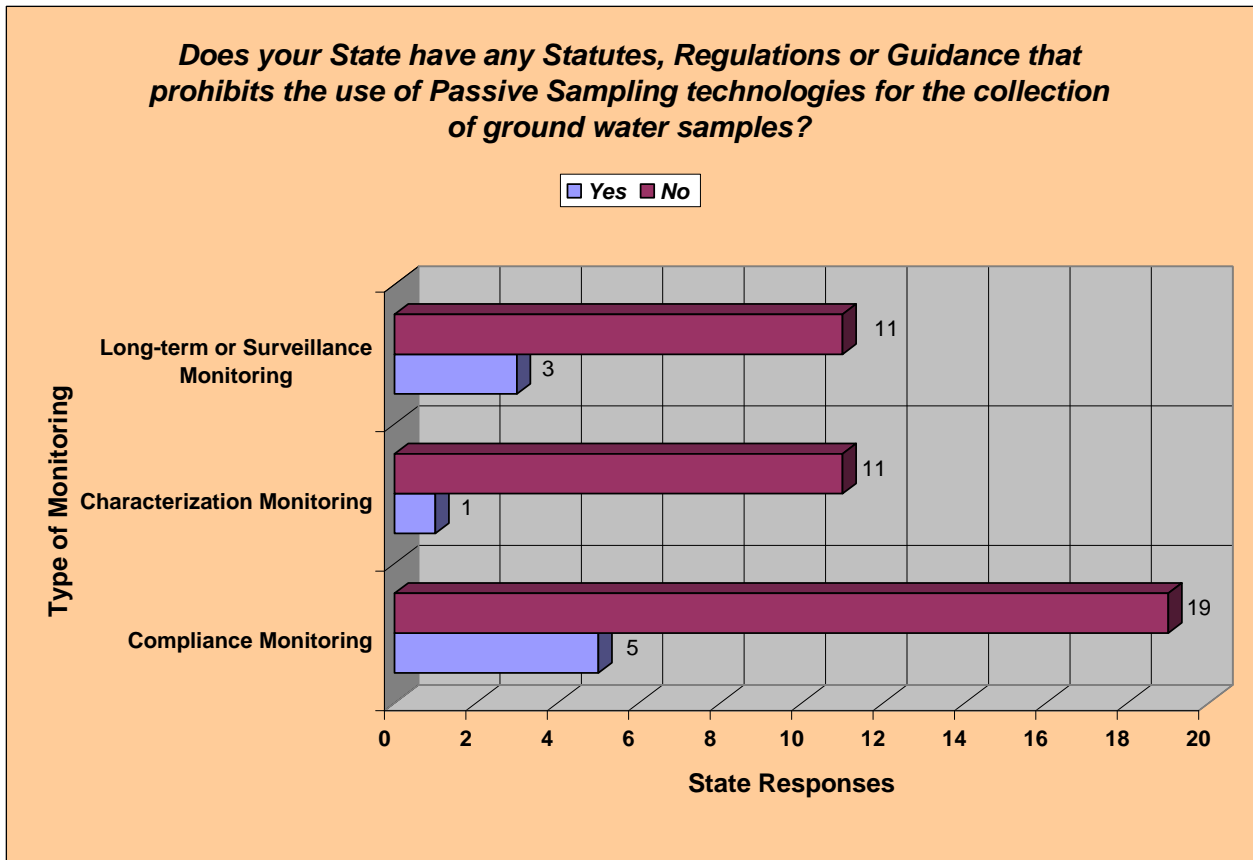
Thank you in advance for your attention to this request. Your state's input will make our team's products more valuable to states and the broader environmental community.

Questions:

1. **Does your state have any statutes, regulations, or guidance that prohibit or impede the use of passive sampling technologies for the collection of groundwater samples?**
Yes No *Left Double click on your choice of answer box. In the window click checked under default value.*

Examples of requirements that might impede or prohibit the use of passive sampler systems might include:

- Groundwater monitoring requirements may vary depending on the objective of the data. Examples include groundwater samples collected for compliance, characterization, or long-term (surveillance or performance) monitoring.
 - Field parameter collection may be required to demonstrate a stable geochemical environment before sample collection.
2. **If you answered yes to the question above; please identify, via electronic copy or html link, the specific statute, regulation, or guidance that forms the basis for the prohibition or impedance and identify if it applies to any particular sample type (e.g. compliance samples, characterization sampling, long-term sampling, or others).**



This chart illustrates that states do not prohibit the use of passive sampler technologies. Many states have developed or adopted guidance for collecting groundwater samples using well-volume purge and low-flow purge and sampling techniques; however, few have developed guidance for passive samplers. As a result many continue to rely on familiar techniques. The protocols the Diffusion/Passive Sampler Team has prepared were developed to serve as such a guidance or the basis of a state guidance where none is currently available. Following are more detailed responses from a number of the states responding to the questionnaire.

New Jersey

The NJDEP published a revised Field Sampling Procedures Manual (Manual) in 2005 to modify sampling techniques and add procedures for “new” sampling technologies. One of the Manual additions was the procedure on how use PDBs for the collection of groundwater and surface water within NJ. The Manual specifically states that NJDEP will approve the use of PDBs on a well-by-well basis. The purposes of this guidance and the intended application of PDBs is for long term monitoring of VOCs in groundwater at well-characterized sites.

The link to the Manual is www.state.nj.us/dep/srp/guidance/fspm with specific text for PDBs included in Chapter 5, Section 5A and Chapter 6, sections 6D and 6E.

To clarify the NJDEP stance for using PDBS, here is an excerpt from the Manual:

“Once it has been demonstrated that PDBS are appropriate for the intended application and regulatory approval has been granted, PDBS may replace the existing sampling method used for long term monitoring applications.

“The use of PDBS has been approved by the NJDEP at sites within NJ, and generated data may be used for compliance monitoring and/or to demonstrate that clean-up objectives have been achieved for site closure. When data are needed to document site closure, it is necessary to document that the PDBS interval used during the sampling program is still appropriate, and that data being submitted to close the site represents a worst case scenario. This shall be accomplished by re-profiling the well using PDBS. A less desirable but acceptable alternative would be to take a conventional groundwater sample to document that groundwater contaminant concentrations within the well have decreased to levels that are acceptable for site closure.”

In addition, if you use PDBs for “collecting samples for programs regulated by Technical Requirements for Site Remediation, a variance from the requirement to provide pH, dissolved oxygen, specific conductance and temperature (N.J.A.C. 7:26E-3.13(c)7i.,ii.,iii. & iv.) must first be attained before sampling can commence.”

NJDEP does not have guidance that prohibits the use of passive sampling technologies to collect groundwater. To consider using a new technology, we require a sampling plan and historical sampling data to compare the new sampling approach. If sampling data did not match up, we would request additional work for the proposed sampling technology to be considered.

Virginia

Virginia has nothing in writing that specifically prohibits the use of passive sampling technologies; however, requests are evaluated on a site-by-site basis to satisfy a number of criteria. The hazardous waste site that has been approved has a long history of sampling results. The site was well characterized and an event was performed correlating the old and new sampling technologies. The site samples for volatiles only, and the consultant proposed specific depths in their request. Lastly, QA/QC guidance from NJDEP was reviewed and pertinent sections forwarded to the consultant with the approval letter.

Nebraska

The Nebraska Department of Environmental Quality (NDEQ) has adopted Level A concurrence on the use of ITRC’s publication entitled *Technical and Regulatory Guidance for Using Polyethylene Diffusion Bag Samplers to Monitor Volatile Organic Compounds in Groundwater*, dated February 2004. Nebraska does not have any specific regulatory restrictions on the use of such passive sampling techniques for the collection of groundwater samples, as long as the use of such technology is used for the contaminants and sampling media that are consistent with ITRC’s guidance and involves state- and federal-approved analytical methods.

There are regulations that specify that the Department must review/approve sampling and analytical methods but this process is standard with all environmental sampling activities. Within Nebraska Title 118, entitled “Groundwater Quality Standards and Use Classification,” Chapter 5 stipulates:

Paragraph 001: Sample collection shall be performed according to methods approved by the Department to insure the collection of a representative sample.

Paragraph 002: Any sample analysis method used must be approved by the U.S. Environmental Protection Agency (EPA) and/or approved by the Department and provide protection to public health, safety, and the environment.

Below is a reference to the possible use of passive diffusion bag samplers within one of NDEQ’s petroleum release guidance documents entitled Risk-Based Corrective Action (RBCA) at Petroleum Release Sites: Tier 1/Tier 2 Assessments and Reports. In Section 4.6.5 it states:

Any method used to collect groundwater samples must minimize agitation. Suction, airlift (inertial lift) or peristaltic pumps are not to be used to collect samples. Acceptable sampling methods include the use of: gear-drive pumps; helical rotor pumps; pneumatic piston pumps (sealed drive gas); bladder pumps; passive diffusion bag samplers (for wells totally screened below the water table where MTBE is not identified and a vertical gradient is not present in the aquifer); bailing (provided the bailer is lowered gently into the groundwater); Hydrosleeves.

In addition, the Department often reviews groundwater sampling work plans and other related QA/QC documents, such as Quality Assurance Project Plans, for approval, and as such, those sampling procedure documents are subject to conformance with groundwater sampling and monitoring requirements set forth in various state environmental programs and regulations. However, none of the guidance and regulatory requirements are intended to inhibit or impede the use of passive diffusion bag sampling technology. In fact, not only do the regulatory requirements we have in place not inhibit or impede the use of passive diffusion bag sampling technology; on the contrary, they allow our agency to institute a technical review and approval process that is necessary to ensure that, when used, the technology is applied to the appropriate conditions that are consistent with EPA approved methods and ITRC’s guidance document.

South Carolina

South Carolina DHEC does not have any regulations or guidance that prohibits the use of passive sampling technologies to collect groundwater. In fact, South Carolina has been proactive in encouraging their use (Passive sampling technologies have been used successfully at several Resource Conservation and Recovery Act and CERCLA sites in SC).

Illinois

Illinois regulation and/or guidance do not specify a technology to be used. However, sampling and analysis procedures must provide a reliable indication of groundwater quality below the unit. We would review a proposal and if appropriate, would approve.

Georgia

The Hazardous Sites Response Program (HSRP) functions under the authority of the Georgia Hazardous Site Response Act (Chapter 391-3-19) of the Georgia Hazardous Waste Management Act (§ 12-8-60). The Rules promulgated by the Hazardous Site Response Act specify that “approved analytical test methods” are SW-846 test methods that have been promulgated, recommended, or otherwise approved by USEPA, or methods approved by EPD. The Rules also specify that “all pertinent field data and the results of all laboratory analyses [be] supported by sufficient quality assurance/quality control data to validate results” (Section 391-3-19.06(3)(b)(3)(xi)).

There is no specific language in the Rules regarding “approved sample collection methods”; however, the HSRP relies on test methods and quality assurance guidance specified in the *Region 4 USEPA Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* (November 2001) and *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, USEPA Publication SW-846. Neither document provides guidance for the collection of groundwater samples using passive diffusion sampling methods.

Georgia HSRP has offered to allow diffusion sampling on a “Site-by-Site” basis for the purpose of long-term surveillance or performance monitoring if, after a period of 2 years, diffusion sampling methods are shown to be representative of site conditions in side-by-side comparisons using low-flow sampling methods.

Ohio

Ohio does not have rules or guidance prohibiting the use of passive sampling technologies to collect groundwater samples. Ohio has addressed passive diffusion sampling in the *Ohio EPA Technical Guidance Manual (TGM) for Hydrogeologic Investigations and Ground Water Monitoring*. This document recommends techniques for investigating groundwater at known or potential groundwater pollution sources.

TGM Chapter 10 (available at www.epa.state.oh.us/ddagw/Documents/tgmguid10sap2006final.pdf) covers diffusion sampling but does not address other types of passive sampling. The document was prepared by the Division of Drinking and Ground Waters with review and comment by the agency’s waste management divisions (Hazardous Waste Management, Emergency and Remedial Response, and Solid and Infectious Waste Management). The following is excerpted from the two places in the chapter where passive diffusion sampling is covered:

Passive Diffusion Samplers (pp. 10–14)

Passive diffusion bag samplers (PDBs) use a low-density polyethylene diffusion membrane filled with deionized water to collect water samples for VOC analysis. The polyethylene acts as a semi-permeable membrane allowing volatile contaminants to diffuse into the deionized water. Once chemical equilibrium is reached, a water sample that is representative of the VOC concentrations may be obtained for the interval at which the sampler is placed. Use of multiple PDB samplers at different depths within a well screen interval can allow for a vertical profile of the VOC contamination within the well. Advantages of PDB sampling include its low cost, minimal purging and water disposal, and the ability to monitor a variety of VOCs. A disadvantage is that they are not applicable to inorganics and other contaminants that do not readily diffuse across the semi-permeable membrane. PDB sampling may not be applicable for sites where water in the well casing may not be representative of the saturated zone adjacent to the well screen. This may occur when water in the well casing is stagnant, or when there is a vertical flow within the well. In addition, PDB samplers do not provide a discrete time-interval sample, but rather an average of the concentrations in the well over the equilibrium period.

Passive diffusion bag samplers are appropriate for long-term monitoring at well-characterized sites. The target analytes should be limited to chemicals that have been demonstrated to diffuse well through polyethylene (i.e., most VOCs and limited non-VOCs), as listed in Tables 1-1 and 4-1 of ITRC's PDB sampler guidance document (ITRC, 2004). A combined version of these tables is provided below as a reference (Table 10.2). However, as the compound list may change as further tests are conducted, ITRC (<http://www.itrcweb.org>) should be contacted for the most recent list of chemicals favorable for sampling with PDB. The site sampled should have sufficient groundwater flow to provide equilibrium between the water in the well screen and the surrounding groundwater zone. ITRC (2004) suggests that care should be given in interpreting PDB results when the hydraulic conductivity is <10-5 cm/s, the hydraulic gradient is <0.001, or the groundwater velocity is < 0.5 ft/day. Use of PDBs is not appropriate when a vertical flow in the well exists. A deployment time of at least two weeks is recommended to allow for diffusion of the analytes across the membrane (ITRC, 2004, Vroblesky, 2001; Vroblesky and Hyde, 1997; Yeskis and Zavala, 2001; and U.S.G.S , 2002).

Passive Diffusion Sampling (pp. 10–34)

Passive diffusion samplers are a simple and inexpensive way to sample monitoring wells for a variety of VOCs. As described in the previous section (Types of Equipment), the passive diffusion bag is suspended in the well at the target horizon by a weighted line and allowed to equilibrate with the surrounding water (typically 2 weeks). The sampler bags are retrieved from the well after the equilibration period and the enclosed water is immediately transferred to the sample container. Passive diffusion sampling is recommended only for long term groundwater monitoring of VOCs at well-characterized sites (ITRC, 2004). PDS is not applicable for inorganics, where there is vertical flow, or when discrete interval samples are needed. See pages 10–15 for more description of the applicability of PDS.

The NJDEP published a revised Field Sampling Procedures Manual (Manual) in 2005 to modify sampling techniques and add procedures for “new” sampling technologies. One of

the Manual additions was the procedure on how use PDBs for the collection of groundwater and surface water within NJ. The Manual specifically states that NJDEP will approve the use of PDBs on a well by well basis. The purposes of this guidance and the intended application of PDBs is for long term monitoring of VOCs in groundwater at well-characterized sites.

Rhode Island

Rhode Island Solid Waste, LUST, Site Remediation statues, regulations or guidance does not specify how any samples are collected. Decisions as to whether a diffusion bag sampler is appropriate are made on a site-by-site basis.

Our UST Section has Regulations/Guidance we have to follow; however, our Contaminated Sites Section is not under the same constraints.

Our Tier 1 Guidance, page 23:

www.iowadnr.com/land/ust/technicalresources/lustsiteassessment/documents/tier1guide.pdf

Michigan

Although, there is no statute, regulation, or guidance in Michigan that prohibits the use of passive sampling technologies, the applicable groundwater sampling guidance can be interpreted to impede implementation of passive sampling technologies in that it specifically recommends low-flow sampling methods for the collection of groundwater samples. However, it should be noted that the guidance does allow for the use of another sampling method if approved by the Department. For clarification, the applicable groundwater sampling guidance is copied below. The title of the Guidance Document is: Attachment 5 (Collection of Samples for Comparison to Generic Criteria) of Remediation and Redevelopment Division's (RRD) Operational Memorandum 2 (Sampling and Analysis Guidance). A link to the guidance is provided in the below.

COLLECTION OF GROUNDWATER SAMPLES FOR COMPARISON TO THE GENERIC CRITERIA

www.deq.state.mi.us/documents/deq-rrd-OpMemo_2_Attachment5.pdf

General Considerations

Groundwater samples collected for analyses must be representative of the water moving in the aquifer, in the contaminant plume or in the target zone where contaminants are expected to be located or to migrate. Groundwater samples must represent the contaminant concentrations, including dissolved and naturally suspended particles. Stagnant water in monitor well casings is not representative of the groundwater. Purging of the stagnant water in monitor well casings is necessary but must minimize changes in groundwater chemistry to yield water samples that are representative of the groundwater. Indicator parameters including temperature, pH, dissolved oxygen, specific conductivity and turbidity must be monitored during the purging process to determine stabilization between the well casing waters and the formation waters. Turbidity is the most conservative indicator of stabilization as it is often the last to stabilize. Turbidity in groundwater samples may be naturally

occurring, caused by the contamination, or a result of sampling disturbances such as accidental inclusion of aquifer matrix materials from disturbances or mixing that may occur while sampling. Knowledge of site geology, well design, and sampling methodology is helpful in determining the source of turbidity and the method of sampling. Turbidity due to sampling disturbances should be eliminated or minimized while naturally occurring turbidity or turbidity due to contamination should not.

A sampling methodology must be used that accounts for the effects of aquifer heterogeneities while minimizing alterations in water chemistry that could result from sampling disturbances. The MDEQ will accept properly conducted purging methods designed to minimize drawdown by controlling the flow from the well while monitoring stabilization indicator parameters, commonly referred to as Low-Flow methods. Available Low-Flow procedures include United States Environmental Protection Agency, Office of Research and Development, Office of Solid Waste and Emergency Response, EPA/540/S-95/504, December 1995, EPA Ground Water Issue, *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, Robert Puls and Michael Barcelona (<http://www.epa.gov/ahaazvuc/download/issue/lwflw2a.pdf>) and *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells*, United States Environmental Protection Agency Region 1, July 30, 1996, Revision 2 (<http://www.epa.gov/region01/measure/well/wellmon.html>). If another sampling methodology is used, documentation must be submitted to the MDEQ with the data that demonstrates why it is as representative of aquifer conditions as low-flow methodologies. Careful use of the Low-Flow methods is essential in collection of groundwater samples from wells that contain non-aqueous phase liquids, as these substances may be stratified in the monitoring well. Where non-aqueous phase liquid is present, refer to additional guidance for sampling strategies for non-aqueous phase liquids available in RRD Operational Memorandum No. 4, Attachment 5.