

Field Filtering of Ground Water Samples

FSOP 2.2.12, September 13, 2016

Ohio EPA Division of Environmental Response and Revitalization

1.0 Scope and Applicability

- 1.1 Field filtration of ground water samples is performed to remove the immobile sediment fraction associated with sample turbidity, which is an important concern for samples to be analyzed for total metals and other turbidity-sensitive constituents. The presence of sediment in samples preserved by field acidification may result in total metal analyses that overestimate the true concentration of mobile (dissolved plus colloidal fraction) metals species. Therefore, field filtering of ground water samples may be appropriate under certain conditions if consistent with site-specific work plan (SSWP) project and data quality objectives (DQOs), and if permitted under the regulatory program for which the samples are being collected and analyzed.
- 1.2 There are two types of field filtration techniques: “open system” and “in-line” (or “closed”) system. The primary difference between the two is that ground water samples filtered using the open system technique are exposed to the atmosphere and pressurized, whereas ground water samples filtered using the in-line system are not. Accordingly, Ohio EPA utilizes the in-line filtering technique, which provides more representative and reliable results. The open system technique should not be used.
- 1.3 Ground water samples should be filtered only when all of the following conditions are present:
 - 1.3.1 Samples are collected from monitoring wells that have been properly designed, installed and developed.
 - 1.3.2 Samples are collected using the low-flow purging and sampling technique that is designed to minimize sample disturbance. Refer to [FSOP 2.2.6, Low-Flow Ground Water Sampling](#).
 - 1.3.3 Indicator parameters have been measured and stabilized before sample collection.
 - 1.3.4 Turbidity stabilizes above 10 NTUs, and based on professional judgment, the formation/saturated zone being sampled exhibits a high degree of sediment mobility, i.e., the turbidity is a function of natural formation conditions (e.g., clay- or silt-rich glacial deposits, karst aquifers with high flow rates).
- 1.4 Ground water samples collected at municipal solid waste landfills (MSW) should never be filtered. Federal regulations [40 CFR 258.53(b)] specify that metals analyses for ground water samples collected at MSW landfills be performed on unfiltered ground water samples only.
- 1.5 All ground water sampling techniques and associated procedures should be consistent with Ohio EPA’s [Technical Guidance Manual \(TGM\) for Hydrogeologic](#)

[Investigations and Ground Water Monitoring](#), specifically [Chapter 10. Ground Water Sampling](#). In addition, [U.S. EPA 2002 \(Yeskis and Zavala\)](#) provides ground water sampling guidance for RCRA and CERCLA sites. For Ohio EPA Voluntary Action Program (VAP) sites, field filtration procedures should be consistent with [Ohio EPA VAP Technical Guidance Compendium VA30007.14.004, Ground Water Sample Filtration](#). The site-specific work plan (SSWP) will provide project objectives and data quality objectives (DQOs). In the event there appears to be inconsistency between the referenced guidance documents and project objectives or DQOs, please contact the DERR SIFU supervisor and DERR site coordinator for clarification.

2.0 Definitions

Not applicable

3.0 Health and Safety Considerations

- 3.1 Review the site-specific health and safety plan (HASP) for sampling hazards before beginning work.
- 3.2 Wear appropriate personal protective equipment (PPE) when performing ground water sampling activities, including but not limited to chemical-resistant gloves compatible with the contaminants of concern and eye/face protection and coveralls for splash protection, which may be more likely to occur when field filtering ground water samples.
- 3.3 Use caution and wear work gloves when assembling or disassembling equipment and cutting discharge tubing.

4.0 Procedure Cautions

- 4.1 Field filtering should only be performed for metals and other turbidity-sensitive parameters. Ground water samples for volatile organic compounds, semivolatile organic compounds, pesticides/herbicides or polychlorinated biphenyls should never be field filtered.
- 4.2 The appropriate filter size should be determined during the development of the SSWP. Filters with pore sizes ranging from 10 microns to 0.1 microns may be used as warranted based on project objectives, DQOs and site hydrogeologic conditions. SIFU typically uses 0.45-micron filters for non-VAP ground water sampling and 5-micron filters for VAP ground water sampling. If estimates of dissolved metals concentrations are desired, Ohio EPA recommends 0.1-micron filters.
- 4.3 If using filters with smaller pore sizes, i.e., 0.45-micron to 0.1-micron field filters, carry at least two filters per sample in the field. These filters tend to clog quickly and additional filters may be needed to collect the required sample volumes.

- 4.4 If using a flow-through cell to measure ground water stabilization parameters, an in-line field filter should never be installed directly before (directly upgradient of) the flow through cell. A “t” fitting with a stopcock valves may be installed in the discharge line before (upgradient) of the flow-through cell to provide a separate discharge line for sample filtering.
- 4.5 Never attempt to decontaminate or re-use a field filter.

5.0 Personnel Qualifications

Ohio EPA personnel working at sites that fall under the scope of OSHA’s hazardous waste operations and emergency response standard (29 CFR 1910.120) must meet the training requirements described in that standard.

6.0 Equipment and Supplies

- 6.1 In-line 5-micron to 0.45-micron polycarbonate or cellulose acetate filters
- 6.2 In-line filter apparatus
- 6.3 Ground water sampling supplies required by FSOP 2.2.4, Ground Water Sampling (General Practices)

7.0 Procedure (In-Line Filtering Method with Low-Flow Sampling Only)

- 7.1 After ground water stabilization has been achieved (including turbidity stabilization), assemble the filter and install it in the sampling discharge line as recommended by the filter manufacturer. If using a flow-through cell to measure ground water stabilization parameters, the flow through cell should be disconnected and removed before installing the in-line filter. Alternatively, a “t” fitting with a stopcock valves may be installed in the discharge line before (upgradient) of the flow-through cell to provide a separate discharge line for sample filtering.
- 7.2 Allow at least 500 ml of ground water to pass through the filter before sample collection to help ensure that the filter has equilibrated with the ground water sample (Ohio EPA 2012 and U.S. EPA 2002). The filter manufacturer’s recommendations regarding sample equilibration should also be consulted.
- 7.3 Collect filtered samples for metals or and/or other turbidity-sensitive parameters as described in the SSWP and in accordance with FSOP 2.2.4, Ground Water Sampling (General Practices).
- 7.4 When sampling is completed, dispose of the used filters and any associate disposable apparatus in accordance with FSOP 1.7, Investigation Derived Wastes.

8.0 Data and Records Management

Refer to FSOP 1.3, Field Documentation

9.0 Quality Control and Quality Assurance

None

10.0 Attachments

None

11.0 References

FSOP 1.3, Field Documentation

FSOP 1.7, Investigation Derived Wastes

FSOP 2.2.4, Ground Water Sampling (General Practices)

FSOP 2.2.6, Low-Flow (Low-Stress) Ground Water Sampling

Ohio EPA, May 2012, Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring, Chapter 10, Ground Water Sampling: Ohio EPA Division of Drinking and Ground Waters

Ohio EPA, January 2003, VAP Technical Guidance Compendium VA30007.14.004, Ground Water Sample Filtration

U.S. EPA (D. Yeskis and B. Zavala), May 2002, Ground Water Sampling Guidelines for Superfund and RCRA Project Managers (Ground Water Forum Issue Paper): Office of Solid Waste and Emergency Response, EPA 542-S-02-001