

Ground Water Sampling Using an Inertial Lift (Check Valve) Pump

FSOP 2.2.5, August 9, 2016

Division of Environmental Response and Revitalization

1.0 Scope and Applicability

- 1.1 Inertial lift pumps, commonly referred to as check valve samplers, are portable purging and sampling devices which do not require a power source. Inertial lift pumps consist of a ball valve connected to flexible tubing. Water is purged from the well by lifting and dropping the pump in a continuous up-and-down manner (manually or automatically). These tools can quickly move water and are an efficient means of purging a well.
- 1.2 The check valve sampler device typically used by Ohio EPA is constructed of stainless steel (Geoprobe® MN#:214061) and is most commonly used for ground water sample collection with the Geoprobe® Screen Point Sampler. The check valve is 2.25" long and is used with 3/8" OD tubing (Teflon™-lined or LDPE tubing can be used). Refer to FSOP 3.1.7, Geoprobe® Operation and Sampling.
- 1.3 Check valve samplers are used for screening purposes during the assessment phase of site investigations. The water quality results from samples collected using a check valve device are very helpful for evaluating and optimizing monitoring well locations and construction. Due to the way these devices are operated, check valve samplers should not be used to collect ground water samples for compliance, risk assessment or modeling.
- 1.4 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](#) and [Chapter 15, Use of Direct Push Technologies for Soil and Ground water Sampling](#). In addition, [U.S. EPA 2002 \(Yeskis and Zavala\)](#) provides ground water sampling guidance for RCRA and CERCLA sites. 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 TGM 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 Always review the site-specific health and safety plan (HASP) for site-specific hazards before beginning work.
- 3.2 Refer to FSOP 2.2.4, Ground Water Sampling (General Practices) for general ground water sampling health and safety considerations.
- 3.3 This sampling procedure requires physical exertion for lifting and lowering the

tubing and check valve through the water column. Sampling many wells in one day using this technique can be physically challenging.

4.0 Procedure Cautions

- 4.1 Refer to FSOP 2.2.4, Ground Water Sampling (General Practices) for general ground water sampling procedure cautions.
- 4.2 The up-and-down motion of the check valve and tubing within the water column may cause excessive sample turbidity, especially when sampling wells or well points in fine-grained geologic materials. Excessive turbidity may result in artificially elevated metals concentrations in a ground water sample.
- 4.3 The up-and-down motion of the check valve and tubing within the water column may cause off-gassing of volatile organic compounds (VOCs), resulting in sample VOC concentrations that are not representative of in-situ ground water quality.
- 4.4 Fine-grained sediments may get caught between the check valve wall and ball and decrease the lift capability (efficiency) of the check valve. The tubing and check valve may need to be periodically removed and cleaned.
- 4.5 Check valves can be used at multiple locations if properly cleaned and decontaminated in accordance with FSOP 1.6, Sampling Equipment Decontamination. However, excessive reuse of the sampler can result in oxidation (rusting) of the check valve ball and can result in the ball getting jammed or not providing sufficient seal to provide the lift needed. Replace check valves that appear to have their seal compromised from oxidation.
- 4.6 Always carry extra check valve samplers and tubing to the field.
- 4.7 The tubing may or may not need to be replaced between sample locations depending on the project objectives and DQOs. Consult the site-specific work plan (SSWP).

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 Check valve sampler
- 6.2 3/8" tubing (LDPE, Teflon™-lined tubing, etc.)
- 6.3 Tubing cutters
- 6.4 Sample collection supplies as outlined in FSOP 2.2.4, Ground Water Sampling (General Practices)

6.5 Water quality meter(s)

7.0 Procedures

- 7.1 Measure the water level in the well or well point, calculate the well or well point volume and determine purge volume per FSOP 2.2.4, Ground Water Sampling (General Practices).
- 7.2 Attach tubing to the check valve by screwing the check valve clockwise onto the tubing so that approximately ½" of tubing is inserted into the valve casing. Ensure that the connection is very snug.
- 7.3 Insert the check valve and tubing into the well or well point to the bottom of the screen. After ensuring the check valve is at the bottom of the screen, cut the tubing to the proper length to allow the purged ground water to easily discharge into a container.
- 7.4 Raise the tubing about one foot out of the well point and then lower the tubing back down. Continue this up-and-down motion to lift ground water to the surface.
- 7.5 Ensure that the open (discharge) end of the tubing remains in the purge water collection container to avoid spilling potentially contaminated water on the ground and to obtain an accurate purge volume estimate.
- 7.6 Begin measuring the field parameters per FSOP 2.2.4, Ground Water Sampling (General Practices) when the purge water container begins to fill with ground water.
- 7.7 Purging activities should be performed as required by the SSWP to meet project objectives and DQOs, and in accordance with FSOP 2.2.4, Ground Water Sampling (General Practices). General purging practices for collecting ground water screening samples from Geoprobe® wells and screen point borings as follows:
 - 7.7.1 GEOPROBE® WELLS: purge at least 3 well volumes or purge until the field parameters have stabilized. If collecting samples for metals or other turbidity-sensitive constituents, continue to purge until ground water turbidity is less than 10 NTUs or has stabilized to within +/- 10 percent over three consecutive measurements.
 - 7.7.2 GEOPROBE® SCREEN POINT BORINGS: purge the temporary point until the water clarity visually stabilizes; a turbidity meter should be used to monitor sample turbidity if required by the SSWP.
- 7.8 Ground water samples should not be filtered unless filtering is included in the SSWP. DERR's Remedial Response Program and Voluntary Action Program both discourage the use of filtered ground water samples for site assessment purposes.

- 7.9 After purging is completed, collect and handle samples following the procedures outlined in FSOP 2.2.4, Ground Water Sampling (General Practices) and FSOP 1.5, Sample Custody and Sampling.
- 7.10 Decontaminate the check valve between each sampling location per FSOP 1.6, Sampling Equipment Decontamination unless using a new (dedicated) check valve at each sample location. Discharge tubing should not be reused between sampling locations.
- 7.11 Dispose of discharge tubing and other investigation derived waste 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 Assurance and Quality Control

Refer to the SSWP and FSOP 2.2.4, Ground Water Sampling (General Practices)

10.0 Attachments

None

11.0 References

FSOP 1.3, Field Documentation.

FSOP 1.5, Sample Custody and Sampling

FSOP 1.6, Sampling Equipment Decontamination

FSOP 1.7, Investigation Derived Wastes

FSOP 2.2.4, Ground Water Sampling (General Practices)

FSOP 3.1.7, Geoprobe® Operation and Sampling

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

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