COVER SHEET
STANDARD OPERATING PROCEDURE

OPERATION TITLE: **PROTOCOL FOR GROUNDWATER/SURFACE WATER INTERFACE SAMPLING USING A PORE WATER SAMPLER**

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1.0 PURPOSE

The purpose of this document is to describe the Maine Department of Environmental Protection, Bureau of Remediation and Waste Management, Division of Site Remediation (MEDEP/DR) standard operating procedure (SOP) for collecting groundwater samples using a pore water sampler.

2.0 APPLICABILITY

MEDEP/DR is responsible for the investigation and remediation of uncontrolled hazardous substance sites throughout Maine. In the course of these investigations, samples are sometimes taken from groundwater discharge points beneath surface water bodies. This Standard Operating Procedure (SOP) is designed to be a guideline for MEDEP/DR staff for collecting such groundwater samples for chemical analysis. This procedure is based on current methodology guidelines and field experience of MEDEP personnel.

3.0 RESPONSIBILITIES

All MEDEP/DR staff must follow this procedure when using a pore water sampler to perform groundwater sampling activities. Typically, MEDEP/DR field staff (OHMS positions) conduct this type of sampling, although other staff may collect these types of samples in specific instances if accompanied by, or once appropriately trained in, this methodology. The respective managers and supervisors for MEDEP/DR are responsible for ensuring that their staff receive adequate training, are familiar with, and adhere to these procedures.

4.0 INTRODUCTION

It is often difficult to determine the extent and origin of contamination using solely surface water sampling techniques. In some cases, a surface water body may be clean but the groundwater beneath it may be contaminated. Thus, sampling the groundwater prior to its discharge to a surface water body may lead to a better understanding of the extent and origin of contamination. This can be accomplished by using a pore water sampler.

Underlying this procedure is the assumption that surface water bodies are common discharge points for groundwater. Thus, a sample of the water beneath a stream or riverbed would be characteristic of the groundwater in the area. This SOP identifies sampling protocols to be followed when collecting samples using a pore water sampler.

5.0 PLANNING

A well developed conceptual site model (CSM) is imperative for effective porewater sampling. Prior to conducting any sampling event, a sampling plan should be developed (see SOP DR#014 - Development of a Sampling and Analysis Plan). Included in the sampling plan should be specifics regarding the anticipated substances of concern, data quality objectives, the laboratory conducting analysis and Quality Assurance/Quality Control.

6.0 EQUIPMENT

The following is a list of equipment currently owned and available to MEDEP/DR staff for collecting groundwater samples using the pore water sampler method.

- Peristaltic Pump
- Tubing – Two types of tubing are needed for this sampling technique. Polyethylene tubing with an inside diameter (ID) of one-quarter (1/4) inch is the standard size tubing used in conjunction with peristaltic pumps. This size tubing should also be used to fit around the top opening of the pore water sampler. Additionally, one-quarter (1/4) inch outside diameter (OD) polyethylene tubing will be necessary to connect the pore water sampler to the peristaltic pump. A knife or other tool to cut tubing to desired lengths is recommended.
- Power Supply – A power supply will be necessary to operate the peristaltic pump.
- Hip Waders – This sampling method will likely require the sampler to wade into stream or river in order to insert pore water sampler in a suitable location.
- Boat – Depending on the depth and size of a water body, a boat may be required to access sample points. Even if sample points are accessible by wading, boats and canoes can also act as equipment barges to help transport equipment between sample locations.
- Pore Water Samplers – A pore water sampler comes in two parts, a strengthening rod and the pore water sampler itself, both made of stainless steel. The pore water sampler is basically a hollow tube with small holes in its tip that allow groundwater to percolate through. The strengthening rod slides into the pore water sampler, and while in place, blocks all water from entering pore water sampler. Both pieces are placed in a PVC sheath for protection. Although the pore water sampler is fairly sturdy, exercise caution during use, as once either piece becomes bent, the equipment is useless. Bring at least as many pore water samplers as there are sampling locations, as onsite decontamination is difficult and should be avoided.
- Permanent Porewater Samplers – A porewater sampler modified for long-term deployment. This may be necessary for silty organic rich sediments where low turbidity samples are required and traditional porewater samplers will not meet the DQOs for the site.
- Sample Collection Containers – These will be provided by the lab, and will vary depending on parameters to be sampled.

7.0 PROCEDURES FOR USE OF PORE WATER SAMPLER

6.1 MOBILIZATION/ RECONNAISSANCE

Prior to sampling suitable access points to porewater sampling locations should be identified, and reviewed to assure safe sampling. The Water body should not be in flood stage during sampling. If available, a water bodies' flow should be checked prior to sampling; porewater sampling should not be conducted during flood stage.

5.2 SAMPLING PORCEDURE

Once an appropriate sampling location has been determined, obtain pore water sampler and carefully insert into river/streambed to desired depth. Do not remove strengthening rod until

instrument has been securely placed in sediment. Pore water sampler should be inserted deep enough as to ensure the sample collected will contain only groundwater and no surface water. Typically, this depth is at least 8 inches. Once this has been accomplished, remove the strengthening rod from the pore water sampler and connect pore water sampler to peristaltic pump using appropriate tubing described in section 4.0 of this SOP. Turn pump on and purge water for several minutes until purge water is relatively clear. If sample is not visually free of sediment, it should be documented in field notes (see SOP DR#013: Documentation of Field Notes and Development of a Sampling Event Trip Report).

If sampling for metals, it is recommended that turbidity be measured. If turbidity is above 30 NTUs, it is recommended that an additional sample be collected that has been filtered through a 0.2-0.45 μm inline particulate filter.

After water has been sufficiently purged, decrease pumping rate if necessary (e.g., to fill 40ml VOA vials) and begin collecting sample. Pumping rate should be low enough to ensure that surface water is not drawn down into the sample. Low flow purging and sampling protocol is not required, but if desired, refer to SOP DR#003 - Groundwater Sampling Using Low Flow Purging and Sampling Protocol. Course sediment are the most transmissive; with experience, samplers can actually "feel" the type of sediment as the pore water sampler is advanced. If the formation intercepted by the screen is not transmissive enough for collection of sample, gently advance and/or pull back the sampler in an attempt to find a more transmissive zone. If the formation does not allow adequate transmission of water, it may require a change in sampling location. This change is made at the discretion of the sampler and should be documented in field notes (see SOP DR#013: Documentation of Field Notes and Development of a Sampling Event Trip Report).

Neither the tubing nor the pore water sampler should be reused at subsequent sampling locations without appropriate decontamination. Do not put strengthening rod back in pore water sampler once sample has been collected, as sediment in the sampler must be flushed out first. Rather, place both pieces separately into plastic sheath.

If porewater sampling is to be repeated, use of permanent porewater samplers should be considered. The sampling point should marked in a permanent manner. Additionally, all points should be located/ identified with global positioning.

7.0 DECONTAMINATION

Decontamination procedures generally follow SOP DR#017: Decontamination Procedures Protocol. However, specific decontamination procedures are as follows.

In the course of sampling, sediment will build up in sampler that must be carefully flushed out. For this reason, it is best if decontamination is conducted with a large amount of water available for continuous flushing. If possible, bring as many pore water samplers as there are sampling locations, as onsite decontamination can be difficult.

8.0 QUALITY ASSURANCE/QUALITY CONTROL

Data quality objectives should be stated in the sampling plan. Quality Assurance/Quality Control (QA/QC) samples may be collected if needed to meet your data quality objectives. The

following typical types of QA/QC samples may be collected as part of the QA/QC program for porewater sample collection. For an additional discussion of QA/QC, please refer to the MEDEP/DR Quality Assurance Plan, Section 5.

8.1 EQUIPMENT BLANKS

If unable to used dedicated equipment, equipment blanks may be collected at a rate of 5%, one equipment blank every twenty samples collected.

8.2 DUPLICATE SAMPLES

It is recommended that duplicate samples be collected at a rate of 5% to assess sample location variability.

8.3 BACKGROUND SAMPLES

Background samples should be collected as part of the porewater evaluation. Background sample requirements should be outlined in the SAP.

8.4 TRIP BLANK

When collecting samples for volatile organic compound analysis, trip blanks are recommended.

9.0 DOCUMENTATION

Documentation is the most important aspect of any sampling event. Documentation should be completed with the idea that someone not present during the actual event may need to repeat the event exactly as it was conducted originally. During the sampling event or immediately upon the completion of the event, diagram a map of the area and locate sampling points (and corresponding sample container numbers) on the map. Also, record observational data concerning the groundwater, such as the approximate depth of the screen when the sample was collected, any detection of odor or contamination, color and turbidity. Make sure to record in your personal field book any and all information that is pertinent to the sample. All deviations from the procedures outlined in this or in any other SOP followed for groundwater sampling using a pore water sampler must be documented in field notes. Refer to the MEDEP/DR SOP DR#013 – Documentation of Field Notes and Development of a Sampling Event Trip Report. It is very important that all information regarding a sampling event (or any events/activities) be accurately recorded. Record all information obtained while sampling such as sample numbers, measurements taken, observations made and other comments. A trip report package should also be completed for the event, as outlined in MEDEP/DR SOP DR#013.

When checking in samples at the laboratory for analysis, a Chain of Custody (COC) form must be completed. Refer to MEDEP/DR SOP DR#012 – Chain of Custody Documentation for requirements for COC protocol.

10.0 HEALTH AND SAFETY

As part of the overall work plan at a hazardous substance site, a site specific health and safety plan (HASP) must be developed and adhered to by all personnel working at the site. Refer to MEDEP/DR SOP DR3014 – Development of a Sampling and Analysis Plan.

All personnel must understand that if a sample cannot be obtained safely, the sample should not be taken at all. If a sample cannot be obtained due to safety considerations it should be documented in the sampler's field book.

All personnel should be aware of the potential dangers associated with this particular sampling method. These dangers include, but are not limited to, strong water currents, slippery substrate, roots or sharp objects beneath the water's surface that may cause a fall or other personal injury. If sampling in water that is greater than three feet deep, all DEP personnel are required to wear life jackets. All necessary precautionary measures should be heeded when performing this sampling technique.