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 APPLICABILITY

This Standard Operating Procedure (SOP) applies to all programs in the Maine Department of Environmental Protection's (MEDEP) Division of Remediation (DR). It is also applicable to all parties that may submit data that will be used by the MEDEP/DR.

This SOP is not a rule and is not intended to have the force of law, nor does it create or affect any legal rights of any individual, all of which are determined by applicable statutes and law. This SOP does not supersede statutes or rules.

2.0 PURPOSE

The purpose of this document is to describe the MEDEP/DR standard operating procedure (SOP) for collecting groundwater samples using a pore water sampler.

3.0 RESPONSIBILITIES

All MEDEP/DR Staff must follow this procedure when performing this task. All Managers and Supervisors are responsible for ensuring that their staff are familiar with and adhere to this procedure. MEDEP/DR staff reviewing data by outside parties are responsible for assuring that the procedure (or an equivalent) was utilized appropriately.

4.0 GUIDANCE AND PROCEDURES

4.1 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.

4.2 PLANNING

A well-developed conceptual site model (CSM) is imperative for effective pore water sampling. Prior to conducting any sampling event, a sampling plan should be developed (see MEDEP/DR SOP# RWM-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 (QA/QC).

4.3 EQUIPMENT

The following is a list of equipment utilized for collecting groundwater samples using the pore water sampler method.

- Peristaltic Pump
- Tubing – Two types of tubing are needed for this sampling technique. Low Density Polyethylene (LDPE) tubing with an inside diameter (ID) of 0.17-inch or 0.25-inch is the standard size tubing used with pore water samplers. Note that the 0.25-inch ID tubing fits over the top opening of the pore water sampler. Using 0.17-inch ID tubing requires a small piece of 3/8-inch outer diameter (OD) silicone tubing to connect with the pore water sampler. The same silicone tubing must be used with a peristaltic pump to collect a pore water sample.
- A knife or other tool to cut tubing to desired lengths will be required.
- Field Parameter Instruments – devices for measuring dissolved oxygen (DO), conductivity and pH of pore water and surface water.
- Turbidity Meter – If testing for dissolved metals turbidity must be measured to determine whether the sample must be field-filtered prior sample collection.
- Sample Filters – 0.2 to 0.45 micron (µm) in-line filters are appropriate for dissolved metals.
- Power Supply – A power supply will be necessary to operate the peristaltic pump.
- GPS Unit – To record geospatial locations of pore water samples.
- Life Preservers – when working around or near waters.
- 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 narrow slits at the 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 not recommended. Once pore water samplers have been used **do not** re-insert the strengthening rod until after the sampler has been decontaminated and cleared of sediment.

- Permanent Pore Water Samplers – A pore water sampler modified for long-term deployment. This may be necessary for silty and/or organic rich sediments where low turbidity samples are required and traditional pore water 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.

4.4 PORE WATER SAMPLER PROCEDURES

4.4.1 MOBILIZATION/ RECONNAISSANCE

Prior to sampling, suitable access points to pore water sampling locations should be identified and reviewed to assure safe sampling. Surface water body flow data should be consulted prior to sampling if available, and pore water sampling should not be conducted during a flood stage. Stream flow information for some sites within the State of Maine can be found at the following USGS website:

http://me.water.usgs.gov/

4.4.2 SAMPLING PROCEDURE

Upon arriving at the site, collect field parameter measurements from the surface water body or bodies that are either being recharged by or recharging site groundwater. This will provide some comparative data to field parameter measurements of pore water samples.

Once an appropriate sampling location has been determined, carefully insert a pore water sampler into the river/streambed to desired depth. Do not remove the strengthening rod until the sampler has been securely placed into the sediment. The 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 the pore water sampler to a peristaltic pump using appropriate tubing described in Section 6.0 of this SOP. Turn the pump on and purge for several minutes until purge water is relatively clear. Record field parameter measurements of the purge water prior to collecting the sample. If the purge water is not visually free of sediment, it should be documented in field notes (see MEDEP/DR SOP# RWM-DR-013 - Documentation of Field Activities and Development of A Trip Report).

If sampling for metals, it is recommended that turbidity be measured. If turbidity is above 20 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 into the sample. A low flow purging and sampling protocol is not required, but if desired, refer to MEDEP/DR SOP# RWM-DR-003 - Groundwater Sampling Using Low Flow Purging and Sampling for Long-term Monitoring. In general, coarse sediments (sands) 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 sampler screen is not transmissive enough for collection of samples, 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 the field notes (see MEDEP/DR SOP# RWM-DR-013 - Documentation of Field Activities and Development of a Trip Report).

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

If pore water sampling is to be repeated, use of permanent pore water samplers should be considered. Repeatable sampling points should be marked with a grade stake or similar method of marking a location. Additionally, all points should be located and identified with GPS.

4.5 DECONTAMINATION

Decontamination procedures generally follow MEDEP/DR SOP# RWM-DR-017 – Equipment Decontamination Protocol. Additionally, it should be noted that 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.

5.0 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.

5.1 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.

5.2 DUPLICATE SAMPLES

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

5.3 BACKGROUND SAMPLES

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

5.4 TRIP BLANKS

Trip blanks are recommended when collecting samples for volatile organic compound analysis (e.g. EPA 8260).

6.0 DOCUMENTATION

Documentation is one of the most important aspects 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. Be sure to also record observational data concerning the groundwater such as the approximate depth of the screen when the sample was collected, detection of odor or contamination, color and turbidity. The sampler should record in the field book any and all information that is pertinent to the sample. All deviations from the procedures in the Site SAP and/or 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# RWM-DR-013 - Documentation of Field Activities and Development of A 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# RWM-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# RWM-DR-012 – Chain of Custody Protocol for requirements for COC protocol.

7.0 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# RWM-DR-014 – 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, or when otherwise working where drowning may be a hazard, all DEP personnel are required to wear life jackets (see SOP No. LW-WRR-001-, Use, selection, and maintenance of Personal Floatation Devices and Anti-Exposure Clothing). All necessary precautionary measures should be heeded when performing this sampling technique.

8.0 REFERENCES

USEPA SOP #EH-03, Sediment Pore Water Sampling using a Micro Push Point, September 2003.

USEPA SESDPROC-513-R2, Pore Water Sampling, February 2013.

023-Pore-Water-Sampling-FINAL-2021 - B Blais

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