COVERSHEET
STANDARD OPERATING PROCEDURE

Operation Title: **WATER SAMPLE COLLECTION FROM WATER SUPPLY WELLS**

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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 Remediation's (MEDEP/DR) procedure for collecting water samples from household wells at or near uncontrolled hazardous substance sites.

2.0 APPLICABILITY

MEDEP/DR is responsible for the investigation and remediation of uncontrolled hazardous substance sites throughout Maine. In the course of the investigation and subsequent remediation, samples must be taken to determine the geographical extent, chemical characteristics, and relative levels of contaminants at each site and the surrounding area. This standard operating procedure (SOP) is designed to be a guideline for collecting water samples from household wells (dug, drilled, etc.) either with or without filtration devices.

3.0 RESPONSIBILITIES

All MEDEP/DR staff must follow this procedure when performing activities involving the collection of water samples from household wells. All Managers and Supervisors are responsible for ensuring that their staff are familiar with and adhere to this procedure.

4.0 INTRODUCTION

Sampling household water supplies is essential to the proper investigation of groundwater contamination at a potential/ actual hazardous waste site. Each well supplying a household(s) also represents a monitoring well for local groundwater. Such information/data must be factored into the groundwater investigation program.

The three most important aspects of household water sampling are as follows: 1) develop a sample plan that adequately and appropriately meets the sampling goal (see also SOP DR#014-Development of a sampling plan); 2) follow established sampling procedures to ensure the integrity of the sample, and; 3) keep accurate records of sampling data (i.e. locations, bottle numbers, etc.).

4.0 DEFINITIONS

- Treatment System - A device which removes contaminants and/or naturally occurring compounds from the water. This may include GAC Filters installed by DEP, water softener, particle filter, air stripper, or reverse osmosis systems.
- DEP Installed Treatment System – Any treatment system device that A MEDEP administered program has placed on a water supply to remove contamination or condition the water prior to contamination removal.
- Sample Point - Any location from which a representative water sample may be obtained. Sample points can be located before the treatment system, between treatment system devices, or after the treatment system.

5.0 GUIDELINES/PROCEDURES

5.1 PREPARATION

Sampling plan development guidance can be found in SOP DR#014 – Sampling Plan Development. However, residential sampling does require several unique aspects, the most important being scheduling. It is best to inform property owners at least one week ahead of the scheduled sampling event, particularly if access to filters or air strippers is required. Be aware of the past contamination history of the site and try to plan visits so that sampling begins with the least contaminated households and ends with the most contaminated households. This method allows the least potential for cross-contamination, and should be followed whenever practical. In planning a sampling event it is recommended to allow twenty (20) minutes between each sampling appointment. If this is an initial visit to a household, bring a well data sheet (Attachment X) and get as much information about each household's well(s) as possible. Important information/data to gather when sampling household wells includes: date of installation of the well; the type of well (drilled, dug, point, or other); gallons per minute produced; depth to the screened interval (and width of screened interval if applicable), and type of piping used. Permission should be obtained to GPS the location of the well.

5.2 EQUIPMENT

Below is a list of recommended equipment to have when household sampling:

- Bucket (to collect excess water when sampling filters), Gloves (to prevent exposure and/or cross-contamination),
- Flashlight (to enter dark basements/cellars),
- Field Notebook (to record pertinent information),
- Chain of Custody Forms (to document chain-of-custody),
- Label Tags (to label sample ports at households with filters),
- Container of clean water (for rinsing),
- Container of Soapy Water(for washing),
- Sample Containers from laboratory
- Short section of hose to attach to spigot

5.3 HEALTH AND SAFETY

Part of completing a successful household sampling assignment is completing it in a safe and healthful manner. Whenever sampling water from any point, at a minimum wear latex gloves. Latex gloves decrease the chance of dermal exposure and also reduce the chance of cross-contamination of samples.

Also be aware of physical hazards; filters are usually located in the basement, so make sure to take a flashlight. Watch for overhead hazards such as low ceilings and/or hanging objects. Be especially careful of electrical hazards such as outlets near the sampling area and/or bare wires. Lastly, try not to splash the water when sampling; splashing contaminated water in the eyes or on exposed skin could be harmful if the water is

significantly contaminated. If water supplies are known or suspected to be contaminated Care should be taken to avoid cross-contamination with other water samples being collected as part of the same sampling event.

5.4 SAMPLING

5.4.1 Sampling Water Supplies Without DEP Installed Treatment System

When sampling a water supply well without any DEP Installed Treatment devices samples may be obtained from indoor faucet (kitchen, bathroom, other),or an outside faucet (spigot). If MEDEP has sampled the well previously and conditions have not changed (house renovations, family size, etc.) samples should be obtained from the same location as previously sampled. If MEDEP has not sampled the well before, or if conditions have changed, samplers should inspect the plumbing and select a sample location closest to the pressure tank or pump. Samplers should make sure that the sample point is clean (i.e., no grease, lead soldering, or other possible contaminants) and that no possible sources of cross-contamination (gas cans, solvents, etc.) are nearby. If a water treatment system (such as radon, sediment filters, or water softeners) are present, the sample should be collected prior to these systems. If sampling from a kitchen faucet, remove the aerator; if sampling from an outside spigot, remove existing hoses from the spigot. Run the water on cold at full flow for least ten(10) minutes.

Running the water will accomplish two goals. First, it will purge the pipes of any stagnant water; second, it will drain the pressure tank and cause the pump to turn on and start pumping water from the well. This should allow the collection of a representative sample from the well.

Record any observations and/or comments about matters pertinent to the sample location or to the site. To the extent possible, avoid contact with water. Samplers should wear nitrile gloves to help avoid cross-contamination with other samples.

After the water has run for approximately 10 minutes, reduce the flow to facilitate sample collection with minimal aeration and begin filling the laboratory containers.

5.4.2 Sampling Households With Treatment System

For households with a DEP Installed Treatment System (GAC Filters, air stripper, etc.) samplers should collect samples after the system first (post-treatment), between treatment devices second, and before the treatment system (pre-treatment) last to reduce likelihood of cross-contamination. The pre-treatment samples should be collected before any filter, softener, or other device that the landowner or DEP has installed.

The plumbing system, including the any treatment devices should be purged by turning on a faucet located on the downstream end of the devices. This may be a kitchen or bathroom faucet. Sufficient water should be purged to flush the treatment devices as completely as possible (10-20 minutes depending on the number of devices present). In

most situations, purging can continue while samples are being collected at the designated sample points. Care should be taken to accurately label the sample containers with the correct sample location designation (pre-, mid-, and post-). Each sample location should be purged to remove stagnant water prior to sample collection. If sampling from a sink faucet, be sure to remove any aerators on faucet. When sampling, it may be appropriate to polyethylene tubing and a bucket to collect purge water. Laboratory containers should be filled using a flow rate that is appropriate for the type of analysis and container type.

The sample before the filter system is taken last due to its highest probability of being contaminated. Run the sample port water ten to twenty seconds to remove the residue/contaminants from the port. The bucket will again be necessary to catch excess water from this sampling port. Gloves will be necessary not only to prevent cross-contamination of samples, but also to protect the sampler from dermal exposure.

If multiple treatment devices are present, it may be necessary to take more samples. Samplers should take care to accurately identify and label sample locations and associated laboratory containers. Filtration devices can often be bypassed with bypass valves included in the plumbing. When sampling any of these devices, trace the route of the plumbing (pipes) to make sure the sample is being taken from the correct sampling port. Be sure to include contingencies for such devices in the sampling plan.

Once all the samples have been collected at a water supply, remove gloves, and return all plumbing to its original position (aerator back on faucet, all sample ports closed). Record water meter readings if the residence is equipped with a meter. Be sure to note if the meter reading is in cubic feet or gallons. The water meter reading will give (in conjunction with the previous reading) the amount of water being used, which is useful in predicting/explaining the breakthrough in GAC filters. Add any necessary preservatives to the samples and place the samples in a cooler on ice for transport to the laboratory.

5.4.3 Special Situations

There are certain situations that require unique sampling methods. For example, when sampling for petroleum hydrocarbons by either the DRO or EPH methods, it may be necessary to collect samples from spigots at high flow rates. Under these circumstances, a section of hose fitted with a "Y"-control valve may be required to assure that grease from the spigot is not entrapped in the sample. Another example of a unique situation is when tritium is used to investigate the relative age of the groundwater. Samplers need to remove their watches before collecting samples that will be analyzed for tritium.

6.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

In order to insure that the samples are representative of the water at a given sampling point, the sampler must pay close attention to QA/QC procedures. At each household the sampler must be aware of four (4) areas which may be sources of cross-contamination of the samples: 1)samplers hands--wear a new pair at every residence sampled; 2) sampling point--sample at the least contaminated households first, the most contaminated last; 3) self-contamination--make sure the sampling area is free of any possible sources of contamination (grease on the tap, solvent bottles near the sample port), and; 4) piping–look

at the plumbing and pipe materials and note the presence of lead soldering or improper lubrication (i.e. WD-40, oil, etc.) on the pipes. Also, ask the resident if any work had recently been done on the well, plumbing, or any other components of the water system.

A trip blank should be preserved with the same preservative as the actual samples, stored and transported with the other samples collected during the sampling event, and then analyzed (along with the other samples) for the appropriate suspected contaminants by the lab. If a sampling event is completed and the trip blank contains contaminants, this indicates that the containers may not have been clean or other QA/QC procedures have failed. In this case, it may be necessary to re-sample. Consult with the project manager and laboratory personnel before re-sampling a site.

Samplers should avoid fueling a vehicle until after the samples have been delivered to the laboratory or after securing them in a cooler. Avoid the use of colognes, perfumes and bug sprays on sampling days. In addition, sampling personnel should avoid any contact with inside surfaces of sample containers and covers or caps.

If sample results indicate that contamination is present at unanticipated levels or between filters re-sampling may be warranted. All sample data should be inspected for possible sources of error before re-sampling the water supply. Recheck all field documentation from the trip to insure the sample numbers were recorded correctly in both the field notebook and on the laboratory analysis request sheet and/or chain of custody. Talk with the person(s) completing the analysis in the laboratory and ask about possible sources of error. If the documentation check fails, go back to the site and re-sample. When re-sampling, be sure to check the plumbing to make sure all valves are properly opened and closed. An open bypass valve would bypass the filters and supply unfiltered raw water to the house.

In some instances, a water supply may have contamination before the filter and between the filter. In this case, the between filter spigot should be re - sampled and analyzed as soon as possible in order to confirm the breakthrough of the first GAC filter, or the first filter should be changed or repacked as soon as possible. If the determination has been made that the first filter has contaminant breakthrough, then arrangements should be made to have the filter replaced and/or repacked with carbon. Whether to resample or change filters is a decision to be made following consultation with the project manager.

7.0 DOCUMENTATION

All sampling activities must be documented as outlined in MEDEP/DR SOP DR#013 - Documentation of Field Notes and Development of a Sampling Event Trip Report. Sample custody must be followed as outlined in MEDEP/DR SOP#012 – Chain of Custody Protocol.

8.0 REFERENCES

- U.S. Environmental Protection Agency, "A Compendium of Superfund Field Operations Methods," EPA-540/P-87/001, December 1987.
- U.S. Environmental Protection Agency, "Sampling of Hazardous Materials," EPA, April 1990.