# COVER SHEET
# STANDARD OPERATING PROCEDURE

**Operation Title:** **PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) SAMPLING CONSIDERATIONS**

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**DISTRIBUTION;**

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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) Bureau of Remediation and Waste Management (BRWM).

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 special considerations that must be taken when collecting environmental media samples that will be analyzed for Per- and Polyfluoroalkyl Substances (PFAS). Other BRWM SOPs detail collection methods for such media (e.g., soil, groundwater, surface water, residential wells, etc.); this PFAS sampling SOP is intended to supplement those individual SOPs.

PFAS refer to a group of man-made chemicals known as Per- and Polyfluoroalkyl Substances. There are thousands of varieties of these chemicals. PFAS have been used historically and are currently found in many household and industrial type products, some of which are commonly available and still manufactured. Because of the ubiquitous nature of PFAS and the very low detection limits associated with environmental media PFAS sample analysis, there is an increased likelihood for cross-contamination when collecting such samples. Such cross-contamination has the potential to lead to false positive results, biasing the data used in project decision-making.

When collecting PFAS samples, special consideration must be given to sampling procedures, sampling equipment selection, decontamination procedures, selection of field clothing and personal protective equipment (PPE), and use of personal care products such as lotions, sunscreens, and insect repellants.

Site specific Data Quality Objectives (DQOs) should be reviewed to determine which MEDEP SOP(s), including sampling methods and laboratory analytic methods, are applicable on any given project.

## 3.0 DEFINITIONS

3.1 **GAC**: Granular activated carbon. A type of media used in a water filtration system that is effective for removing PFAS
3.2 **MEDEP Installed Treatment System:** Any treatment system device that a MEDEP administered program has placed on a water supply for the purpose of removing contamination or conditioning the water prior to contaminant removal
3.3 **PFAS**: Per- and Polyfluoroalkyl Substances
3.4 **PFAS Free Water**: Water that is known to not contain PFAS, typically through analytical testing. PFAS free water is typically supplied by an analytical testing lab.
3.5 **POET**: Point of Entry Treatment System. A "whole house" water filtration system installed as close as possible to where the well water plumbing enters the home.

3.6 **PTFE**: Polytetrafluoroethylene, a synthetic fluoropolymer known by the trade name Teflon™.
3.7 **SAP**: Sampling and analysis plan
3.8 **Treatment System**: A device which removes contaminants and/or naturally occurring compounds from the water. This may include granular activated carbon (GAC) filters, water softeners, particle filters, air strippers, or reverse osmosis systems

## 4.0 RESPONSIBILITIES

All MEDEP/BRWM 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/BRWM staff reviewing data by outside parties are responsible for ensuring that the procedure (or an approved equivalent) was utilized appropriately.

## 5.0 GUIDELINES AND PROCEDURES

### 5.1 INTRODUCTION AND GENERAL WORK PRACTICES

Eliminating unnecessary contact with sample media, wearing appropriate clothing, wearing disposable gloves, selecting appropriate sampling equipment, and proper equipment decontamination are among the most important factors in eliminating cross contamination of PFAS samples. When selecting personal clothing and personal protective or sampling equipment, it is also reasonable to consider if there is a potential pathway for cross-contamination under anticipated field conditions or activities.

The number of staff physically present in the direct vicinity of the sampling location should be minimized and food should not be consumed in the sampling location, in part since food packaging can contain PFAS. Bottled water and hydration drinks (i.e. Gatorade® and Powerade®) should only be consumed in the staging area.

Prior to collecting samples, a sampling and analysis plan should be developed following MEDEP/DR SOP# RWM-DR-014, Development and Analysis of a Sampling and Analysis Plan.

### 5.2 ACCEPTABLE AND PROHIBITED ITEMS

This table is not intended to be a comprehensive listing of all items which may be PFAS-free or all items that pose a potential cross-contamination risk. This table should be utilized when preparing to collect the types of samples referenced in Section 5.3, or if other PFAS samples not discussed in this SOP are being collected.

**Table 1: Summary of Prohibited and Acceptable Items for Use in PFAS Sampling**

| Prohibited Items | Acceptable Items |
|---|---|
| **Field Equipment** | |
| • Teflon® containing materials, including tubing<br>• Low density polyethylene (LDPE) materials, including tubing<br>• Aluminum foil | • High-density polyethylene (HDPE) materials, including tubing<br>• Silicone, including tubing<br>• Stainless steel materials<br>• Acetate direct push liners |
| • Waterproof field books<br>• Water resistant sample bottle labels<br>• Post-It Notes® | • Loose paper (non-waterproof)<br>• Paper sample labels covered with clear packing tape or laboratory supplied labels.<br>• Aluminum or Masonite field clipboards<br>• Sharpies®, pens |
| • Chemical (blue) ice packs | • Regular ice and resealable plastic bags |
| • PTFE thread sealant | • Non-PTFE thread sealant<br>• Bentonite |
| • Equipment with Viton™ Components (need to be evaluated on a case-by-case basis, Viton™ contains PTFE, but may be acceptable if used in gaskets or O-rings that are sealed and will not come into contact with sample media or sampling equipment.) | |
| **Field Clothing and PPE** | |
| • New clothing or water resistant, waterproof, or stain treated clothing. Clothing laundered with fabric softeners, clothing containing Gore-Tex™ on outer layers.<br>• Clothing laundered using fabric softener or "drier sheets" | • Well-laundered clothing, defined as clothing that has been washed 6 or more times after purchase, made of synthetic or natural fibers (preferable cotton)<br>• No fabric softener<br>• Reflective safety vests, uncoated Tyvek™, cotton clothing, synthetic under clothing, body braces |

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| • No cosmetics, moisturizers, hand cream, or other related products applied after regular personal cleaning/showering routine on the morning of sampling | • **Sunscreens** - Alba Organics Natural Sunscreen, Aubrey Organics, Jason Natural Sun Block, Kiss My Face, zinc-oxide/titanium-dioxide or other mineral based sunscreens<br>• **Insect Repellents** – Deep Woods Off®, Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics<br>• **Sunscreen and insect repellant -** Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion |
| **Sample Containers** | |
| • Containers not supplied by laboratory specifically for PFAS analysis | • Maine Accredited Lab supplied containers for PFAS analysis (typically glass or HDPE) |
| **Rain Events** | |
| • Waterproof or resistant rain gear, with exceptions noted on the right | • Polyurethane, vinyl, or rubber-coated rain gear, including boots. Gazebo tent that is only touched or moved prior to and following sampling activities |
| **Equipment Decontamination** | |
| • Decon 90<br>• Water from an on-site well | • Alconox® and/or Liquinox®<br>• Potable water from municipal drinking water supply (if tested as PFAS-free)<br>• PFAS-free water from accredited laboratory |
| **Food Considerations (In Sampling Area)** | |
| • All food and drink, with exceptions noted on the right | • Bottled water and hydration drinks (i.e. Gatorade® and Powerade®) to be brought and consumed only in the staging area |

## 5.3 SAMPLING PROCEDURES AND EQUIPMENT

### 5.3.1 MONITORING WELL, SURFACE WATER, AND SEDIMENT SAMPLING

The following SOPs should also be referenced when collecting groundwater, surface water, or sediment samples:

- MEDEP/DR SOP RWM-DR-002, Groundwater Sample Collection for Site Investigation and

Assessment Monitoring
- MEDEP/DR SOP RWM-DR-003, Groundwater Sampling Using Low Flow Purging and Sampling for Long-Term Monitoring
- MEDEP/DR SOP RWM-DR-004, Surface Water and Sediment Sampling

PFAS specific considerations include selecting sampling equipment that does not contain PFAS or does not have PFAS components that contact the environmental media being sampled. Refer to Table 1 above for guidance. It is recommended that pumps be blank tested to verify sample interference. MEDEP has run blank samples on several MEDEP owned pumps and found them to be acceptable for PFAS sampling. Based on their sorption affinity it is likely elevated turbidity will influence PFAS results due to sorption on suspended solids in ground or surface water. PFAS have been correlated to turbidity in marine settings and in groundwater where turbidity readings exceed 10 NTU. The project team may want to consider testing the solid and liquid fraction separately. These effects can be minimized through low flow methods and standard field practices like sampling surface water from downstream to upstream points.

The collection of groundwater, surface water, or soil samples may utilize tools or pumps that are reused and decontaminated between sample locations. Proper decontamination procedures are especially important in this case; see Section 5.4.

### 5.3.2 RESIDENTIAL WELL INITIAL SAMPLING

The following SOPs should also be referenced when collecting residential well samples:

- MEDEP/DR SOP RWM-DR-001, Water Sample Collection from Water Supply Wells

PFAS specific considerations include collecting the sample as close to the pressure tank associated with the well system as possible. This limits cross-contamination from plumbing system components which may contain PFAS (i.e., PFAS-containing thread tape or paste). If the pressure tank is not equipped with a sample valve, an outside hose valve/spigot may be a second choice sampling location. In any case and if possible, samples should be collected before any filtration systems that may be present. If the initial well system 10-minute purge was not done using the valve where the sample will be collected from, the valve should run for several seconds to flush out any dust or debris, immediately prior to filling a sample container. The valve at the sample port should not be adjusted during sample collection. If the flow rate needs to be adjusted, sample collection should be suspended before adjusting the valve and the valve should be purged for several seconds before resuming sample collection. Staff should also note any potential sources of PFAS in the area where the sample was collected, such as a laundry room or storage of household chemicals.

### 5.3.3 RESIDENTIAL PFAS TREATMENT SYSTEM SAMPLING

The following SOPs should also be referenced when collecting residential well samples:

- MEDEP/DR SOP RWM-DR-001, Water Sample Collection from Water Supply Wells

MEDEP-installed “whole house” PFAS Point of Entry Treatment Systems (POET) typically consist of a sediment filter followed by two granulated activated carbon (GAC) filters with a

sample port installed before the first GAC filter, between the two GAC filters, and immediately after the second GAC filter. To minimize cross-contamination, always collect the treated water sample first (port located after the second GAC filter and typically labelled as “After”), followed by the midpoint of the filter system (port located between the two GAC filters and typically labelled “Between”), and lastly the filter influent water (port located before the first GAC filter and typically labelled as “Before”). New gloves are required if samplers handle the “Between” or “Before” purge water prior to sampling the “After” tap.

MEDEP has limited data indicating that some sample port components may contribute PFAS to filter water samples. To reduce the potential for this to affect sample results, and to reduce resources spent on problem solving and unnecessary filter media changeouts, the following sample procedure should be followed.

When purging the whole system prior to sampling:

- The kitchen or other household tap will be purged for 10 minutes prior to sampling the filter system. This purges stagnant water from pipes and causes the well pump to turn on which fills the system with fresh groundwater, ensuring a representative sample. The additional purge of After and Between ports referenced below can be completed at the same time as the “whole system” purge. Purging the After and Between ports flushes any residual contamination from the sample ports themselves.

When collecting filter system samples:

- Purge three gallons from the After tap prior to sampling with no adjustment of the valve before filling bottles.
- Purge three gallons from the Between tap prior to sampling with no adjustment of the valve before filling bottles.
- No extended purge for the Before sample, unless the sample is being collected to specifically evaluate if treatment may be discontinued, in which case three gallons should be purged prior to collecting the sample.

### 5.3.4 SOIL SAMPLING

The following SOPs should also be referenced when collecting residential soil samples:

- MEDEP/DR SOP RWM-DR-006, Protocol for Collecting Soil Samples.

The collection of soil samples often utilizes tools that are reused and decontaminated between sample locations. Proper decontamination procedures are especially important in this case; see Section 5.4.

## 5.4 EQUIPMENT DECONTAMINATION

Decontamination of sampling equipment should be conducted following the procedure outlined in MEDEP/DR SOP# RWM-DR-017 – Equipment Decontamination Protocol, and as outlined in the project specific SAP.

Any re-usable equipment should be decontaminated using Alconox® and/or Liquinox® soap, including a final rinse with PFAS-free water, both prior to use and between sample locations. Such equipment may include plumbing fittings that may be needed in certain cases to obtain a sample from the pressure tank tap, and tools used to collect surface water, sediment or soil samples.

When a sample program involves field decontamination and re-use of equipment in the field equipment blanks should be collected to assess the effectiveness of decontamination procedures. Typically, these are collected by pouring laboratory-supplied PFAS-free water through the equipment in question and analyzing the rinsate by the same method as the project samples.

### 5.5 FIELD BLANKS

Field Blanks are commonly incorporated into PFAS sample plans, based on the potential for sample handling by the field staff or site conditions to impact water sample data with the regulatory limits at 20 ng/L or lower. Field blanks are often incorporated at a rate of one-per-day for each sample team, depending upon the project requirements. Based on the collection of over 400 field blanks and over 3,000 water samples at residential, landfill, AFFF response, and other sites MEDEP has found that blanks indicate cross-contamination detected in only a small percentage of sample events. Project teams should assess the potential for cross-contamination, the sensitivity of the project, and the availability or lack of previous data from a site and determine the utility of field blank collection.

## 6.0 REFERENCES

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