



**COVER SHEET  
STANDARD OPERATING PROCEDURE-ADDENDUM**

**OPERATION TITLE:            DEVELOPMENT OF A SAMPLING AND ANALYSIS PLAN-**

**ADDENDUM - A – ADDITIONAL REQUIREMENTS FOR THE  
SAMPLING OF PERFLUORINATED ALKYLATED  
SUBSTANCES (PFASs), PERFLUOROCTANOIC ACID  
(PFOA) and PERFLUOROCTANE SULFONATE (PFOS).**



## **1.0 APPLICABILITY**

This Standard Operating Procedure (SOP) ADDENDUM 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 DEP/DR.

This SOP ADDENDUM 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/DRs requirements for the development of a Sampling and Analysis Plan (SAP) and outline specific requirements for the sampling of compounds related to Per- and Polyfluoroalkyl Substances (PFASs), including Perfluorooctanoic acid (PFOA) and Perfluorooctane sulfonate (PFOS).

Prior to conducting any investigative field work, routine monitoring, post closure sampling or any data gathering/sample collection project, a SAP will be developed that outlines the goals of the activity and methodology to achieve that goal. A well-developed SAP that is reviewed by all field team members will assure that the goals are obtainable, the methodology is consistent, and the data generated will meet the Data Quality Objectives (DQOs) for the project.

Given the ubiquitous nature of PFAS compounds, the low detection levels that are generally requested, and the different methodologies for which these compounds are tested, additional requirements regarding sampling methodology, equipment, and analysis for PFAS compounds should be included as part of the sampling plan and during the sampling event. This document outlines those specific requirements to be included in a PFAS sampling plan and during sampling.

## **3.0 GUIDELINES AND PROCEDURES**

### **3.1 INTRODUCTION**

A sampling and analysis plan, regardless of whether sampling for PFAS compounds or other potential contaminants, should include all the elements in SOP RWM-DR-014 – Development of a Sampling and Analysis Plan. Although not required to be included in the SAP, (as outlined in SOP RWM-DR-014), an assessment of the existing data should be conducted, a site reconnaissance completed, a conceptual site model developed, and data quality objectives determined as part of planning to assure the SAP will meet the goals of the sampling.

The SAP itself should include the goal of the sampling, end use of data, data quality objectives, schedule, sampling methodology, sampling locations, media to be sampled, analytical parameters, and QA/QC samples. Additionally, a site-specific health and safety plan may be necessary (see SOP-DR-014) depending on the scope of the sampling event. For example, collection of samples in a large or moving water body, or as part of large sampling effort



involving drilling rigs and/or excavation equipment would require a health and safety plan; residential well or routine monitoring well sampling would not.

### **3.2 SAMPLING METHODOLOGY/EQUIPMENT**

A description of the sampling methodology will be included in the SAP. Generally, reference to an appropriate SOP for the sample methodology will be sufficient. The Division has developed multiple SOPs for sample collection of most media; please refer to the Division of Remediation's Quality Assurance Plan - Attachment B – Data Collection SOPs for a list of all data collection standard operating procedures.

#### **3.2.1 Sampling Methodology**

Sampling for PFAS will follow the standard procedures as outlined in the specific sampling method SOPs. In addition, the following task must be included in the SAP and field staff must perform the task as described below to prevent the introduction of contamination during collection of the sample:

“Prior to sampling each location the sample handler must wash their hands and don nitrile gloves. This is particularly important when driving between locations or carrying pumps and other equipment between sample points. PFAS contamination during sample collection can occur from several common sources, including food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will help to minimize this type of accidental contamination of the samples.”

It should be noted that samples collected for PFAS analysis do not have to be headspace free.

#### **3.2.2 Sampling Equipment/Supplies/Personal Protective Equipment (PPE)**

The low detection limits required for PFAS water analysis and their common occurrence in frequently used items warrant attention to equipment and PPE used for sampling. A sampling equipment list for PFAS projects should follow the material guidelines in Table 1 of Attachment A, avoiding use of LDPE and any Teflon-lined equipment or tubing. If field decontamination of submersible pumps or large non-disposable equipment is necessary, washing with a PFAS-free soap solution, rinsing with DI water and then a rinse with laboratory-supplied PFAS-free water is recommended. Small field equipment such as scoops or bowls can omit the DI rinse. New nitrile gloves should be used between locations and activities. For water sampling where there is adequate separation between the sample point (for example a kitchen tap) and sampler footwear then boot restrictions and PPE such as chicken boots may not be needed. Other recommended clothing and PPE requirements are noted in Table 1 of Attachment A.

### **3.3 Media Sampled/Analytical Parameters**

A chart outlining the media collected and sample analysis methodology will be included in the SAP.



PFOA and PFOS are common potential contaminants of concern (COCs) at PFAS sites, but a wider suite of PFAS must be considered when evaluating a site. Laboratory reporting lists typically include approximately 20 PFAS compounds depending upon method and laboratory, and the DEP PFAS analytical services request required that laboratories report a list of 24 compounds PFAS. **Until additional USEPA methods are finalized or unless otherwise required specifically for the project, the standard analysis for drinking water and groundwater will be Modified Method 537 using isotope dilution with the standard DEP reporting list from the most recent contract.**

For sites where potential unidentified PFAS precursors are a concern, additional analyses such as the total extractable fluorinated compounds (TOP analysis) can be followed by analysis of specific compounds, to assess the presence of precursors in environmental media that are not captured by the compound specific methods. USEPA has also released a newer drinking water method (Method 533) with a longer standard list of compounds, but as of this revision few labs are offering this method.

Parameters will be identified by either laboratory analysis methodology number, or generally accepted name of analysis. Given the different methods currently available for sampling PFAS, there must be a clear understanding between the project manager and the laboratory providing the analysis as to what the media sampled, test methodology, and detection levels will be.

Table 1 provides the current standard methods with their associated media, other methods may be appropriate based on the data quality objectives of the sampling project:

Other methods may be appropriate based on the data quality objectives of the sampling project.

The contracted analytical laboratory must be Maine certified to perform any method for which Maine provides certification. The contract lab must be able to accommodate the sample load and perform the analyses within holding times. The contract lab must be able to achieve PQLs, for all analyses, which are below the associated regulatory guideline value. The contract lab must also provide electronic data deliverable (EDD) results for all samples.

Deviations can be made from the laboratory method on a site or event specific basis, based on the goals of the sampling, end use of the data, and the data quality objectives. Rationale for deviations from these methods should be described in the SAP and/or the final report.

All parameters, containers, preservation, and holding times will be as recommended by the laboratory providing analytical services. Special or out of the ordinary containers or preservation should be noted in the SAP.



**TABLE 1**  
**Media/Analytical Methodology**

<b>MEDIA</b>	<b>LABORATORY METHOD</b>	<b>HOLD TIME*/ PRESERVATION</b>	<b>ANALYSIS TIME</b>	<b>Reporting List</b>
Public Drinking Water Supply **	USEPA Method 537.1	14 days to extraction/Trizma***	28 days after extraction	Method specific
Groundwater and Private Water Supplies	Modified Method 537 (Isotope Dilution)	14 days to extraction/<6°C	28 days after extraction	DEP Minibid list ****
Surface Water	Modified Method 537 (Isotope Dilution)	14 days to extraction/<6°C	28 days after extraction	DEP Minibid list ****
Soil/Sediment/sludge	Modified Method 537 (Isotope Dilution)	14 days to extraction/<6°C	28 days after extraction	DEP Minibid list ****
Other (vegetation...)	Modified Method 537 (Isotope Dilution)	Lab specific	Lab specific	DEP Minibid list ****
Water or Soil	TOP or other total fluorinated analysis	Lab specific/<6°C	Lab specific	Method specific

\* Hold time of 14 days is specified by DEP

\*\* USEPA 537.1 is currently the only Maine certified method for drinking water, others such as Method 533 will be offered in the future

\*\*\* Trizma needed for samples that may contain residual chlorine from treated water sources

\*\*\*\* Longer reporting lists may vary between laboratories, generally the DEP mini-bid list can be used for all projects

### 3.4 FIELD QC SAMPLES

Sample collection for PFAS analysis does not require specific field QC samples outside the normal requirements.

General recommendations for all sampling include one aqueous field blank, per field event, to be analyzed for PFASs to determine if water samples have been contaminated by sources unrelated to the project area, and to assess the overall field procedures. The field blank is typically one bottle of PFAS-free water supplied by the laboratory, which is uncapped and poured to a second bottle. For multi-day events, one blank per day should be considered. If non-dedicated or non-disposable equipment is used a PFAS-free water equipment blank is warranted to check field decontamination procedures.

### 4.0 PFAS SPECIFIC TEMPLATE

In the instances of a PFAS only sampling event, in which samples are being collected from a project which has a history of sampling for other analytes and a well-developed conceptual site



model and/or an SAP already exists, a PFAS sampling specific template has been developed which provides the general requirements of a sampling plan. This template can be found in Attachment A of this Addendum.

## **5.0 REPORT GENERATION**

As stated in SOP RWM-DR-014, A Sampling Event Trip Report (SETR) will be developed for every sampling event (see MEDEP/DR SOP# RWM-DR-013). The staff person responsible for developing the SETR will be stated in the SAP. Data obtained as part of the SAP will be assessed in the final report for which the data has been collected.



**ATTACHMENT A**  
**PFAS SAMPLING AND ANALYSIS PLAN FORM TEMPLATE**

## 1.1 INTRODUCTION

The introduction will state the objectives of the sampling plan which include:

- Goals of the sampling plan;
- End use of data.

## 2.0 BACKGROUND INFORMATION

A BRIEF explanation of the background of the Site and/or conceptual site model (CSM) and reason for sampling for PFAS will be presented.

## 3.0 SITE SPECIFIC HEALTH AND SAFETY PLAN

If determined necessary, a Site-Specific Health and Safety plan (HASP) will be developed and attached.

## 4.1 SAMPLING METHODOLOGY/ EQUIPMENT

A description of the sampling methodology will be included in the SAP. In instances where a MEDEP/DR SOP is available, reference to SOPs by either name or document number is sufficient.

Currently, the MEDEP/DR QAP has SOPs for the following sample collection tasks which may be pertinent to PFAS sampling:

- 001-Water-Sample-Collection-From-Water-Supply-Wells;
- 002-Groundwater-for-Site-Investigation;
- 003-Low-Flow-Groundwater-Sampling;
- 004-surface-water-sediment;
- 006-soil-sampling;
- 010-Container-Sampling;
- 015-Incremental-sample-methodology;
- 023-Pore-Water-Sampling.

Other SOPs may be utilized on a project specific basis if MEDEP/DR does not have a current SOP for sampling a particular media or situation. Prior Department approval is necessary.

Prior to sampling each location the sample handler must wash their hands and don nitrile gloves. PFAS contamination during sample collection can occur from a number of common sources, including food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will help to minimize this type of accidental contamination of the samples, particularly when moving pumps, generators or other equipment between sample points.

Some sampling equipment, field supplies, field clothing and personal protective equipment are prohibited when sampling for PFAS. Table 1 outlines the prohibited items. This table must be included in the SOP and field staff informed as to what equipment is allowed.



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

Prohibited Items	Acceptable Items
<b>Field Equipment</b>	
Teflon® containing materials. Aluminum foil.	High-density polyethylene (HDPE) and stainless steel materials
Storage of samples in containers made of LDPE materials	Acetate direct push liners
Teflon® tubing	Silicon or HDPE tubing
Waterproof field books. Water resistant sample bottle labels.	Loose paper (non-waterproof). Paper sample labels covered with clear packing tape, or lab-applied labels.
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum or Masonite field clipboards
	Sharpies®, pens
Post-It Notes	
Chemical (blue) ice packs	Regular ice
Excel Purity Paste TFW Multipurpose Thread Sealant Vibra-Tite Thread Sealant	Gascoils NT Non-PTFE Thread Sealant 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 away and will not come into contact with sample or sampling equipment.)	
<b>Field Clothing and PPE</b>	
New clothing or water resistant, waterproof, or stain treated clothing, clothing laundered with fabric softeners, clothing containing Gore-Tex™	Well-laundered clothing, defined as clothing that has been washed 6 or more times after purchase, made of synthetic or natural fibers (preferable cotton). Cotton coveralls are one option that reduces the need for specialized personal clothing.
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™	Boots made with polyurethane and PVC for wet conditions, or rubber overboots (“chicken boots”)
	Reflective safety vests, Tyvek®, Cotton clothing, synthetic under clothing, medical braces

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No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling	<b>Sunscreens</b> - sunscreens that are “free” or “natural”, or UV blocking clothing <b>Insect Repellents</b> - Sawyer permethrin clothing treatment, Deep Woods Off, Insect Shield pre-treated clothing <sup>(1)</sup>
<b>Sample Containers</b>	
LDPE, glass containers or passive diffusion bags.	HDPE (any media) or polypropylene (only for EPA Method 537.1 samples)
Teflon®-lined caps	Lined or unlined HDPE or polypropylene caps
<b>Rain Events</b>	
Gore-Tex™ or similar breathable coated waterproof or resistant rain gear	Polyurethane, vinyl, wax or rubber-coated rain gear. Gazebo tent that is only touched or moved prior to and following sampling activities
<b>Equipment Decontamination</b>	
Decon 90	Alconox® and/or Liquinox®
Water from an on-site well	Potable water from municipal drinking water supply (if tested as PFAS-free); Lab-supplied PFAS-free water
<b>Food Considerations</b>	
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

(1) Bartlett SA, Davis KL. Evaluating PFAS cross contamination issues. *Remediation*. 2018;28:53–57.

It is recommended that all water samples will be collected using dedicated or disposable sampling equipment where possible. Any re-usable equipment, such as plumbing fittings, that may be needed in certain cases to obtain a sample from the pressure tank tap, should be decontaminated using Alconox/Liquinox soap and rinsed with PFAS-free water prior to use and between locations.

## 5.0 Sample Locations

A map showing planned sampling locations will be included in the sampling plan. If locations are not pre-determined, the method that samples will be chosen and collected (field observations, random, etc.) will be outlined in the SAP. Field or laboratory compositing procedures will also be described, if applicable.

This section should also indicate sampling collection priority and order, to assure that the most important samples are obtained, and that sampling is generally done from low areas of contamination to higher levels of contamination. It is recommended that critical samples be collected in duplicate.

## 6.0 Media Sampled

A chart outlining the media collected and sample analysis will be included in the SAP. Table 2 provides several current methods with their associated media:

**TABLE 2**  
**Media/Analytical Methodology**

<b>MEDIA</b>	<b>LABORATORY METHOD</b>	<b>HOLD TIME*/ PRESERVATION</b>	<b>ANALYSIS TIME</b>	<b>Reporting List</b>
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Other methods may be appropriate based on the data quality objectives of the sampling project.

The contracted analytical laboratory must be Maine certified to perform any method for which Maine provides certification. The contract lab must be able to accommodate the sample load and perform the analyses within holding times. The contract lab must be able to achieve PQLs, for all analyses, which are below the associated regulatory guideline value.

Containers, preservation, and holding times will be as recommended by the laboratory providing analytical services. Special or out of the ordinary containers or preservation should be noted in the SAP.

## 7.0 FIELD QC SAMPLES

The specific needs for QC samples for the project will be outlined. General requirements for PFAS sampling events include one aqueous field blank, per field event, to be tested for PFASs to determine if water samples have been contaminated by sources unrelated to the project area, and to assess the overall field procedures. The field blank is typically

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one bottle of PFAS-free water supplied by the laboratory, which is uncapped and poured to a second bottle. An equipment blank should be collected if non-dedicated equipment is used. For multi-day events, one blank per day should be considered, and for large events one blank per 10 or 20 samples is warranted, depending upon the project requirements. All blanks should be collected with laboratory supplied PFAS-free water. A source-water blank is handled like a trip blank, and assesses the laboratory supplied water and sample containers. This blank may be warranted depending on DEP experience with the laboratory or sensitivity of the project.

Additionally, any QC samples that will be collected in the field that are required as part of laboratory QC requirements and to allow data validation will be outlined.

#### **4.9 REPORT GENERATION**

A Sampling Event Trip Report (SETR) will be developed for every sampling event (See MEDEP/DR SOP# RWM-DR-013). Staff person responsible for developing the SETR will be stated.