



**COVER SHEET
STANDARD OPERATING PROCEDURE**

OPERATION TITLE: DEVELOPMENT OF A SAMPLING AND ANALYSIS PLAN

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DISTRIBUTION:

() Division of Remediation.....By: _____ Date: _____



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/DRs requirements for the development of a Sampling and Analysis Plan (SAP). Prior to conducting investigative field work, routine monitoring, post closure sampling or any data gathering 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 activity team members should assure that the goals are obtainable, the methodology is consistent, and the data generated will meet the Data Quality Objectives (DQOs) for the project.

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 GUIDELINES AND PROCEDURES

4.1 INTRODUCTION

The SAP may be developed as a narrative document or staff may use the standard sampling and analysis form found as attachment A to this SOP. A SAP will, at a minimum, contain the following elements.

4.2 ASSESSMENT OF EXISTING DATA

The project manager for the site will ensure the review of any existing information on the site. Analytical data will be analyzed for completeness, quality and usability.

4.2.1 Site Reconnaissance

Prior to sampling events, particularly large multi - day events or multi media events, it is recommended that a site reconnaissance be conducted to work out any logistical problems that may arise during sampling. This would include site access issues, physical impediments to sampling, access issues with surface water sampling, etc. Any logistical issues discovered



during the site reconnaissance should be mentioned in the SAP along with recommendations for overcoming these issues.

4.2.2 Conceptual Site Model

The first step in developing any sampling plan is to develop a conceptual site model (CSM). ASTM defines a CSM as “a written or pictorial representation of an environmental system and the biological, physical and chemical processes that determine the transport of contaminants from, sources through environmental media to environmental receptors within the system.” The CSM is a dynamic tool to be updated as new information becomes available, and therefore it should be amended, as appropriate, after each stage of investigation.

The CSM should be site-specific and take into consideration the following information:

- What are the Contaminants of Concern (COCs) associated with the site?
- How were COCs released into the environment? Where are the sources located? Was the release due to a surface spill of a liquid, a subsurface spill from piping or a tank, improper storage of materials such as chemical soaked filters at a drycleaner, through a floor drain to the subsurface beneath a building, or through a floor drain to a surface location? Is there a non-aqueous phase liquid (NAPL)?
- What are the chemical characteristics that will influence how the COCs will act in the environment? Do they dissolve readily in water? Are they very volatile or less volatile? How much was released? Do they degrade in the subsurface?
- How does the geology, preferential pathways, groundwater flow, depth to groundwater, proximity to impermeable surfaces, and chemical attenuation influence contaminant migration?
- Where are the potential receptors and how might contaminants reach them? Have all of the migration pathways been identified? Has future construction been considered?

4.3 TITLE SECTION

The title section of an SAP will contain the name and town of project, the name and title of the person developing the SAP, and the expected date of the field work and field personnel.

4.4 INTRODUCTION

The introduction will state the DQOs which include:

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

4.5 BACKGROUND INFORMATION

A brief explanation of the background of the Site will be presented.

4.6 SITE SPECIFIC HEALTH AND SAFETY PLAN

A Site-Specific Health and Safety plan (HASP) will be developed and included with the SAP. The MEDEP/Bureau of Remediation and Waste Management HASP form, which contains the minimum requirements for a HASP, can be found as Attachment B of this SOP.



If below grade sampling is part of the SAP, Dig - Safe must be notified at least 3 working days prior to the sampling event. Sample locations must be marked on the ground prior to calling Dig-Safe.

4.7 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.

4.8 SAMPLES AND PARAMETERS

4.8.1 Sample Locations

A map showing planned sampling locations shall 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. Also outlined will be any composite procedures, 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.

4.8.2 Media Sampled

A chart outlining the media collected and sample analysis will be included in the SAP. Generally, the media sampled will be:

- Soil;
- Groundwater (via monitoring wells and residential wells);
- Pore water;
- Soil gas and/or sub-slab soil gas;
- Indoor air;
- Surface Water;
- Sediment;
- Neat waste material.

4.8.3 Analytical Parameters

Parameters will be identified by either laboratory analysis methodology number, or generally accepted name of analysis.

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.



4.9 FIELD QC SAMPLES

The specific needs for QC samples for the project will be outlined; including, but not limited to:

- Background samples;
- Field duplicates;
- Trip blanks; and
- Equipment blanks

5.0 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 in the SAP. Data obtained as part of the SAP will be assessed in the final report.



SOP No. RWM-DR-014
Effective Date: 04/08/2020
Revision No. 03
Last Revision Date: 03/10/2021
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ATTACHMENT A
SAMPLING AND ANALYSIS PLAN FORM



SOP No. RWM-DR-014
Effective Date: 04/08/2020
Revision No. 03
Last Revision Date: 03/10/2021
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ATTACHMENT B
HEALTH AND SAFETY PLAN FORM

MEDEP DIVISION of REMEDIATION SAMPLING and ANALYSIS PLAN

SITE NAME:

DATE of SAMPLING:

MEDEP PERSONNEL: (list names, titles and roles such as person responsible for ordering containers and completing trip reports)

OTHER PERSONNEL: (list name affiliation, title and role)

CONCEPTUAL SITE MODEL (CSM):

(ASTM defines a CSM as “a written or pictorial representation of an environmental system and the biological, physical and chemical processes that determine the transport of contaminants from, sources through environmental media to environmental receptors within the system.” The CSM is a dynamic tool to be updated as new information becomes available, and therefore it should be amended, as appropriate, after each stage of investigation.) All active sites in the Division of Remediation should have a CSM. Staff should work with their geologist to develop and update this as necessary. Provide the following information for the site from the CSM.

Hydrogeologic Setting: (prepare a narrative describing what is known about the site-specific geology and hydrology with respect to its effect on contaminant distribution and migration.

Contaminants of Concern: (list contaminants and their chemical properties that will influence how they act in the environment)

Method of Release: (look at all releases)

Migration/Exposure Pathways: (groundwater, soil, surface water and or air)

Receptors: (list potential receptors and describe the risk to the receptor posed by contamination).

EVALUATION OF PREVIOUS DATA and DATA GAP ANALYSIS:

Review previous data to determine the environmental and physical conditions existing at the site. For example, if wells are present, well diameter and depth to water will govern the type of sampling equipment that is necessary to sample the wells. Other information such as whether it is necessary to filter samples may also be available. If samples were previously collected, were they analyzed for the appropriate parameters? In addition, previous studies may indicate there is a high degree of confidence with data that has been collected in one portion of the site, but not the other. In order to avoid or fill data gaps, all available data should be assessed and compared to the current CSM. This will result in an efficient and complete site assessment.)

SITE RECONNAISSANCE:

(Depending on the objectives of the sampling and the date of the last site visit staff may need to visit the site prior to conducting the sampling. List the date of last site visit or reconnaissance)

INVESTIGATION PURPOSE and DATA QUALITY OBJECTIVES:

(fill out and attach forms for the pathway which will be sampled)

___ Groundwater Sampling

___ Soil Sampling

___ Surface Water/Sediment Sampling

___ Air Sampling

ADDITIONAL ATTACHMENTS:

- Sample SUMMARY OF SITE INVESTIGATION Table- (example attached)
- Sample location map
- Container list
- HASP
- Equipment Checklist
- Previous “flow sheets”

GROUNDWATER SAMPLING:

DQOs:

- To determine if contamination onsite has impacted groundwater
- To determine if contamination in groundwater poses a risk to receptors
- To determine if concentrations of contaminants have changed
- To determine if groundwater is discharging to surface water
- Other: _____

Sample Point:

- Existing monitoring wells (list date last sampled, attach previous “flow sheets”)
- Wells which will be installed (with _____)
- Pore water
- Residential Wells
- Other: _____

Regulatory Standards/Guidelines that will be used for comparison:

- MEGs/MCLs
- Background

Sample Method:

- Low Flow
 - Peristaltic Pump
 - Submersible Pump
- Other: _____

Field Screening:

- pH
- eh
- conductivity
- turbidity
- DO
- Temperature
- Water level
- Flow rate
- Other: _____

Analytical Method: (list the method and make sure the method meets the objective)

- VOCs:
- Metals (field filtered for dissolved, unfiltered for total):
- Pesticides/Herbicide:
- SVOCs:

- Petroleum:
- Other:_____

SOIL SAMPLING:

DQOs:

- To determine if a release of contaminants has occurred
- To determine if contaminants pose a risk to residential/recreational receptors
- To determine if contaminants pose a risk to commercial and/or construction workers
- To determine the lateral and vertical extent of contamination
- Determining disposal criteria
- Other:_____

Regulatory Standard/Guideline:

- RAGs:
- Waste Disposal Criteria:
- Background:
- Other:_____

Sample Method: (CALL DIG SAFE)

- Shovel/trowel
- Geoprobe
 - Hand
 - Drill Rig
- Excavator
- Other:_____

Field Screening:

- PID
- FID
- XRF
- Other:_____

Analytical Method: (list the method and make sure the method meets the objective)

- VOCs:
- Metals:
- Pesticides/Herbicide:
- SVOCs:
- Petroleum:
- PCBs:

SURFACE WATER/ SEDIMENT SAMPLING

DQOs:

- To determine if contaminants from the site are discharging to surface water
- To determine the extent of contamination in surface water
- To determine if contamination in the surface water body exceeds regulatory standards
- To determine if contamination in sediments exceeds ecological toxicity criteria
- Other:_____

Media:

- Surface water
- Pore water
- Sediment

Regulatory Standard/Guideline:

- AWQC
- SQIRT
- PEC/TEC
- Background
- Other: _____

Sample Methods:

- Shovel/Trowel
- Ponar
- Beta/Kemmerer
- Peristaltic pump:
- Other: _____

Field Screening:

- PID
- XRF
- DO
- Eh
- pH
- Conductivity
- Temperature
- Other: _____

Analytical Method: (list the method and make sure the method meets the objective)

- VOCs:
- Metals:
- Pesticides/Herbicide:
- SVOCs:
- Petroleum:
- PCBs:
- Other: _____

AIR SAMPLING

DQOs:

- To determine if vapors are present in soil gas at levels that pose a threat to receptors.
- To determine how vapors are migrating from the site.
- To determine if vapors are present in indoor air at levels that pose a risk to receptors.
- To determine if landfill gases are present at a site.
- Other: _____

Sample Point:

- Soil gas
- Preferential pathway
- Subslab

- Indoor Air
- Ambient air
- Other: _____

Regulatory Guideline:

- Ambient Air Guideline
- Indoor Air Target
 - Residential 1 compound
 - Residential Multiple compounds
 - Commercial 1 compound
 - Commercial multiple compounds
 - Residential sub chronic
 - Commercial sub chronic
- Soil Screening level (this assumes an attenuation factor for soil gas to indoor air)
- Other: _____

Sample Method:

- Tedlar bag
- Summa canister
- Other: _____

Field Screening:

- PID (ppm or ppb)
- FID
- Oxygen (%)
- Carbon Dioxide (ppm)
- Hydrogen Sulfide
- Methane (% LEL)
- Other: _____

Analytical Method:

- Mobile lab
- TO-15
- TO-17
- APH
- Other: _____

DEP Limited Operation Site Safety & Health Plan

SITE INFORMATION			
SITE NAME:		JOB/FILE/SPILL #	
SITE LOCATION (ADDRESS):		TOWN:	
DIRECTIONS TO SITE:			
WORK OBJECTIVE:			
MAP/DIAGRAM (SKETCH ON LAST PAGE) MUST INCLUDE:	SITE MAP (DETAIL WHERE THIS PLAN APPLIES WORK ZONES (EXCLUSION, HAZARD REDUCTION, SUPPORT & CLEAN) ESCAPE ROUT FROM WORK AREAS & REFUGE AREA/OFF SITE CHECK IN AREA BASIC SITE TOPOGRAPHY		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
ENVIRONMENTAL CONDITIONS:	TEMPERATURE:		CLOUD COVER
	WIND DIRECTION:		WIND SPEED:
EMERGENCY RESPONSE PLAN			
FIELD STAFF TO EXIT SITE IN CASE OF EMERGENCY (NOT RESPOND)		FIELD STAFF TO RESPOND IN EMERGENCY	
<input type="checkbox"/>		<input type="checkbox"/>	
RESPONDING FIRE DEPT:		TEL #:	
RESPONDING RESCUE SERVICE:		TEL #:	
ON-SITE CONTRACTOR(S):		TEL #:	
ON-SITE CONTRACTOR(S):		TEL #:	
ON-SITE CONTRACTOR(S):		TEL #:	
POLICE:		TEL #:	
HOSPITAL:		TEL #:	
AMBULANCE SERVICE:		TEL #:	
PRIMARY FIRST AID ATTENDANT:		TEL #:	
MEDICAL TREATMENT BY DEP STAFF IS LIMITED TO BASIC FIRST AID			
RESCUE PERSONNEL (WHILE EXITING AREA, RESCUE PERSONNEL WILL ASSIST OTHERS REQUIRING ASSISTANCE OR AS DESIGNATED IN ATTACHED REQUIRED PERMITS. OTHER RESCUE WILL BE BY OFF-SITE RESCUE SERVICE:			
SITE SAFETY COORDINATOR (RESPONSIBLE TO ACCOUNT FOR PERSONNEL FROM THE SITE AT CHECK-IN AREA; TO COORDINATE ON-SITE EMERGENCY ACTIONS & WITH OFF-SITE RESPONDERS):			

DEP LIMITED OPERATION SITE SAFETY & HEALTH PLAN CONTINUED

SITE SUPERVISOR (RESPONSIBLE TO COORDINATE NON-EMERGENCY ON-SITE ACTIVITIES; TO INITIATE CALL FOR OFF-SITE EMERGENCY PERSONNEL AS APPROPRIATE THROUGH OFF-SITE COMMUNICATION SYSTEM):				
ALARM SYSTEM:	VOICE <input type="checkbox"/>	3 BLAST AUTO HORN <input type="checkbox"/>	OTHER (SPECIFY):	
COMMUNICATIONS (ON-SITE):	WALKIE TALKIE <input type="checkbox"/>	HEADSET RADIO <input type="checkbox"/>	SIGNALS <input type="checkbox"/>	
COMMUNICATIONS (OFF-SITE):	RADIO <input type="checkbox"/>	SITE TEL #:		
OTHER EMERGENCY TELEPHONE NUMBERS:				
DEP REGIONAL OFFICES:		AUGUSTA: (207) 287-7800		
		BANGOR: (207) 941-4570		
		PORTLAND: (207) 822-6300		
		PRESQUE ISLE: (207) 764-0477		
		DEP SAFETY DIRECTOR, LINDA DORAN: (207) 287-7867		
		NATIONAL RESPONSE CENTER: (800) 424-8802		
		POISON CONTROL CENTER: (800) 222-1222		
SITE OPERATIONAL RISKS				
CHEMICAL RISKS (ATTACH MSDS):		CONCENTRATION HAZARD (INCLUDE PEL & LEL):		
CHEMICAL RISKS (ATTACH MSDS):		CONCENTRATION HAZARD (INCLUDE PEL & LEL):		
CHEMICAL RISKS (ATTACH MSDS):		CONCENTRATION HAZARD (INCLUDE PEL & LEL):		
CHEMICAL RISKS (ATTACH MSDS):		CONCENTRATION HAZARD (INCLUDE PEL & LEL):		
PHYSICAL RISKS				
CONFINED SPACES (ATTACH CONFINED SPACE ENTRY PERMIT OR NON-HAZARD DECLARATION) <input type="checkbox"/>		ELECTRICAL HAZARD (LOCK OUT/TAG OUT REQUIRED FOR DEACTIVATED EQUIPMENT; 10 FT FROM HIGH VOLTAGE) <input type="checkbox"/>		
TRENCHING/EXCAVATION (ENTRY CONSIDERED CONFINED IF SPACE IS GREATER THAN 4 FT.) <input type="checkbox"/>		UTILITIES CONTACTED <input type="checkbox"/>	DIG SAFE CALLED (800) 344-7233 <input type="checkbox"/>	
HEAVY EQUIPMENT <input type="checkbox"/>	DRUM HANDLING/SAMPLING <input type="checkbox"/>	HEAT/COLD <input type="checkbox"/>	ANTICIPATED TEMP RANGE:	
ELEVATED AREA/FALL HAZARD (GREATER THAN 6 FT) <input type="checkbox"/>	NOISE (HEARING PROTECTION REQUIRED IF POSSIBILITY OF OVER 85 DECIBELS) <input type="checkbox"/>		VEHICULAR TRAFFIC <input type="checkbox"/>	
OTHER (SPECIFY): <input type="checkbox"/>				
WORK PRACTICE/ENGINEERING CONTROLS				
AREA/SPACE VENTILATION <input type="checkbox"/>	EXPLOSION-PROOF FAN (S) <input type="checkbox"/>	MARK OFF AREA SIGNS/TAPE <input type="checkbox"/>		
VEHICULAR CONTROLS <input type="checkbox"/>	CONES <input type="checkbox"/>	BARRICADES <input type="checkbox"/>	FLAG PERSON <input type="checkbox"/>	
EXCAVATION TRENCH <input type="checkbox"/>	SLOPED <input type="checkbox"/>	SHORED <input type="checkbox"/>	BARRICADES <input type="checkbox"/>	
SEAL OFF/POLY OFF WORK AREA <input type="checkbox"/>	ELECTRICAL <input type="checkbox"/>	LOCK OUT/TAG OUT <input type="checkbox"/>	SHIELD/INSULATE <input type="checkbox"/>	MAINTAIN 10 FT SEPARATION <input type="checkbox"/>

DEP LIMITED OPERATION SITE SAFETY & HEALTH PLAN CONTINUED

IGNITION SOURCES SECURED <input type="checkbox"/>	EQUIPMENT BONDED & GROUNDED <input type="checkbox"/>	SPARK RESISTANT TOOLS <input type="checkbox"/>	CLEAN AREA ESTABLISHED FOR EATING/RESTING <input type="checkbox"/>				
SPILL/ACCIDENT CONTROL							
FIRE EXTINGUISHER(S) <input type="checkbox"/>	TYPE(S):						
CONTAINMENT <input type="checkbox"/>	SORBENT <input type="checkbox"/>	OVER-PACK DRUMS <input type="checkbox"/>	BOOMS <input type="checkbox"/>				
BARRIER MATERIAL <input type="checkbox"/>							
PREVENTION PROCEDURES (DESCRIBE):							
HAZARD RECOGNITION (DESCRIBE):							
ADDITIONAL SAFETY EQUIPMENT							
FIRST AID KIT <input type="checkbox"/>	FIRE BLANKET <input type="checkbox"/>	SAFETY EYEWASH/SHOWER <input type="checkbox"/>					
ESCAPE LADDERS <input type="checkbox"/>	BODY HARNESS & LIFELINE <input type="checkbox"/>	TRIPOD WINCH <input type="checkbox"/>					
SITE MONITORING (ATTACH DAILY AIR MONITORING LOGS)							
THERMOMETER <input type="checkbox"/>	C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:	
HYGROMETER <input type="checkbox"/>	C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:	
WIND SOCK <input type="checkbox"/>	C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:	
CGI <input type="checkbox"/>	C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:	
OXYGEN METER <input type="checkbox"/>	C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:	
PID (LAMP) <input type="checkbox"/>	C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:	
FID <input type="checkbox"/>	C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:	
OTHER (SPECIFY) <input type="checkbox"/>		C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:
OTHER (SPECIFY) <input type="checkbox"/>		C <input type="checkbox"/>	CA <input type="checkbox"/>	P <input type="checkbox"/>	INTERVAL IF PERIODIC:		ACTION LEVELS:
COLOROMETRIC <input type="checkbox"/>	TUBE USED:					ACTION LEVELS:	
C = CONTINUOUS CA = CONTINUOUS WITH ALARM P = PERIODIC							
PERSONAL PROTECTIVE EQUIPMENT: RESPIRATORY							
TASK(S):		LEVEL:		RESPIRATOR USED (CARTRIDGE & TYPE):			
TASK(S):		LEVEL:		RESPIRATOR USED (CARTRIDGE & TYPE):			
TASK(S):		LEVEL:		RESPIRATOR USED (CARTRIDGE & TYPE):			
PERSONAL PROTECTIVE EQUIPMENT: CHEMICAL PROTECTIVE CLOTHING							
TASK(S):		LEVEL:		CLOTHING USED:			
TASK(S):		LEVEL:		CLOTHING USED:			
TASK(S):		LEVEL:		CLOTHING USED:			

DEP LIMITED OPERATION SITE SAFETY & HEALTH PLAN CONTINUED

PERSONAL PROTECTIVE CLOTHING: GLOVES					
TASK(S):		INNER (TYPE & MATERIAL):		OUTER (TYPE & MATERIAL):	
TASK(S):		INNER (TYPE & MATERIAL):		OUTER (TYPE & MATERIAL):	
TASK(S):		INNER (TYPE & MATERIAL):		OUTER (TYPE & MATERIAL):	
PERSONAL PROTECTIVE EQUIPMENT: BOOTS					
TASK(S):		INNER (TYPE & MATERIAL):		OUTER (TYPE & MATERIAL):	
TASK(S):		INNER (TYPE & MATERIAL):		OUTER (TYPE & MATERIAL):	
TASK(S):		INNER (TYPE & MATERIAL):		OUTER (TYPE & MATERIAL):	
OTHER EQUIPMENT					
TASK(S):		EQUIPMENT:		DESCRIPTION:	
TASK(S):		EQUIPMENT:		DESCRIPTION:	
DECONTAMINATION					
PERSONNEL	PROTOCOL				
BETWEEN TASKS:					
LEAVING SITE:					
EMERGENCY DECONTAMINATION:					
RESPIRATOR	PROTOCOL				
BETWEEN TASKS:					
FIELD DECONTAMINATION:					
FINAL SANITIZATION:					
PROTECTIVE CLOTHING	PROTOCOL				
BETWEEN TASKS:					
FIELD DECONTAMINATION:					
FINAL WASH:					
EQUIPMENT	PROTOCOL				
BETWEEN TASKS:					
FIELD DECONTAMINATION:					
FINAL DECONTAMINATION:					

DEP LIMITED OPERATION SITE SAFETY & HEALTH PLAN CONTINUED

I have read/understand the contents of this plan, supporting material referenced, and have completed field certification to perform tasks as called for in this plan.

SITE SUPERVISOR SIGNATURE:		DATE:	
SITE SAFETY COORDINATOR SIGNATURE:		DATE:	
OTHER (SPECIFY):		SIGNATURE:	DATE:

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 many common sources, including food packaging and water and stain proof clothing and other materials. 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 some prohibited and acceptable items but is not an exhaustive list. Use of PPE related items like sunscreen and bug repellent should be considered on a site-specific basis relative to the potential risk of exposure or cross-contamination. This table must be included in the SOP and field staff informed as to what equipment is allowed. This table is particularly important for water sampling where the regulatory criteria are low parts-per-trillion.

ATTACHMENT A -
 PFAS SAMPLING AND ANALYSIS PLAN FORM TEMPLATE –
 12/07/21

Table 1: Summary of Prohibited and Acceptable Items for Use in PFAS Sampling
 This table is not intended to be a comprehensive listing of all items which may be PFAS-free or a potential cross-contamination risk. Eliminating unnecessary contact with sample media, wearing nitrile gloves, and careful field procedures are the most important factors in eliminating sample contamination.

Prohibited Items	Acceptable Items
Field Equipment	
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
Post-It Notes	Sharpies®, pens
Chemical (blue) ice packs	Regular ice
Excel Purity Paste TFW Multipurpose Thread Sealant Vibra-Tite Thread Sealant	Gas oils 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.)	
Field Clothing and PPE	
New clothing or water resistant, waterproof, or stain treated clothing, clothing laundered with fabric softeners, clothing containing Gore-Tex™, clothing laundered using fabric softener	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.
Boots containing Gore-Tex™	Boots made with polyurethane and PVC for wet conditions, rubber overboots (“chicken boots”), or non-Gore Tex™ boots
Tyvek® coveralls	Reflective safety vests, other PPE required for safely working on site

**ATTACHMENT A -
PFAS SAMPLING AND ANALYSIS PLAN FORM TEMPLATE –
12/07/21**

Cosmetics, moisturizers, hand cream, or other related products often contain PFAS and should be avoided prior to PFAS sampling.	<p>Insect Repellents - Sawyer permethrin clothing treatment, Deep Woods Off, Insect Shield pre-treated clothing ⁽¹⁾ Other products may be currently tested as PFAS free.</p> <p>Sunscreens – There are numerous sunscreens tested to be PFAS-free ⁽²⁾ and other products may be currently tested as PFAS free.</p> <p>Sunscreen or insect repellent should be applied prior to arrival at the site or in the staging area, and handwashing is required prior to sampling activities.</p>
Sample Containers	
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
Rain Events	
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
Equipment Decontamination	
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
Food Considerations	
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.

(2) https://www.michigan.gov/documents/pfasresponse/General_Pfas_Sampling_Guidance_634597_7.pdf , Table 2 is one listing, other published research may be available.

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:

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 PFAS SAMPLING AND ANALYSIS PLAN FORM TEMPLATE –
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TABLE 2
Media/Analytical Methodology

MEDIA	LABORATORY METHOD	HOLD TIME*/ PRESERVATION	ANALYSIS TIME	Reporting List
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	****
Surface Water	Modified Method 537 (Isotope Dilution)	14 days to extraction/<6°C	28 days after extraction	****
Soil/Sediment/sludge	Modified Method 537 (Isotope Dilution)	14 days to extraction/<6°C	28 days after extraction	****
Other (vegetation...)	Modified Method 537 (Isotope Dilution)	Lab specific	Lab specific	****
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 and USEPA Method 533 are currently the only Maine certified method for drinking water, others such as Method 8327 for groundwater, wastewater and other media 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, check recent mini-bid lists or with the Chemistry Unit for the most current parameter list

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

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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. 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. Other QC such as field duplicates or matrix spikes should be collected at the same rate as other analytes on a project-specific basis.

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.



**COVER SHEET
STANDARD OPERATING PROCEDURE-ADDENDUM**

OPERATION TITLE: DEVELOPMENT OF A SAMPLING AND ANALYSIS PLAN-

**ADDENDUM - A – ADDITIONAL REQUIREMENTS FOR THE
SAMPLING OF PER- AND POLYFLUOROALKYL
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 or tap 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 or tap water rinse. When soil sampling a dry brush or paper towel wipe down can reduce the need for significant rinsing. 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 filter sample port) and sampler footwear then boot restrictions and PPE such as chicken boots are not 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 to 30 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 oxidizable 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. USEPA has completed validation studies on SW-846 Method 8327 for PFAS in wastewater, surface water and groundwater but that method has not yet been finalized.

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 (or newly approved 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

MEDIA	LABORATORY METHOD	HOLD TIME*/ PRESERVATION	ANALYSIS TIME	Reporting List
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 and USEPA Method 533 are currently the only Maine certified method for drinking water, others such as Method 8327 for groundwater, wastewater and other media 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
PFOA SAMPLING AND ANALYSIS PLAN FORM TEMPLATE

014-FORM-Sampling-and-Analysis-FINAL - B. Blais

Final Audit Report

2021-12-23

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