

## **FIELD SAMPLING PROTOCOLS TO AVOID CROSS-CONTAMINATION AT PERFLUORINATED CHEMICAL (PFC) SITES**

The following are procedures/considerations to be made during field activities at potential perfluorinated chemical (PFC) release sites. A summary of the prohibited and acceptable items for PFC sites is included in Table 1. A checklist for field use is provided as Attachment 1.

These procedures apply to all personnel and subcontractors who collect or otherwise handle samples of soil, sediment, surface water, ground water, or drinking water for analysis of PFCs. These procedures should be reviewed by all on-site personnel prior to implementation of field activities. Given the low detection limits associated with PFC analysis and the many potential sources of trace levels of PFCs, field personnel shall act on the side of caution by strictly following these protocols, frequently replacing nitrile gloves, and rinsing field equipment to help mitigate the potential for false detections of PFCs. Specific items related to field sampling are discussed below.

### **Field Equipment**

- Do not use Teflon®-containing materials** (e.g., Teflon® tubing, bailers, tape, plumbing paste, or other Teflon® materials) since Teflon® contains fluorinated compounds.
- Do not use low-density polyethylene (LDPE) materials** during sampling. High-density polyethylene (HDPE) and silicon materials are acceptable.
- When using liners to collect soil samples during direct-push technology (DPT) or conventional drilling methodologies, **acetate liners are to be used.**
- To avoid plastic coating or glue materials, **do not use waterproof field books.** Field reports will be documented on loose paper on masonite or aluminum clipboards (i.e. plastic clipboards, binders, or spiral hard cover notebooks are not acceptable) using a pen or pencil. Sharpies®/markers may be used.
- Post-It Notes are not allowed** on project sites.
- Do not use markers other than Sharpies® markers.** Pens will be used when documenting field activities in the field log and on field forms as well as labeling sample containers and preparing the Chain of Custody.
- Do not use chemical (blue) ice packs** during the sampling program. This includes the use of ice packs for the storage of food and/or samples.

### **Field Clothing and Personal Protective Equipment**

- Do not wear synthetic water resistant, waterproof, or stain-treated clothing** during the field program. Field clothing to be worn on-site should be restricted to natural fibers (preferably cotton) and not synthetic. Field clothing should be laundered avoiding the

use of fabric softener. Preferably, field gear should be cotton construction and well laundered (a minimum of 6 times from time of purchase). New cotton clothing may contain PFC related treatments. **Do not use new clothing** while sampling or sample handling.

- Do not wear clothing or boots containing Gore-Tex™** during the sampling program as it consists of a PFC membrane.
- All safety footwear will consist of steel-toed boots made with polyurethane and polyvinyl chloride (PVC).
- Do not wear Tyvek® clothing** on-site since it contains fluorinated compounds.
- Disposable nitrile gloves must be worn at all times. Further, a new pair of nitrile gloves shall be donned prior to the following activities at each sample location:
  - Decontamination of re-usable sampling equipment;
  - Prior to contact with sample bottles or water containers;
  - Handling of any quality assurance/quality control samples including field blanks and equipment blanks; and,
  - After the handling of any non-dedicated sampling equipment, contact with non-decontaminated surfaces, or when judged necessary by field personnel.

### **Sample Containers**

- Different laboratories may supply sample collection containers of varying sizes dependent on the type of media to be sampled (e.g., soil, groundwater, etc.). However, all samples should be collected in polypropylene or HDPE bottles fitted with an unlined (no Teflon®), polypropylene or HDPE screw cap.
- Container labels will be completed using pen after the caps have been placed back on each bottle.
- Glass containers should also be avoided due to potential loss of analyte through adsorption.

### **Wet Weather**

- Field sampling occurring during wet weather (e.g., rainfall and snowfall) should be conducted while wearing appropriate clothing that will not pose a risk for cross-contamination. Teams will avoid synthetic gear that has been treated with water-repellant finishes containing PFCs. Use rain gear made from polyurethane and wax-coated materials.
- Teams should consider the use of a gazebo tent, which can be erected over the sample location and provide shelter from the rain. It should be noted that the canopy material is likely a treated surface and should be treated as such; therefore, gloves should be worn when moving the tent, changed immediately afterwards and further contact with the tent

should be avoided until all sampling activities have been finished and the team is ready to move on to the next sample location.

### **Equipment Decontamination**

Field sampling equipment, such as trowels and augers, that are utilized at each sample location will require cleaning between uses. Alconox® and Liquinox® soaps are acceptable for use since the Material Safety Data Sheets do not list fluoro-surfactants as an ingredient. However, **Decon 90 will not be used** during decontamination activities. Water used for the final rinse during decontamination of sampling equipment will be laboratory certified PFC-free water.

For larger equipment (e.g., drill rigs), decontamination will be conducted with potable water using a high-pressure washer and then rinsed using potable water. Details regarding the decontamination of drilling equipment and other heavy equipment are presented below under the heading “Decontamination Procedures for Drilling Equipment and Other Heavy Equipment at PFC Sites”.

### **Personnel Hygiene**

- Field personnel will not use cosmetics, moisturizers, hand cream, or other related products as part of their personal cleaning/showering routine on the morning of a sampling event, as these products may contain surfactants and represent a potential source of PFCs.
- Many manufactured sunblock and insect repellants contain PFCs and should not be brought or used on-site. Sunblock and insect repellants that are used on-site should consist of 100% natural ingredients. A list of acceptable sunscreens and insect repellents are listed in Table 1.
- For washroom breaks, field personnel will leave the exclusion zone and then remove gloves and overalls. Field personnel should wash as normal with extra time for rinsing with water after soap use. When finished washing, the use of a mechanical dryer is preferred and the use of paper towel for drying is to be avoided (if possible).

### **Food Considerations**

- No food or drink shall be brought on-site, with the exception of bottled water and hydration drinks (i.e., Gatorade® and Powerade®), which will only be allowed to be brought and consumed within the staging area.

### **Visitors**

- Visitors to the site are asked to remain outside of the exclusion zone during sampling activities.

**Table 1. Summary of Prohibited and Acceptable Items for PFC Sampling**

Prohibited	Acceptable
<b>Field</b>	
Teflon® containing materials	High-density polyethylene (HDPE) materials
Low density polyethylene (LDPE) materials	Acetate liners
	Silicon tubing
Waterproof field books	Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
	Sharpies®, pens
Post-It Notes	
Chemical (blue) ice packs	Regular ice
<b>Field Clothing and</b>	
New cotton clothing or synthetic water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing made of natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric
Boots containing Gore-Tex™	Boots made with polyurethane and PVC
Tyvek®	Cotton Clothing
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling	<p><b>Sunscreens</b> - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are “free” or “natural”</p> <p><b>Insect Repellents</b> - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellent, Herbal Armor, California Baby Natural Bug Spray, BabyGanics</p> <p><b>Sunscreen and insect repellent</b> - Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion</p>
<b>Sample</b>	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Unlined polypropylene caps
<b>Rain</b>	
Waterproof or resistant rain gear	Gazebo tent that is only touched or moved prior to and following sampling activities
<b>Equipment</b>	
Decon 90	Alconox® and/or Liquinox®
Water from an on-site well	Potable water from remote drinking water supply
<b>Food</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

**Attachment 1**  
**Daily PFC Protocol Checklist**

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Date: \_\_\_\_\_ Installation Name: \_\_\_\_\_

Weather (*temp./precipitation*): \_\_\_\_\_ Site Name: \_\_\_\_\_

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***Field Clothing and PPE:***

- No clothing or boots containing Gore-Tex™
- All safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Field crew has not used fabric softener on clothing
- Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning
- Field crew has not applied unauthorized sunscreen or insect repellent

***Field Equipment:***

- No Teflon® or LDPE containing materials on-site
- All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books on-site
- No plastic clipboards, binders, or spiral hard cover notebooks on-site
- No adhesives (Post-It Notes) on-site

- Coolers filled with regular ice only. No chemical (blue) ice packs in possession

***Sample Containers:***

- All sample containers made of HDPE or polypropylene
- Caps are unlined and made of HDPE or polypropylene

***Wet Weather (as applicable):***

- Wet weather gear made of polyurethane and PVC only

***Equipment Decontamination:***

- “PFC-free” water on-site for decontamination of sample equipment. No other water sources to be used.
- Alconox and Liquinox to be used as decontamination materials

***Food Considerations:***

- No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

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If any applicable boxes cannot be checked, the Field Manager shall describe the noncompliance issues below and work with field personnel to address noncompliance issues prior to commencement of that day’s work. Corrective action shall include removal of noncompliance items from the site or removal of worker offsite until in compliance. Repeated failure to comply with PFC sample protocols will result in the permanent removal of worker(s) from the site.

Describe the noncompliance issues (include personnel not in compliance) and action/outcome of noncompliance:

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Field Manager Name: \_\_\_\_\_

Field Manager Signature: \_\_\_\_\_

Time: \_\_\_\_\_

## **DECONTAMINATION PROCEDURES FOR DRILLING EQUIPMENT AND OTHER HEAVY EQUIPMENT AT PFC SITES**

These procedures establish guidelines for use by field personnel in the decontamination of drilling equipment and other heavy equipment when conducting PFC environmental assessments. The details are applicable as general requirements for drilling and heavy equipment decontamination, and should also be used in conjunction with the project QAPP.

Compliance with this procedure is the responsibility of project management and field personnel. These procedures and the project QAPP should be reviewed before implementing drilling, development, and heavy equipment decontamination at the project site.

This section provides requirements for the construction of a temporary decontamination facility for drilling, development, and heavy equipment and the decontamination procedures to be followed. The project QAPP provides specific information regarding:

- Types of equipment requiring decontamination under these procedures;
- Location of the decontamination station;
- Types and/or specifications on materials to be used in the fabrication of the decontamination station; and,
- Types of materials and additional details on the procedures to be used in the decontamination process.

Field personnel associated with construction of the decontamination station or decontamination of drilling or heavy equipment must read these procedures and the project QAPP prior to implementation of related decontamination activities.

### **Decontamination Facility**

A decontamination facility will be set up in an area exclusively for decontamination of drilling equipment and other heavy equipment. Decontamination of drilling equipment and other heavy equipment will be conducted within the station.

At a minimum, the station will be constructed such that all rinsates, liquid spray, soil, debris, and other decontamination wastes are fully contained and may be collected for appropriate waste management and disposal. The facility may be as simple as a bermed pad lined with approved PFC-free, high density polyethylene (HDPE) sheeting with an impermeable sump for collecting rinse water. More sophisticated designs involving self-contained metal decontamination pads in combination with bermed HDPE sheeting may also be used, depending on project-specific requirements. These requirements along with specific equipment and construction specifications for the decontamination facility will be provided in the project QAPP.

## **Decontamination of Downhole Equipment**

Downhole drilling and development equipment (including but not limited to drill pipe, drive casing, drill rods, bits, tools, nondisposable bailers, etc.) will be thoroughly decontaminated before mobilization to each site and between borings or wells at each site or as required in the project QAPP. The standard procedure will be performed as described below. Decontamination will be performed in accordance with these procedures and the project QAPP.

- Appropriate personal protective equipment (as specified in the project QAPP) must be worn by all personnel involved with the task to limit personal exposure.
- Equipment caked with drill cuttings, soil, or other material will initially be scraped or brushed. The scrapings will be staged and appropriately handled.
- Equipment will then be sprayed with potable water using a high-pressure washer.
- Washed equipment that will be used to collect the samples or will come into contact with the sampled media (such as the direct-push cutting shoe) will then be final rinsed with certified PFC-free water.
- Decontaminated downhole equipment (such as drill pipe, drive casing, bits, tools, bailers, etc.) will be placed on clean PFC-free, HDPE plastic sheeting to prevent contact with contaminated soil and allowed to air dry. If equipment is not used immediately, it will be covered or wrapped in PFC-free plastic sheeting to minimize airborne contamination.
- Decontamination activities will be documented by field personnel in the field log and/or appropriate form(s), as specified in the project QAPP.

## **Decontamination of Heavy Equipment**

Heavy equipment (e.g., drill rigs, development rigs, backhoes, trucks, and other earthmoving equipment) will be decontaminated between drilling sites or inside the contaminant reduction area prior to entering and leaving an exclusion zone. Decontamination will be performed in accordance with the project work plans. The standard procedure will be performed as described below.

- Appropriate personal protective equipment will be worn by all personnel involved in the task, in order to limit personal exposure.
- Heavy equipment caked with drill cuttings, soil, or other material will be initially scraped or brushed to remove bulk soil.
- Heavy equipment will then be moved to the decontamination pad and sprayed with potable water using a high pressure washer.
- Those portions of the heavy equipment that will potentially contact the sample will be rinsed in a final rinse with lab provided "PFC-free" water.
- During the decontamination effort, fluid systems should be inspected for any leaks or problems, which might potentially result in an inadvertent release at the site, thereby

contributing to the volume of waste or contamination. Decontamination of heavy equipment should be performed before moving equipment between sites or before leaving the site.

- Decontamination activities will be documented in the field log and appropriate form(s), as specified in the project QAPP.