

SAMPLING PROCEDURE BACKFILL SOIL SAMPLING FOR 1,4-DIOXANE AND PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Study Area Corning, New York

1. INTRODUCTION

The New York State Department of Conservation (NYSDEC) is requiring sampling of soil imported for use in a soil cap, soil cover, or as backfill for 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS) in compliance with the NYSDEC’s “*Sampling for 1,4-Dioxane and Per- and Polyfluoroalkyl Substances (PFAS) Under DEC’s Part 375 Remedial Programs*” (NYSDEC, 2019) and “*Guidelines for Sampling and Analysis of PFAS Under NYSDEC’s Part 375 Remedial Programs*” dated October 2020 (NYSDEC, 2020) which requires sampling for 1,4-dioxane and PFAS at a frequency in conformance with the requirements presented in Section 5.4(e), Table 5.4(e)10 of NYSDEC’s DER-10 (“*Technical Guidance for Site Investigation and Remediation,*” dated May 2010; Table 1) (NYSDEC, 2010). Corning Incorporated is performing remedial activities in the Study Area under an Order on Consent and Administrative Settlement with NYSDEC (NYSDEC, 2017). The Study Area is located in the City of Corning, New York, and, in general, is bound by the Chemung River to the south; Post Creek and Interstate 86 to the east and north; and the Guthrie Medical Center, the City of Corning Fire Department, and Centerway to the west.

A Remedial Action Work Plan (RAWP) was prepared by Weston Solutions, Inc. (WESTON) on behalf of Corning Incorporated to perform remedial activities in the residential Operable Units of the Study Area (OU1, OU2 and OU5) (WESTON, 2018). As described in the NYSDEC-approved RAWP, prior to importing backfill material, analytical samples will be collected at the backfill source to ensure the material meets the requirements for soil to be imported under DER-10 Section 5.4(e) (see Table 1, attached) and analytical results for soil samples will be submitted to NYSDEC for approval prior to use during the RAWP activities.

The purpose of this Sampling Procedure is to provide a protocol for collecting representative soil samples of stockpiled backfill, specifically for analysis of 1,4-dioxane and PFAS.

PFAS are a class of chemicals referred to as emerging contaminants and have been more frequently requested for analysis. An additional term used to describe these and related fluorinated organic compounds is perfluorinated alkyl acids (PFAAs). The entire list of 21 PFAS compounds for analysis consists of the following:

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTTrDA	72629-94-8
Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7	
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluorooctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Note: CAS = Chemical Abstracts Service

2. MATERIALS REQUIRED

Equipment requests should be completed at least one week in advance of site operations. Pre-assemble all sampling equipment that requires assembly prior to departure.

Personnel will take steps to reduce the possibility of sample contamination from common sources of PFAS such as waterproof or stain-resistant clothing, food packaging, and certain foods and beverages. Personnel will not wear stain-resistant or treated clothing during the sample collection process. Additional precautions intended to reduce potential cross-contamination during PFAS sampling are described in Attachment 1.

Depending on site-specific conditions, the equipment used for backfill sampling are as follows:

- Personal protective equipment (as specified in the Health and Safety Plan)
- Sampling Procedure
- To avoid plastic coating or glue materials, do not use waterproof field books. Field reports will be documented on loose paper, masonite or aluminum clipboards using a ball point pen or pencil. Plastic clipboards, binders, or spiral hard cover notebooks are not acceptable.
- Maps/sketches
- Global Positioning System (GPS) unit
- Tape measure (up to 300 ft)
- Survey stakes/flags
- Aluminum homogenization trays
- Sample jars
- Sample labels/tags
- Chain of custody forms and custody seals
- Field data sheets
- Garbage bags (non-scented) for disposal of trash
- Coolers
- Ice for sample preservation — **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. Ice for sample preservation should be double bagged using polyethylene plastic bags (e.g., Ziploc).
- Decontamination supplies (brushes, baskets, garden sprayer, phosphate-free soap, deionized water, etc.)
- Resealable plastic bags
- Paper towels
- Camera
- Plastic (high density polyethylene (HDPE)) sample scoops

- Stainless steel trowels
- Scissors
- Methanol/hexane/nitric acid
- Screw auger
- Bucket auger
- T-handle
- Extension rods
- Manual sledge hammer
- Rubber mallet
- Shovel/spade
- Tool box (vice grips, adjustable wrenches, pliers, channel locks, etc.)
- Back support belt(s)
- **Post-It Notes are not allowed** on PFAS project sites.
- Do not use PFAS or Teflon[®]-containing materials (e.g., Teflon[®] tubing, bailers, tape, plumbing paste, or other Teflon[®] materials) since Teflon[®] contains fluorinated compounds.
- Ballpoint 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.

The preferred material for containers is HDPE. Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory. All reagents and water provided by the laboratory for blanks and decontamination water will be certified PFAS-free.

3. SAMPLING PROCEDURES

3.1 SAMPLING PREPARATION

1. Perform a general site reconnaissance to verify actual site conditions consistent with the project Health and Safety Plan (HASP).
2. Identify and mark all sampling locations using sample flags or stakes. All sample locations should be located with GPS coordinates, and, if appropriate, measured, documented, and mapped in reference to a permanent marker, i.e. specified utility pole, benchmark, property marker, etc.
3. Make sure all sampling equipment is properly decontaminated prior to bringing onsite.

3.2 SOIL SAMPLING

This discussion of soil sampling methodology is applicable to the collection of samples of backfill soils from stockpiled soil or in-situ topsoil sources using scoops or hand augers. Prior to handling

bottleware and conducting sample collection, personnel will wash their hands and don clean nitrile gloves. Personnel will take steps to reduce the possibility of sample contamination from common sources of PFAS such as waterproof or stain-resistant clothing, food packaging, and certain foods and beverages. Personnel will not wear stain-resistant or treated clothing during the sample collection process. PFAS samples will be collected first. Additional precautions intended to reduce potential cross-contamination during PFAS sampling are described in Attachment 1.

1. Wear appropriate personal protective equipment (PPE), as defined by the HASP. Rubber boot covers must be worn if the safety boots have Gortex or waterproof coatings. Wear nitrile gloves to prevent skin contact with soil, as well as to lessen the chances of contaminating the samples with essential skin oils, etc.
2. Assemble the auger unit, if required. The auger unit will be pre-cleaned with PFAS-free water and Alconox. All decontamination water needs to be PFAS-free and certified from the laboratory or through lab results for the source.
3. Clear the area to be sampled of any surface debris.
4. Soil samples will be collected using decontaminated stainless steel equipment or disposable plastic HDPE scoops. The soil will be placed in a decontaminated stainless steel bowl. When adequate volume is achieved, don fresh nitrile gloves and blend the soil until the soil is adequately homogenized.
5. Leather work gloves may be worn by the person operating the sampling device provided that they do not come in contact with subsurface soil.
6. If needed, the sample for volatile organic compounds will be collected prior to homogenization.
7. Deposit sample into a stainless steel bowl for analysis and thoroughly mix the soils to obtain a homogenous, representative sample.
8. Decontaminate the augers or stainless steel scoops after each sample-depth is collected. Assemble the appropriate bottles. Label sample bottle before sampling. Container labels will be completed when the caps are still on the bottle. Sample bottles containing Teflon[®] or bottles with Teflon[®] caps will not be used.
9. Place homogenized sample into an appropriate, labeled sample container with a dedicated HDPE scoop or stainless steel trowel.
10. Record all field notes on field data sheets as specified in the sampling plan. The sample location should reference a permanent marker, and should be mapped and described in the field notes.
11. Properly decontaminate all sampling equipment with a two-step process using PFAS-free detergent (Alconox) and PFAS-free water.

12. The samples will be transported to Eurofins TestAmerica for analysis preserved on regular ice.

4. REFERENCES

NYSDEC, 2010. DER-10 *Technical Guidance for Site Investigation and Remediation*. May 2010.

NYSDEC, 2017. Order on Consent and Administrative Settlement, Index No. CO 8-20171204-140, Study Area, Corning, Steuben County, New York, Site ID No. 851046, December 2017.

NYSDEC. 2019, *Sampling for 1,4-Dioxane and Per- and Polyfluoroalkyl Substances (PFAS) Under DEC's Part 375 Remedial Programs*, June 2019.

NYSDEC. 2020, *Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs*, October 2020.

WESTON. 2018. *Remedial Action Work Plan, Residential Areas (OU1, OU2 and OU5), Study Area*, April 6, 2018 Prepared by WESTON for Corning Incorporated.

TABLES

Table 1 - DER-10 Table 5.4(e)10 Number of Soil Samples for Imported Soil

Table 5.4(e)10			
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➤ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

ATTACHMENT 1

**FIELD SAMPLING PROTOCOL TO AVOID CROSS-CONTAMINATION
DURING SAMPLING FOR PER- AND POLYFLUOROALKYL
SUBSTANCES (PFAS) ANALYSIS**

FIELD SAMPLING PROTOCOL TO AVOID CROSS-CONTAMINATION DURING SAMPLING FOR PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ANALYSIS

1. GENERAL INFORMATION

This Field Sampling Protocol (FSP) applies to all AECOM personnel and subcontractors who collect or handle soil samples for analysis of per- and polyfluoroalkyl substances (PFAS).

Given the low detection limits associated with PFAS analysis and the many potential sources of trace levels of PFAS, field personnel are required to strictly follow these protocols, frequently replacing nitrile gloves, and rinsing field equipment with PFAS-free liquids to mitigate the potential for false detections of PFAS. Specific items related to field sampling are discussed below.

2. ADDITIONAL CONSIDERATIONS

The following are procedures and considerations to follow during field activities at potential PFAS release sites in addition to those listed in the main text of the sampling procedure. A summary of the prohibited and acceptable items for PFAS sites is included in Table FSP-1, which will be reviewed prior to the commencement of fieldwork to ensure the field team is in compliance with this protocol.

2.1 FIELD CLOTHING AND PERSONAL PROTECTIVE EQUIPMENT

- Do not wear water resistant, waterproof, or stain-treated clothing during the field program.
- Field clothing made of synthetic and natural fibers (preferably cotton) is acceptable. Field clothing should be laundered without the use of fabric softener. Preferably, field gear should be of cotton construction and well laundered (a minimum of 6 times from time of purchase). New clothing may contain PFAS-related treatments; therefore, **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 contains a PFAS membrane.
- All safety footwear will consist of steel-toed or composite-toed boots made with polyurethane and polyvinyl chloride (PVC).
- **Do not wear Tyvek® clothing** on-site because it contains fluorinated compounds.

- Disposable nitrile gloves must be worn at all times. Further, a new pair of nitrile gloves will be donned prior to the following activities if performed at each sample location:
 - Decontamination of re-usable sampling equipment;
 - Prior to contact with sample 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.

2.2 WET WEATHER

- Field sampling occurring during wet weather (such as 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 repellent finishes containing PFAS. Use rain gear made from polyurethane and wax-coated materials.
- Teams should consider the use of a tent, which can be erected above 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 to the next sample location.

2.3 EQUIPMENT DECONTAMINATION

- Field sampling equipment utilized at each sample location will require cleaning between uses. Alconox[®] or Liquinox[®] soap is acceptable for use. 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 “PFAS-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.

2.4 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, because these products may contain surfactants and represent a potential source of PFAS.
- Many manufactured sunblock and insect repellents contain PFAS and should not be brought or used on-site. Sunblock and insect repellents that are used on-site should

consist of 100% natural ingredients. A list of acceptable sunscreens and insect repellents is presented in Table FSP-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).

2.5 FOOD CONSIDERATIONS

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

2.6 VISITORS

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

3. TIERED APPROACH TO ASSIST WITH FIELD DECISIONS

In evaluating whether products contain PFAS and are suitable for use in the field, the tiered approach presented in Table FSP-2 will be used to assist with field decisions. Any member of the field team should contact the Project Manager with questions.

Table FSP-1 Summary of Prohibited and Acceptable Items for PFAS Sampling

Prohibited Items	Acceptable Items
Field Equipment	
Teflon® containing materials	High-density polyethylene (HDPE) materials
Storage of samples in containers made of low-density polyethylene (LDPE) materials	Acetate liners
Aluminum Foil	Silicon tubing
Waterproof field books	Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Post-It Notes	Ballpoint pens
Chemical (blue) ice packs	Regular ice
Field Clothing and PPE	
New clothing or water resistant, waterproof, or stain-treated clothing, 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 (preferably cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™	Boots made with polyurethane and polyvinyl chloride (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	Sunscreens—Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are “free” or “natural” Insect Repellents - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellent, Herbal Armor, California Baby Natural Bug Spray, BabyGanics Sunscreen and insect repellent—Avon Skin So Soft Bug Guard Plus—SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Lined or unlined HDPE or polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Gazebo tent that is only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90	Alconox® or Liquinox®
Water from an on-site well	Potable water from municipal drinking water supply
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

Table FSP-2 Tiered Approach to Assist with Field Decisions

Tier and Description	Action
Tier 1: Products that will come into direct contact with field samples include, but are not limited to, sampling equipment, sample containers, and well construction materials.	These products will undergo the greatest scrutiny and requires chemist or other PFAS expert input to help evaluate the materials as a possible source of contamination and as possible sampling or storage materials or both.
Tier 2: Products that will not come into direct <i>contact with samples, but could be reasonably expected to contain PFASs, such as</i> waterproof or nonstick products.	Project team/affected person can review the Safety Data Sheet (SDS) and if it shows PFAS, product should not be used. If product SDS does not indicate PFAS, confirm with chemist before use.
Tier 3: Products that will not come into direct <i>contact with samples and are not expected to contain PFAS, such as ballpoint pens, zipper bags, and body braces.</i>	Project team/affected person can review SDS and if no PFAS, then appropriate to use.
<p>A. Tier 1 products will undergo the closest scrutiny. It may be necessary to have Tier 1 products analyzed for PFAS to confirm that a specific batch or lot number does not contain PFAS. Alternate products will need to be evaluated/used if PFAS are identified in the product.</p>	
<p>B. SDS Check: To evaluate product SDS and/or manufacturing specs, check whether the product contains anything with “fluoro” in the name or the acronyms TPE (tritium plasma experiment), FEP (fluorinated ethylene propylene), ETFE (ethylene tetrafluoroethylene), and/or PFA. If fluorinated compounds are not listed in the manufacturing specs and/or on the SDSs, product can be used.</p>	