



March 23, 2020

Ms. Jennifer Borski
Wisconsin Department of Natural Resources
625 East County Road Y, Suite No. 700
Oshkosh, WI 54901-9731

Re: Work Scope for PFAS Sampling of Groundwater
Appleton Wire (Former)
908 N. Lawe Street
Appleton, Wisconsin 54911
BRRTS# 02-45-000015

Dear Ms. Borski:

EnviroForensics, LLC (EnviroForensics) has prepared this work scope for the Appleton Wire (former), Albany International Chrome Plant located at 908 North Lawe Street in Appleton, Wisconsin. This work scope is in response to the Wisconsin Department of Natural Resources (WDNR) requirements to perform initial sampling of groundwater for per- and polyfluoroalkyl substances (PFAS). This work scope provides proposed methods for sampling of these PFAS compounds.

Current Regulatory Status

The WDNR is currently developing sampling guidance, soil and groundwater standards, and other procedures aimed at the regulation of PFAS. Along with the developing WDNR regulatory procedures, there exist several sampling guidance resources from various agencies such as the State of Michigan Department of Environmental Quality, the State of California Water Quality Control Board, the U.S. Department of Defense, the U.S. Environmental Protection Agency, the Interstate Technology & Regulatory Council, and a few analytical laboratories.

Although similar to standard groundwater sampling methods, special precautions are necessary when sampling for PFAS due to the proliferation of PFAS in everyday products. There is a high risk potential for these compounds to be inadvertently introduced to the samples that will be collected, resulting in false positive detections. The following proposal and sampling protocol has been developed based on the procedures and guidance developed to date by these agencies and laboratories.



Locations for Collecting Groundwater Samples

New groundwater monitoring wells were recently installed inside the building that housed the former chrome plating operation following remedial actions. The wells were constructed of poly-vinyl chloride (PVC). Since construction, the wells have been developed using bailers constructed of pure polyethylene. Polyolefin line was utilized to lower the bailers. These materials are known to be PFAS-free. In March of 2020 the wells, along with others, were sampled for chromium and chlorinated volatile organic compounds. During this sampling event, the procedures we utilized followed our PFAS Standard Standard Operating Procedure (SOP) referenced below to minimize the potential for inadvertently introducing PFAS to the wells from ancillary sources such as household products and equipment.

Initial sampling for PFAS will be limited to new wells MW-19AR, MW-20R, and MW-28R shown on **Figure 1**. These wells are in a downgradient direction of groundwater flow across the Site and are in the area of former chrome plating operations.

PFAS Sampling Protocol

EnviroForensics has established an SOP for the collection of PFAS samples (attached). The SOP contains the following quality assurance and quality control (QA/QC) elements:

- Pre-sampling preparations to include personal hygiene and selection of clothing and PPE
- Selection and use of in-field soil and groundwater sampling equipment
- Procedures to ensure sample integrity such as sample collection and handling procedures
- Decontamination procedures and break time policy
- Additional sample collection including field duplicates, equipment blanks, field blanks, and trip blanks
- Sample preservation methods
- Sample holding times

Site Specific Sampling Criteria

The water table typically occurs between 3-6 feet deep within the sampling area. The water table resides in lean clay material having low permeability. Recharge of groundwater is typically very slow and may take weeks to fully recharge after pumping dry. In the past, sampling of monitoring wells on this site has been performed approximately 3-4-days following purging of the wells. This typically allows enough recharged groundwater to allow the collection of samples.



Low-flow sampling methods have been utilized in the past where accurate field measured parameters are needed, but the wells do not sustain adequate recharge for collecting both field measured parameters and samples for laboratory analysis using low-flow methods. Therefore, disposable polyethylene bailers will be utilized to collect all analytical samples from these wells. Samples collected for PFAS analysis will not be filtered or preserved, except that they will be kept on ice at a temperature below the freezing point (approximately 4-6 °C) promptly after collection, and during storage and transport to the analytical laboratory.

One (1) field duplicate, and one (1) field reagent blank will be collected for QA/QC purposes. In addition, one (1) trip blank will accompany the cooler. The groundwater samples will be analyzed for the 36 compounds identified in the WDNR *Wisconsin Laboratory Accreditation Program PFAS Certification Offerings – 5.1.19* and includes: 13 carboxylic acids; 12 sulfonic acids; 7 sulfonamides, sulfonamidoacetic acids, and sulfonamidoethanols; and 4 replacement chemicals. The analyses will be performed by the Wisconsin State Laboratory of Hygiene.

Other than this site specific criteria, all other sampling criteria will follow our SOP.

If you have any questions regarding this submittal, feel free to contact me at 414-982-3988 or by email at wfassbender@enviroforensics.com.

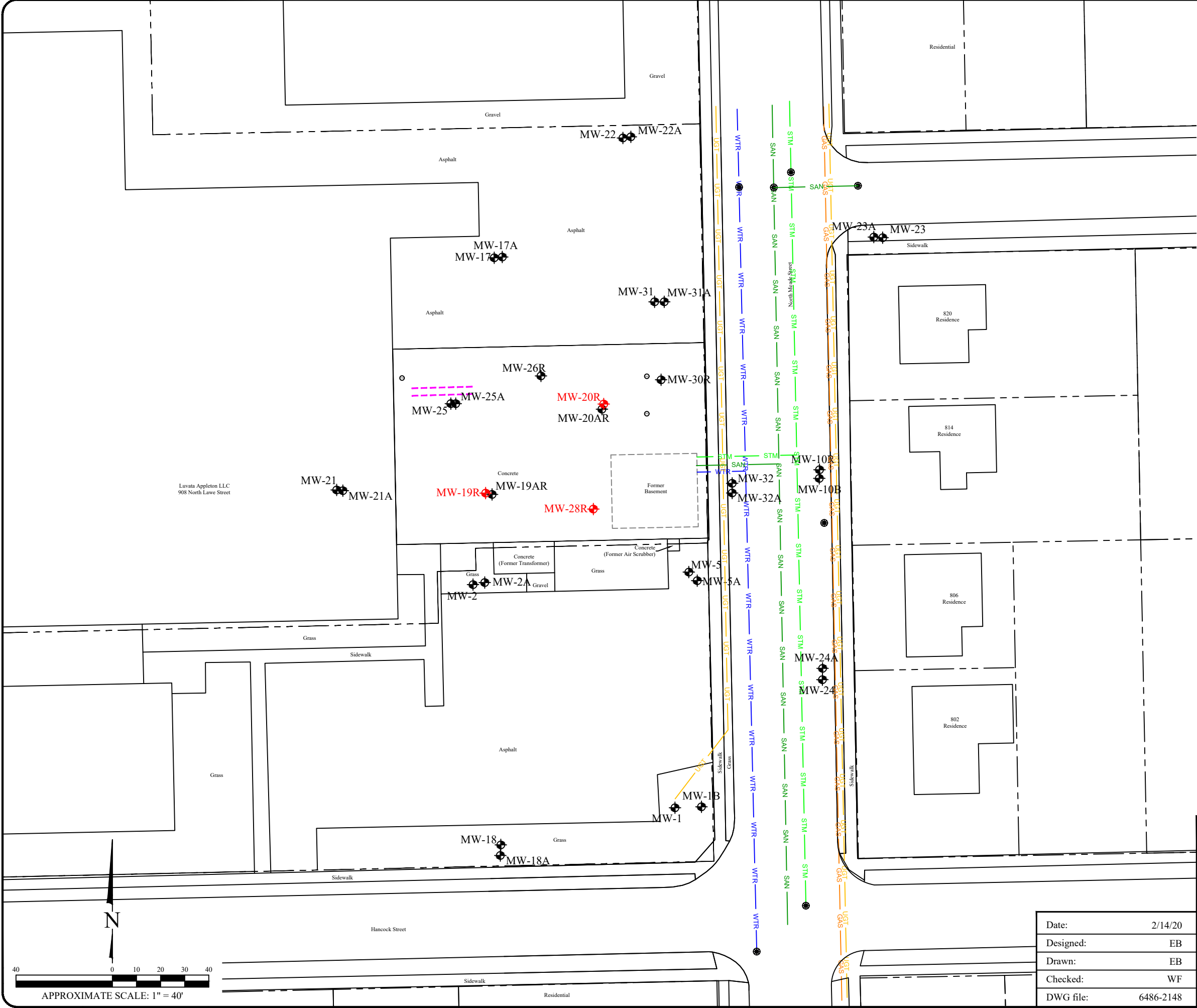
Sincerely,
EnviroForensics, LLC

A handwritten signature in black ink that reads "Wayne P. Fassbender".

Wayne Fassbender, PG, PMP
Senior Project Manager

Attachments:
Figure 1- Monitoring Wells for PFAS Sampling
EnviroForensics PFAS Sampling SOP

cc: Joe Gaug, Albany International



- ### Legend
- Property boundary
 - GAS - Underground gas utility line
 - WTR - Underground water utility line
 - SAN - Underground sanitary utility line
 - UGT - Fiber optics line
 - STM - Underground storm utility line
 - Pipe chase
 - Floor drain
 - Manhole
 - MW-19R - Monitoring well designated for PFAS sampling
 - MW-1 - Site monitoring well

WELLS FOR INITIAL PFAS SAMPLING

Albany International - Luvata Site
908 North Lawe Street
Appleton, Wisconsin

Date:	2/14/20
Designed:	EB
Drawn:	EB
Checked:	WF
DWG file:	6486-2148

Figure	1
Project	6486

825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

STANDARD OPERATING PROCEDURE

Sampling Protocol for Per- and Polyfluoroalkyl Substances (PFAS)

INTRODUCTION

State regulatory agencies are currently developing sampling guidance, soil and groundwater standards, and other procedures aimed at the regulation of per- and polyfluoroalkyl substances (PFAS). Along with the developing regulatory procedures, there exist several sampling guidance resources from various agencies such as the State of Michigan, the U.S. Department of Defense, the U.S. Environmental Protection Agency, the Interstate Technology & Regulatory Council, and a few analytical laboratories such as Pace Analytical and Test America. This Standard Operating Procedure (SOP) was based on the procedures and guidance developed to date by these agencies. Since regulations and standards regarding PFAS are evolving, it is anticipated that this SOP will require periodic modifications.

When sampling for PFAS, this SOP should be used as a supplement to modify existing EnviroForensics SOP's related to standard groundwater and soil sampling procedures.

Although similar to standard sampling methods for other chemical compounds, special precautions are necessary when sampling for PFAS due to the laboratory detection limits that are in the parts per trillion range, and the proliferation of PFAS in common consumer products. This greatly raises the potential for these compounds to be inadvertently introduced to the samples, resulting in false-positive detections.

The sampling precautions and protocol for PFAS are rigorous and there are many potential opportunities for mistakes in the field that can result in cross-contamination, or the inadvertent introduction of PFAS into the sample media. **It is required that any field investigations for PFAS be conducted by a two (2) person team.** One (1) person is assigned the actual sample collection protocol and the other person is assigned to maintaining the integrity of the sample throughout the sampling process.

PRE-SAMPLING CONSIDERATIONS

As mentioned, PFAS have been detected in many everyday products including cosmetics, soaps, sun-screen, insect repellent, and many products having water repellents and/or stain-resistant coatings to include carpeting, car upholstery, some Tyvek suits, water proof leather boots, garments, and rain-wear. Several agencies have prepared a list of acceptable materials that have

been tested free of PFAS; however, there is a long list of items that have not been tested. This SOP provides some acceptable materials that can be safely used before and during sampling for PFAS, along with comments regarding materials that should not be used and various recommendations to improve sample integrity.

A limited number of readily available and recognizable products are presented below instead of listing all options. For example, there are numerous sun-screen and insect repellent products that have been determined to be PFAS-free (and the list will likely grow over time); however, only a few readily available and recognizable products are listed or recommended here to reduce the number of product decisions that project staff may need to make. If any other product is proposed for use, but is not identified in this SOP as PFAS-free, then that product or substance will need to be analyzed or otherwise determined to be PFAS-free before it can be used.

Personal Hygiene and Care Products

Many personal care products may contain PFAS. These products include soaps, shampoos, cosmetics, deodorants, and dental products including floss. By following this SOP it is not likely that these types of products will come into direct contact with a sample. However, it is **highly recommended that the use of personal care products be curtailed the day of sampling** until more information is available for personal care products that do not contain PFAS.

Personal Protective Equipment

Many common types of protective equipment including clothes, jackets, boots, gloves, Tyvek products, sunscreen, and insect repellents contain PFAS. For common clothing, jackets, boots, and gloves, the PFAS occurs in water repellent and stain repellent treatments that have been applied to the clothing and outer wear. The use of fabric softeners during laundering may also impart PFAS to clothing. Rain suits made of breathable, yet water repellent, materials typically have PFAS in them. Items made of rubber or PVC do not contain PFAS.

Items that may be worn and are known to be free of PFAS include:

- Powderless nitrile gloves;
- Clothing made of natural and synthetic fibers (preferably cotton) and that have been **washed at least six (6) times and without using fabric softeners or dryer sheets;**
- Polyvinyl chloride (PVC) or wax-coated fabrics, including rain gear;
- Any boots or over-boots made of polyurethane or PVC;
- Neoprene;
- Un-coated Tyvek® coveralls;

- Sunscreen: Banana Boat Sport Performance Sunscreen Lotion Broad Spectrum SPF 30; or Coppertone Sunscreen Lotion Ultra Guard Broad Spectrum SPF 50; and
- Insect repellent: Off Deep Woods.

Items that **may not** be worn due to the potential for containing PFAS:

- Coated Tyvek® materials as they do contain PFAS;
- Leather or other steel-toed work boots unless polyurethane or PVC over-boots are used;
- Clothing treated with stain or water repellents;
- Clothing and outerwear that has been dry cleaned; and
- Any rain gear having Gore-Tex™ or other water-proof, or water-repellent fabrics or coatings.

Field Sampling Equipment

Carefully select sampling equipment that directly contacts the sample to ensure it is free from PFAS. Submersible pumps, down-hole instruments, and tubing used for groundwater sampling could have external or internal parts that are not PFAS-free. Check with the manufacturer to evaluate whether there are PFAS-containing components in the equipment. If unsure collect an equipment blank and have it analyzed for PFAS.

Some materials that are known to be PFAS-free include:

- Metals (metal components used for groundwater sampling are typically either stainless steel or brass);
- Nylon;
- PVC (bailers and pump parts);
- High-density polyethylene (HDPE);
- Polypropylene and polyurethane (bailer rope and tubing);
- Silicone (tubing); and
- Acetate (drill core sleeves).

Materials that may contain PFAS and **are not** to be used include:

- Low-density polyethylene (LDPE) tubing. LDPE does not inherently contain PFAS, but may have acquired it through materials used in the manufacturing process. LDPE Zip-loc® sample bags can be used if they do not contact the sample media directly;
- Aluminum foil;

- Teflon-lined tubing or equipment having Teflon components;
- Any product or equipment having any “fluoro” prefix;
- “Rite in the Rain” or other all-weather field books; and
- Sharpie markers, post-it notes, or other adhesive paper products.

In addition, **do not** transport field equipment in direct contact with vehicle carpet or seats. These materials typically contain PFAS in stain and water repellent applications. If equipment must be set on seats or carpet, then transport it in a closed container.

Sample Collection Recommendations:

1. If the depth to water is shallow, use disposable PVC bailers with polypropylene or polyurethane rope.
2. Collect an equipment blank from or through any sampling equipment before its use in the field, unless all equipment materials are inherently PFAS-free, or the manufacturer can guarantee that all components are PFAS-free.
3. Determine if the measuring tape on the water level meter contains PFAS, see #2 above.
4. If using a peristaltic pump to collect shallow water table samples, use only new, unused, tubing that is inherently PFAS-free at each sample location (HDPE, nylon, polyurethane, silicone).
5. If using any other submersible pump in deeper water table conditions, see #2 above.
6. If using any other down-hole data collection probe, see #2 above.
7. For longer-term monitoring of confirmed PFAS in groundwater, consider using dedicated and PFAS-free equipment such as dedicated pumps. Passive Diffusion Bags may be used if equipped with HDPE hydrasleeves and the de-ionized water is PFAS-free.
8. If setting temporary wells, collecting soil samples, or using any other drilling method, ensure that the core sleeves are either acetate, PVC, or HDPE (see #2 above).
9. Use only stainless steel tools or wooden disposable tongue depressors to collect soil sub-samples from drill cores.
10. Use only aluminum or Masonite clipboards with loose paper (non-water resistant) to record field notes.
11. Use only ball-point pens to record field data, prepare sample labels, etc.

Decontamination

It is extremely important that any **water** used for decontamination of equipment or hand washing before, between, and after sampling be free of PFAS. Commercially available distilled water sources should be analyzed for PFAS before its use in the field and should come in an HDPE container. If using municipal water, check with the municipality to determine if the source is

PFAS-free. If that cannot be readily determined, then sample the water for PFAS before its use.

All rental equipment and in-house equipment previously used at other sites needs to be decontaminated before its use. Use only Alconox®, Liquinox®, or Citranox® to decontaminate equipment or wash hands, and use only PVC or HDPE brushes for scrubbing equipment.

Decontaminate equipment before collecting samples, between samples, and at the end of the day. Triple-rinse equipment after cleaning, and change nitrile gloves after decontaminating equipment between sample locations.

FIELD SAMPLING PROCEDURES

Sample Handling

Sample handling procedures are implemented to ensure that sample integrity is maintained throughout the sample collection process. Therefore, the procedures for collecting PFAS samples are not unlike typical sample handling procedures already employed by EnviroForensics personnel. However, due to the pervasiveness of PFAS in the environment, low laboratory detection limits, and possibility of cross-sample contamination, the sample handling procedures for PFAS are more rigorous. EnviroForensics uses a clean hands/dirty hands approach during sample handling activities. One person handles all of the sampling equipment and the other person handles only the sample containers. Specific sample handling procedures with respect to PFAS include:

1. Label sample containers and zip-lock bags in the office before visiting the Site, or in a staging area, and keep the containers in a PFAS-free cooler for use on site. Wash hands and don new powderless nitrile gloves before sample collection.
2. The person designated “dirty hands” handles the sampling equipment only. The person designated “clean hands” holds the sample container and seals the container lid after collecting the sample.
3. **Do not** touch anything other than decontaminated field sampling equipment or sample containers after donning clean nitrile gloves. If you do by accident, change gloves before proceeding further.
4. **Do not** touch the sample or let the outside of the sampling equipment (tubing, bailer, etc.) touch the sample container during sample collection.
5. **Do not** set the sample container on the ground or other surfaces while collecting the sample. That is why there are two people involved.

6. Hands must be washed and new powderless nitrile gloves donned after any decontamination procedure, or (if using all disposable materials) before collecting another groundwater or soil sample;
7. Double bag individual soil or groundwater samples in zip-loc bags and immediately place samples on ice in the cooler.

Additional Considerations

1. Wash hands and change gloves frequently during a long decontamination procedure.
2. Set up a staging area away from the sample collection area for logging field notes, labeling samples containers before sampling, and for taking breaks.
3. **Do not bring any fast food to the site or go off site for lunch.** Fast food wrappers typically contain PFAS. Instead, prepare a lunch and bring it in a plain paper bag to consume in the staging area.
4. Wash hands thoroughly and don clean nitrile gloves following lunch and other breaks.

Laboratory

Many states are currently developing PFAS regulatory standards and laboratory certification programs. There are many compounds of concern contained in the overall PFAS family of chemicals. If State standards have not yet been developed, check with the State regulatory agency to determine the particular compounds to analyze for. Some analytical laboratories have been certified by various agencies such as: State regulatory agencies; Department of Defense; Department of Energy; National Environmental Laboratory Accreditation Program; and International Organization for Standardization. That does not mean that they are set up to analyze for all PFAS chemicals of concern to a particular State agency. Check with the laboratory after determining the State requirements.

Do not use glass sampling containers, as glass tends to adsorb PFAS. Instead, use HDPE or polypropylene containers. Container caps should be of the same material with no Teflon™ seal. Confirm that coolers used to store and ship laboratory samples are PFAS-free. A qualified laboratory will provide the appropriate media for these protocols.

For groundwater samples, do not filter or use a chemical preservative. For samples of municipal drinking water (also possibly used for equipment decontamination) the analytical methods call for preservation with Trizma® to buffer and remove chlorine. Check with the laboratory regarding how many sample containers are needed per sample and appropriate preservatives. Place samples separately in double zip-loc® bags and place immediately on ice. Maintain temperature of the samples below 50° F (10° C). Use regular ice. **Do not use “blue ice” or**

chemical ice packs.

Seal Chain-of-Custody forms and other forms in a zip-loc® bag and tape to the inside lid of the cooler. Tape the cooler closed with a custody seal and ship to the analytical laboratory. Hold time is 14 days to the laboratory with extraction within 28 days.

The current U.S. Environmental Protection Agency (USEPA) developed, and validated analytical methods for PFAS are USEPA Method 533, and USEPA Method 537.1. USEPA Method 533 is focused on the detection of short-chained PFAS (4-12 carbon chain lengths), while Method 537.1 is more focused on detecting longer chain PFAS. Using both methods, up to 29 PFAS chemicals can be detected. These methods were developed for drinking water, but would also apply to groundwater. Soil samples are currently being analyzed for PFAS using a modified Method 537M. New sampling methods are evolving, so these methods may change in the future. Check with State agencies and the analytical laboratories to determine if the above stated methods are still valid or if other methods have been developed and approved by the USEPA and State.

ADDITIONAL FIELD QUALITY CONTROL (BLANKS)

Several different blanks will need to be collected during and possibly before field sampling operations. As previously mentioned, equipment blanks should be collected and analyzed before site work if any materials to be used in field sampling cannot be determined to be PFAS-free. There are additional blanks that will need to be collected during the actual sample collection process to ensure that quality control has been maintained and samples have not been contaminated by outside sources.

Equipment Blanks

Equipment blanks are collected to determine the adequacy of the decontamination process. Equipment blanks are not needed if using dedicated or disposable sampling equipment that has been determined to be PFAS-free.

- Collect an equipment blank by passing PFAS-free water through/over field sampling equipment before use; and
- Collect an additional equipment blank for every five (5) samples collected.

Have the analytical laboratory hold the equipment blanks for possible analysis. Some of the equipment blanks may be analyzed if one or more samples contain PFAS detections.

Field Reagent Blanks

Field reagent blanks (FRBs) are collected to determine if PFAS have entered the samples through the ambient environment, the sampling process in general, and the analytical laboratory sample handling processes. The analytical laboratory will supply a vial of PFAS-free water and an empty sample container for collecting the FRB. The analytical laboratory should be consulted regarding the number of FRBs that should be collected per sampling event.

The FRB will be opened during the collection of one (1) site sample and handled in the same way as that of the site sample. The laboratory provided PFAS-free water will be poured into the provided clean sample vial to mimic field sample collection procedures. As with equipment blanks, reserve the FRBs for possible laboratory analysis if PFAS is detected in any given sample.

Field Duplicates

Collect duplicate samples to measure both field and laboratory precision. The State regulatory agency should be contacted to determine the number of duplicate samples to collect. The State may require more duplicate samples than would be typical for other types of contaminants. For example, the Wisconsin Department of Natural Resources typically requires that one (1) duplicate sample be collected for every 10 groundwater samples that are collected. However, this is guidance (refer to *Groundwater Sampling Desk Reference*, PUBL-DG-037, September 1996) and they may require more when sampling for PFAS.

Trip Blanks

Typically, trip blanks are utilized to determine cross-contamination during shipment of samples and the possible introduction of contaminants in the laboratory environment due to volatile organic compounds. However, the analytical laboratory should be consulted regarding the need for a trip blank during PFAS sampling.

If requested by the laboratory, the laboratory will prepare the trip blanks using PFAS-free water and will ship them with the cooler. If required, include one (1) trip blank in each sample cooler. Do not remove the trip blank from the cooler during sampling, or transport to and from the site. The laboratory will decide whether to run the trip blank if one (1) or more site samples contain PFAS.

REFERENCES

California State Water Quality Control Board, Division of Water Quality, 2019, *Per- and Polyfluoroalkyl Substances (PFAS) Sampling Guidelines*, 9 pp.

Interstate Technology Regulatory Council, 2018, *Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods for Per- and Polyfluoroalkyl Substances (PFAS)*, 9 pp.

Michigan Department of Environmental Quality, 2018, *General PFAS Sampling Guidance*, 24 pp.

Pace Analytical Webpage, *PFAS Field Sampling Guide*: <https://www.pacelabs.com/assets/2020-01-14-pfas-field-sampling-guide.pdf>.

United States Department of Defense Webpage, *Bottle Selection and Other Sampling Considerations When Sampling for Per- and Poly-Fluoroalkyl Substances (PFAS)*: <https://www.denix.osd.mil/edqw/home/what-s-new/unassigned/edqw-pfas-sampling-factsheet-rev-1-2-july-2017/>.

United States Environmental Protection Agency Webpage, *EPA Drinking Water Laboratory Method 537 Q&A*: <https://www.epa.gov/pfas/epa-drinking-water-laboratory-method-537-qa>.