# LEACHATE PFAS SAMPLING

## Guidance

## Introduction

This Leachate PFAS Sampling Guidance document discusses the processes, decontamination procedures, and acceptable materials for sampling landfill leachate for per- and polyfluoroalkyl substances (PFAS). In addition, this guidance will be used to support the sampling objectives and procedures based on the Quality Assurance Project Plan (QAPP) developed prior to sampling activities. This guidance assumes staff has a basic familiarity with and/or understanding of basic environmental sampling procedures.

**NOTE**: Review the **General PFAS Sampling Guidance** prior to reviewing this Guidance.

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) intends to update the information contained within this PFAS sampling guidance document as new information becomes available. Users of this guidance are encouraged to visit the Michigan PFAS Response Web site (Michigan.gov/PFASResponse) to access the current version of this document.

The primary focus of this Guidance is to ensure that landfill leachate samples collected are:

- Representative of the bulk aqueous solution being sampled (a leachate accumulation tank, leachate from an individual landfill cell, etc.).
- Not contaminated by external sources of PFAS.

Please see the **General PFAS Sampling Guidance**, **PFAS Sampling Quick Reference Field Guide** and the **Wastewater PFAS Sampling Guidance** documents for reference. If there is a potential to collect a pond sample at a landfill, refer to the **Surface Water PFAS Sampling Guidance** document.

This sampling guidance covers the collection of landfill leachate PFAS samples and contains methods to prevent cross-contamination that can occur from:

- Field clothing and personal protective equipment (PPE)
- Personal care products (PCPs)
- Food packaging
- Sampling equipment
- Equipment decontamination
- Sample collection and handling
- Sample shipment

## Contents

**NOTE:** Additional information about PFAS testing can be found on the Michigan PFAS Action Response Web site: Michigan.gov/PFASResponse

## 1. Potential Sources for PFAS Cross-Contamination

Potential sources for PFAS cross-contamination include items and materials used within the sampling environment, such as sampling equipment, field clothing, PPE, sun and insect repellant products, personal hygiene, personal care products, and food packaging. A detailed discussion about potential sources for PFAS cross-contamination is included in the **General PFAS Sampling Guidance**, which should be reviewed before reading this document. A high-level summary is presented in this guidance.

All the items and materials discussed in each of EGLE's PFAS Sampling Guidance Documents are divided into three major groups:

- Prohibited (●) identifies items and materials that should not be used when sampling. It is well documented that they contain PFAS or that PFAS are used in their manufacture.

- Allowable (■) identifies items and materials that have been proven not to be sources of PFAS cross-contamination and are considered acceptable for sampling.

- Needs Screening (▲) identifies items and materials that have the potential for PFAS cross-contamination due to a lack of scientific data or statements from manufacturers to prove otherwise. These items and materials are further subdivided into two categories:

  - **Category 1:** Items and materials that will come in direct contact with the sample. These should not be used when sampling unless they are known to be PFAS-free by collecting an

equipment blank sample prior to use.

- **Category 2:** Items and materials that will not come in direct contact with the sample. These should be avoided, if possible, unless they are known to be PFAS-free by collecting an equipment blank sample prior to use.

A general overview of PFAS contamination sources during sampling can be found in **Section 4.2** of the **General PFAS Sampling Guidance**. Any items or materials utilized that are not identified in this guidance or not discussed in **Section 4.2** should be evaluated as described in **Section 4.2.1**.

Sampling staff should take appropriate precautions to avoid items that are likely to contain PFAS at the sampling site, as well as avoid specific items during the sampling event.

## 1.1 Field Clothing and Personal Protection Equipment (PPE)

**Section 4.2.4** of the **General PFAS Sampling Guidance** lists approved field clothing. As with any field mobilization, it is the responsibility of all staff to be aware of the physical, chemical, and biological hazards associated with a site. Personal safety is paramount. Any deviation from this guidance, including those necessary to ensure the health and safety of sampling personnel, should be recorded in field notes and discussed in the final report. A **Quick Reference Field Guide** can also be found on the Michigan PFAS Response Web site: Michigan.gov/PFASResponse.

**NOTE**: Special attention should be given to clothing that has been advertised as having waterproof, water-repellant, or dirt and/or stain repellant characteristics. These items are likely to contain PFAS.

## 1.2 Personal Care Products (PCPs)

Several sampling guidance documents recommend that personal hygiene and PCPs (e.g., cosmetics, shampoo and other hair products, sunscreens, dental floss, etc.) not be used prior to and on the day(s) of sampling because the presence of PFAS in these products has been documented (OECD, 2002; Fujii, 2013; Borg and Ivarsson, 2017). However, if EGLE's sampling guidance documents are followed, these items should not come in to contact with the sampling equipment or the sample being collected. As of the date of this sampling guidance, cross-contamination of samples due to the use of PCPs has not been documented during the collection of thousands of samples. Field personnel should be aware however, of the potential of cross-contamination if the sampling equipment or actual samples would come in to contact with these products. The following precautions should be taken when dealing with personal hygiene or PCPs before sampling:

- ● Do not handle or apply PCPs in the sampling area.
- ● Do not handle or apply PCPs while wearing PPE that will be present during sampling.
- ■ Move to the staging area and remove PPE if applying PCPs becomes necessary.
- ■ Wash hands thoroughly after the handling or application of PCPs and, when finished, put on a fresh pair of powderless nitrile gloves.

## 1.3 Food Packaging

PFAS have been used by the paper industry as a special protective coating against grease, oil, and water for paper and paperboards, including food packaging, since the late 1950s (Trier et al., 2018). PFAS application for food packaging includes paper products that come in to contact with food such

as paper plates, food containers, bags, and wraps (OECD, 2002). Prewrapped food or snacks (such as candy bars, microwave popcorn, etc.) must not be in the sampling and staging area during sampling due to PFAS contamination of the packaging. When staff requires a break to eat or drink, they should remove their gloves, coveralls, and any other PPE, if worn, in the staging area and move to the designated area for food and beverage consumption. When finished, staff should wash their hands and put on a fresh pair of powderless nitrile gloves at the staging area before returning to the sampling area.

- ● Do not handle, consume, or otherwise interact with prewrapped food or snacks, carry-out food, fast food, or other food items while on site during sampling.
- ■ Move to the staging area and remove PPE prior to leaving the sampling and staging areas if consuming food on site becomes necessary.

## 2. Sampling Equipment

Landfill leachate sampling may require the use of nondedicated equipment (equipment used for sampling more than one location), such as stainless steel or glass beakers and dippers, which must be decontaminated prior to first use and between samples to avoid cross-contamination. Any disposable equipment must be known to be PFAS-free.

**NOTE**: As a precautionary action, for **Category 1** sampling materials, an equipment rinsate blank should be collected even if the sampling materials are made of materials that are not expected to contain PFAS.

It is standard procedure with landfill leachate sampling that the equipment is decontaminated before the sampling event. If the previous user of the sampling equipment is not known and it is unclear how the sampling equipment was handled (especially rental equipment), decontaminate the equipment before sampling. Landfill leachate sampling equipment that is also used for non-PFAS sampling, such as dippers or other equipment, must be decontaminated before collecting PFAS samples to avoid cross-contamination. Any **Category 1** nondedicated sampling equipment must be known to be PFAS-free prior to use. Decontamination must be documented in the sampling field log.

Sampling equipment that falls into **Category 1** or **2** are presented below:

**Category 1:** Any item that will directly contact the leachate, including various leachate samplers, tubing, sample bottles, etc. These items should be known to be PFAS-free prior to use.

**Category 2:** Any item that will not directly contact leachate, including Global Positioning System receivers, notebooks, and clipboards. Every effort should be made to ensure these items are PFAS-free. Be aware, the surface of some of this field equipment or the containers in which they are kept may contain PFAS. Care should be taken to prevent cross-contamination in these cases.

Do not use any equipment that contains any known fluoropolymers including, but not limited to:

- Polytetrafluoroethylene (PTFE) that includes the trademarks Teflon® and Hostaflon®.
- Polyvinylidene fluoride (PVDF) that includes the trademark Kynar®.
- Polychlorotrifluoroethylene (PCTFE) that includes the trademark Neoflon®.
- Fluorinated ethylene propylene (FEP) that includes the trademarks Teflon® FEP, Hostaflon® FEP, and Neoflon® FEP.
- Ethylene-tetrafluoro-ethylene (ETFE) that includes the trademark Tefzel®.

**NOTE:** Manufacturers can change the chemical composition of any product. As a result, all items and materials that will come into direct contact with the sample media should be tested to confirm they are "PFAS-free", i.e. will not contaminate samples at detectable levels. **There is no guarantee that materials in the "Allowable" category will always be PFAS-free.**

Items that may contain fluoropolymers such as those listed above include, but are not limited to: the hose and piping; tubing; cables and wires; and films/coatings on aluminum, galvanized steel, aluminized steel, valves, seals, and gaskets.

- Do not use low-density polyethylene (LDPE) for any items that will come into **direct contact** with the sample media. LDPE can be found in many items, such as plastic bags, tubing, and containers, including some sample bottles.
  - ▲ **However**, an item containing LDPE may be used if it is known to be PFAS-free. LDPE as a raw material does not contain PFAS, but cross-contamination during manufacturing can occur.
- ■ Items containing LDPE (e.g., Ziploc® storage bags) that **do not** come into direct contact with the sample media and do not introduce cross-contamination with samples may be used.
- ■ Use materials that are either made of high-density polyethylene (HDPE), stainless steel, polypropylene, silicone, or acetate.
- ■ Store tubing, dippers, or other equipment in a clean location free of dust and fibers.

**NOTE**: Staff should follow EGLE's **PFAS Sampling Quick Reference Field Guide Table** for approved and prohibited items.

## 3. Equipment Decontamination

Field sampling equipment used at multiple sites or sampling locations can become highly contaminated with PFAS. Decontamination procedures should be implemented to prevent cross-contamination, especially between individual sample locations.

For nondedicated **Category 1** sampling equipment, the following materials and procedures must be used for decontamination:

- Do not use Decon® 90.
- ■ Laboratory supplied PFAS-free deionized water is preferred for decontamination.
- ■ Alconox®, Liquinox®, and Citranox® may be used for equipment decontamination.
- ■ Sampling equipment can be scrubbed using a polyethylene or PVC brush to remove particulates.
- ■ Decontamination procedures should include triple rinsing with PFAS-free water.

●- Prohibited ■- Allowable ▲- Needs Screening

- ■ Commercially available deionized water in an HDPE container may be used for decontamination purposes if the water and container are known to be PFAS-free.
  - ▲ Municipal drinking water may be used for decontamination purposes if it is known to be PFAS-free.

It is customary to decontaminate leachate sampling equipment at the end of the sampling event, whether it is a single sampling location or the conclusion of the workday. This is to ensure sampling equipment is decontaminated ahead of time for the next sampling event.

- ● Do not put equipment away without decontaminating it.
- ■ Decontaminate sampling equipment after sampling at each location and at the end of the workday.

## 4. Sample Collection and Handling

The following must be observed for sample collection:

- ● Dust and fibers must be kept out of sample bottles.
- ● The sample cap should never be placed directly on the ground during sampling. If sampling staff must set the sample bottle cap down during sample collection and a second member of the sampling crew (wearing a fresh pair of powderless nitrile gloves) is not available, set the cap on a clean surface (cotton sheeting, HDPE sheeting, triple rinsed cooler lid, etc.).
- ● Do not sample without powderless nitrile gloves.
- ● Regular/thick size markers (Sharpie® or otherwise) are to be avoided as they may contain PFAS.
- ■ Fine and Ultra-Fine Point Sharpie® markers are acceptable for labels.
- ■ Ballpoint pens may be used when labeling sample containers. If ballpoint pens do not write on the sample container labels, preprinted labels from the laboratory may be used.
- ■ Hands should be well washed and gloved.
- ■ Use HDPE or polypropylene containers or sample bottles with Teflon®-free caps, provided by the laboratory.
- ■ Commercially bought sample bottles used with automatic sampling equipment should be decontaminated prior to sampling and equipment blank samples should be collected using laboratory provided PFAS-free water.
- ■ Bottles should only be opened immediately prior to sampling.
- ■ Bottles should be capped immediately after collecting the sample.
- ■ Samples should be double-bagged using LDPE (e.g., Ziploc®) resealable storage bags.
- ■ In the absence of a United States Environmental Protection Agency (USEPA) approved method, staff should contact the laboratory performing the sample analysis to obtain values for thermal preservation and holding time consistent with the analytical method to be used. At a minimum, samples should be placed on ice within 15 minutes of collection and chilled to a temperature of at or below 42.8°F (6°C) (as determined by Title 40 of the Code of Federal Regulations, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants). This temperature should be maintained during collection and through transit to the laboratory.

●- Prohibited ■- Allowable ▲- Needs Screening

- Glass bottles or containers may be used if they are known to be PFAS-free; however, PFAS has been found to adsorb to glass, especially when the sample is in contact with the glass for a long period of time (e.g., being stored in a glass container). If the sample comes into direct contact with the glass for a short period of time (e.g., using a glass container to collect the sample and then transferring the sample to a non-glass sample bottle), the adsorption is minimal.

**NOTE:** Currently, there are no USEPA-approved methods for PFAS analysis of leachate; therefore, an isotope dilution method could be used. All PFAS analytes found on the EGLE PFAS Minimum Laboratory Analyte List are required to be reported for any PFAS samples collected by EGLE staff or their contractors. The PFAS Minimum Laboratory Analyte List can be found at Michigan.gov/PFASResponse

- If site-specific information is available, sampling should be conducted from the least to the most contaminated location. Additional guidance on the sampling sequence can be found in **Section 4.3.3.** of the **General PFAS Sampling Guidance**.
- If possible, collect PFAS samples prior to collecting non-PFAS samples or field parameters (pH, temperature, etc.).
- Powderless nitrile gloves should be changed any time there is an opportunity for cross-contamination during sampling, including, but not limited to:
  - Immediately prior to sample collection.
  - Each time sampling equipment is placed in and removed from leachate (e.g., various sampling devices, direct temperature meter, etc.).
  - Handling of any sample, including quality assurance/quality control samples.
  - After the handling of any nondedicated sampling equipment.
  - After contact with non-decontaminated surfaces.
  - After decontamination of sampling equipment.
  - When judged necessary by field personnel.

## 5. Sample Collection Methods

The most frequent leachate samples are collected from aboveground storage tanks and underground tanks, vaults or sumps, or leachate risers. The following section will present sample collection procedures for each of these scenarios.

### 5.1 Aboveground Tank Sampling

Aboveground tanks typically have a valve or sampling port from which samples may be directly collected. It is unlikely that extensive setup is necessary when sampling from an aboveground tank. If such setup is necessary; all supplies should be placed on clean HDPE sheeting near the sampling point.

1. Place a clean HDPE bucket on the ground below the sampling point.
2. Open the valve or port and let leachate run into the bucket for several seconds in order to clear any sediment from the line and to adjust the flow to an appropriate rate for sample collection.
   a. If at all possible, a second member of the sampling crew should open the valve or port. If it is necessary for sampling personnel handling the sample container to open the valve or

port, all efforts should be made to prevent the sample collection container or lid from touching external surfaces.

b. While the primary purpose of the HDPE bucket is to contain any spillage, if the flow from the sample port cannot be choked down enough to easily fill the sample container, the sampling crew may have to partially fill the bucket, and then fill the sample container from the bucket.

3. In immediate proximity to the sampling point, and with a freshly gloved hand, open the sampling container. Keep the lid of the sample collection container in hand and do not put it down on any surface.

4. Once the sample collection container has been filled consistent with the sampling method and laboratory guidance, immediately replace the cap.

5. Complete label information on the sample collection container and place it in a LDPE (e.g., Ziploc®) bag.

6. Place the LDPE (e.g., Ziploc®) bag containing the filled sample collection container in a cooler filled with regular ice (not Blue Ice or any other chemical coolant product).

7. Properly dispose of any leachate in the bucket. If the bucket will be reused, it must be decontaminated (see **Section 3, Equipment Decontamination**).

8. If a duplicate sample is being collected at this location, change powderless nitrile gloves before handling the sample collection container for the duplicate sample, and then repeat the process.

## 5.2 Underground Tank, Vault, or Sump Sampling

Underground tanks typically have a port from which a sample may be collected. If the port is hard plumbed with an in-line pump, PFAS samples can be collected in the same manner as from an aboveground tank (see **Section 5.1, Aboveground Tank Sampling**).

**NOTE:** If there are concerns that parts of the plumbing or pump may be constructed of PFAS-containing materials, the data quality objectives of the sample collection effort must be considered. For example, if the goal of the sample collection effort is to characterize PFAS concentrations of leachate sent to a publicly owned treatment works, or disposed of in some other fashion, then any contamination contributed by plumbing and pumps is representative of this population, and no special steps should be taken to eliminate it from the sample.

If the goal of the sample collection is to characterize leachate before any potential contribution from the sampling train, an alternate method of sampling, such as a peristaltic pump with silicone tubing, should be considered. It is beyond the scope of this Guidance to consider every possible variation of this situation; staff should identify any such issues at a specific site as part of the planning process and consult, as needed, with division PFAS subject matter experts on the best way to address them.

- If the underground tank is plumbed with an in-line pump, and staff are not concerned about potential cross-contamination from the sampling train, proceed using the same steps as for an aboveground tank (see **Section 5.1, Aboveground Tank Sampling**).
- If the underground tank is plumbed with temporary or permanent tubing, but a portable pump is used by the landfill for emptying/sampling leachate, and staff are not concerned about potential cross-contamination from the sampling train, proceed using the same steps as for an aboveground tank.
- If access to the leachate is obtained through a hatch or port with a tube or manhole to the surface, staff should follow the site safety plan before determining the appropriate sampling device: dip sampler; pump and tubing; or bailer.
    - A dip sampler may be used when the depth from the tank access point to the leachate surface is small (three to four feet or less), and there is adequate depth of leachate in the tank in which to submerge the sample container in the dip sampler.
    - All other situations require the use of a pump and tubing or a bailer. Peristaltic pumps are preferred because no pump parts make contact with the sample, thus eliminating a potential avenue of cross-contamination. Use a pump and tubing that have been determined to be PFAS-free.

Underground tanks, vaults, or sumps may be sampled with either a dip sampler, a bailer, or a pump, whichever is the most practical given the physical layout of the structure being sampled. A description of all three sampling procedures are described in the sections below.

### 5.2.1 Dip Sampler

All components of the dip sampler, including any line used to lower it, should be constructed of PFAS-free materials. Prior to use in the field, this should be verified by knowledge of the construction materials and the collection and analysis of an equipment blank. Once the dip sampler has been demonstrated to be PFAS-free by the collection and analysis of an equipment blank, it can be used, with decontamination between each use and an occasional (on the order of once every ten uses) equipment blank, to demonstrate that it has not become contaminated.

The use of a fetch bottle may be considered. A fetch bottle is a laboratory - provided PFAS-free bottle that is placed in the dip sampler for sample collection. Once the fetch bottle is filled with the sample, the dip sampler is removed from the sample medium, and the contents of the fetch bottle are poured into the laboratory provided PFAS-free sample container. The advantages of using a fetch bottle include:

- Not contaminating the outside of the final sample collection container with PFAS or other hazardous substances.
- Being able to more easily affix the sample label to the final sample container.

The primary disadvantage of using a fetch bottle is additional sample handling, which may introduce cross-contamination. Site-specific factors will determine the advisability of using a fetch bottle.

1. All sampling supplies should be placed on clean HDPE sheeting near the sampling point.
2. Wearing powderless nitrile gloves, open the access port to the tank.

3. After opening the access port, change into a clean pair of powderless nitrile gloves.
4. Place the sample container in the dip sampler.
5. Remove the cap from the sample container. Do not put the cap down on any surface. If necessary, a second member of the sampling crew, wearing a fresh pair of powderless nitrile gloves, may hold the cap.
6. Submerge the dip sampler with the sample container in the leachate. If at all possible, prevent the dip sampler from touching the bottom of the tank to avoid collecting any sediment.
7. When filled, remove the dip sampler and the sample container.
8. If using a fetch bottle, carefully pour the contents of the fetch bottle into the sample collection container. If at all possible, a second member of the sampling team, wearing fresh powderless nitrile gloves, should perform this task.
9. Replace the cap on the sample collection container.
10. Complete label information on the sample collection container and place it in a LDPE (e.g., Ziploc®) bag.
11. Place the LDPE (e.g., Ziploc®) bag containing the filled sample collection container in a cooler filled with regular ice (not Blue Ice or any other chemical coolant product, unless it has been screened).
12. If a duplicate sample is being collected at this location, change powderless nitrile gloves before handling the sample collection container for the duplicate sample, and then repeat the process.
13. Any excess leachate in the dip sampler should be poured back into the tank.
14. Decontaminate the dip sampler and decontaminate or dispose of any fetch bottle before proceeding to the next sampling location (see **Section 3, Equipment Decontamination**).
15. After decontamination, the dip sampler should be stored by wrapping it in HDPE sheeting.

### 5.2.2 Bailer

Bailers are only suitable for sampling tanks when an adequate depth of leachate is present in the bottom of the tank to fill the bailer full enough to collect a sample without excessively agitating the sediment at the bottom of the tank. If at all possible, the sample should be collected with only one trip of the bailer into the leachate.

- ■ Use only disposable bailers that are packaged in HDPE plastic.
- ● The bailer should not have a Teflon® check ball.

1. Place a clean HDPE bucket on the ground, and fill sample containers above the bucket in order to contain any overflow.
2. Cotton string or twine should be used as bailer line. If any synthetic string or cord is used, an equipment blank should be collected by pouring PFAS-free water (obtained from and verified by the analytical laboratory) over the synthetic string and into a sample container prior to collecting samples.

●- Prohibited ■- Allowable ▲- Needs Screening

3. All sampling supplies should be placed on clean HDPE sheeting near the sampling point.
4. Due to the fact that two hands are necessary to effectively operate the bailer, samples using a bailer should be collected by a team of two field staff.
5. Wearing powderless nitrile gloves, open the access port to the tank.
6. After opening the access port, change to a clean pair of powderless nitrile gloves.
7. The first member of the sampling team lowers the bailer into the tank, allows it to fill, and retrieves it. If possible, avoid touching the bottom of the tank with the bailer.
8. The second member of the sampling team removes the cap from the sample container. The cap can be placed on clean HDPE sheeting.
9. The first member of the sampling team empties the bailer into the sample container held by the second member.
10. Replace the cap on the sample collection container.
11. Complete label information on the sample collection container and place it in an LDPE (e.g., Ziploc®) bag.
12. Place the LDPE (e.g., Ziploc®) bag containing the filled sample collection container in a cooler filled with regular ice.
13. If a duplicate sample is being collected at this location, change powderless nitrile gloves before handling the sample collection container for the duplicate sample, and then repeat the process.
14. As only disposable sampling supplies should be used for bailer sampling, there is no decontamination required.

### 5.2.3 Pump

It is highly recommended that only peristaltic pumps be used, as no pump parts make contact with leachate. If a bladder pump is to be used, the sampler should attempt to determine if any of its interior parts may be made of PFAS-containing materials and also collect an equipment blank by pumping PFAS-free water (obtained from and verified by the analytical laboratory) through the pump and collecting in a sample container.

- ■ Use only silicone or HDPE tubing with the pump.
- ● Do not pass the leachate through a flow-through cell, in-line filter, or any other device attached to the sampling train.

1. All sampling supplies should be placed on clean HDPE sheeting near the sampling point.
2. Place a clean HDPE bucket on the ground, and fill sample containers above the bucket in order to contain any overflow.
3. After opening the access port, change to a clean pair of powderless nitrile gloves.
4. Cut an appropriate length of tubing. Do not allow the tubing to come in to contact with any surfaces other than the clean HDPE sheeting.

●- Prohibited ■- Allowable ▲- Needs Screening

5. Mount the tubing in the peristaltic pump and lower the other end of the tubing into the leachate to the desired depth.

> **Note**: If the tubing is tightly coiled, it may need to be weighted or guided in order to be effectively lowered into the tank. A metal or plastic rod or a metal weight may be used. Sampling staff must verify that any item used to assist with lowering the tubing is PFAS-free and is either disposed of, or decontaminated, after every use.

6. In immediate proximity to the sampling point, and with a freshly gloved hand, open the sampling container. Keep the lid of the sample collection container in hand, or on clean HDPE sheeting.
7. Start the pump.
8. Adjust the pump speed to control sample flow.

> **Note**: As some PFAS compounds are volatile, and the sample is being collected from a tank and not a groundwater formation, there is no need to run the pump at the low-flow rates suitable for groundwater sampling. It is best to minimize the amount of time the sample container remains open for evaporation or to potential sources of atmospheric contamination, so higher rates are justified.

9. If the pump operator is collecting the sample, the pump operator must change to clean powderless nitrile gloves prior to collecting the sample. If a second member of the field crew is collecting the sample (recommended), clean powderless nitrile gloves should be put on immediately before sample collection.
10. Collect the sample.
11. Turn off the pump.
12. Replace the cap on the sample collection container.
13. Complete label information on the sample collection container and place it in a LDPE (Ziploc®) bag.
14. Place the LDPE (e.g., Ziploc®) bag containing the filled sample collection container in a cooler filled with regular ice.
15. If a duplicate sample is being collected at this location, change powderless nitrile gloves before handling the sample collection container for the duplicate sample, and then repeat the process.
16. Since only disposable tubing is to be used and no other sampling supplies make contact with the leachate, no decontamination is necessary. If an HDPE bucket is used to contain overflow, it must be decontaminated after each sample location.

## 5.3 Leachate Riser Sampling

Leachate risers typically contain an internal pump that lifts the leachate and delivers it to the landfill's central leachate collection point. If sampling from a leachate riser is required (for example, if data are

needed from an individual cell), prior to going out into the field, determine whether the riser was constructed with a sample collection port. If so, follow the procedures listed in **Section 5.1, Aboveground Tank Sampling**.

If the riser was not constructed with a sample collection port, contact the landfill in advance to determine how sample collection will take place. It is likely that the leachate pumping system will have to be dismantled at some point to allow insertion of a temporary sampling port. Typically, this will be at the pitless adapter that connects the individual riser to the landfill's leachate transmission piping, but it may be at some other point. (See **Figure 1**, for a diagram of a typical leachate riser and the location of the pitless adapter) Landfill staff will be responsible for any and all required modifications to the landfill leachate collection system.

- EGLE staff may not make any modifications, temporary or permanent, to the landfill leachate collection system.

Once the landfill staff have provided a usable collection port, follow the procedures listed in **Section 5.1, Aboveground Tank Sampling**.

After collection in laboratory supplied containers, leachate samples for PFAS analysis should be handled as follows:

1. Complete the appropriate data sheets. Place each sample container into a shipping container (i.e., cooler). Pack the container with regular ice.
2. Complete a chain-of-custody record for each shipping container. The chain-of-custody record should be hand-carried to the laboratory by the sampler, or, if being transported by common carrier, the chain-of-custody record should be enclosed in a resealable plastic bag and taped to the inside lid of the shipping container.
3. Shipping containers should be packed with enough noncombustible, absorbent, cushioning material, such as bubble wrap, to minimize the possibility of breakage.
4. The chain-of-custody record should be placed in a resealable plastic bag and affixed to the inside lid of the shipping container.
5. The lid of the shipping container should be secured with a custody seal, and the container should be transported to the selected laboratory by the sampling crew or by common carrier.
6. Chain-of-custody procedures must be followed and documented.

## 6. Field Quality Assurance/Quality Control

Sample blanks and duplicates are the primary means of assuring and assessing quality control during sample collection or transport. Due to the significant potential for cross-contamination of samples with PFAS sources in many industrial and consumer products and other media, and the low concentrations of concern, quality assurance/quality control (QA/QC) samples take on a particular importance when collecting samples for PFAS analysis. When in doubt, the sampling team should collect more QA/QC samples than minimally required. Staff must also follow any test method field quality control requirements.

Field quality assurance and quality control samples consist of:

**NOTE**: Refer to the specific sampling plan or QAPP to determine the appropriate number and frequency of field quality assurance and quality control samples.

## 6.1 Equipment Blanks

Equipment blanks consist of laboratory – verified, PFAS-free water poured over (for equipment such as static water level indicators) or through (for equipment such as pumps, bailers, and flow through cells) the sampling equipment, collected in laboratory-supplied sample containers, and analyzed.

- If samples are collected with a bailer, PFAS-free water is poured through the same model bailer, from the same manufacturer (preferably from the same box or lot), into a sample container.
- If samples are collected with a pump, PFAS-free water is pumped through the pump tubing and, in the case of bladder pumps, the pump bladder, and into the sample collection container.

Equipment blanks should be collected at a **minimum** of one per day, per sampling equipment type, per site or as identified in the QAPP. For example, if collecting two samples using a pump at one site, collect one equipment blank. If collecting two samples each at two sites using a pump, collect two equipment blanks (one at each site). If collecting two samples at one site using a pump for one sample and a bailer another sample, collect two equipment blanks (one for the pump and one for the bailer). Again, these are minimum requirements and, particularly if the sampling crew has a reason to believe that contamination of the sampling train is a concern, a larger number of equipment blanks should be collected.

All aspects of equipment blank collection should be handled as if the samples were environmental samples. This includes wearing clean, powderless nitrile gloves; avoiding placing the sample containers, lids, or sampling equipment on any surface other than clean HDPE sheeting; and observing the recommendations in this Guidance. Once collected, equipment blanks should be handled and transported with the environmental samples for which they are providing QA/QC.

## 6.2 Trip Blanks

Trip blanks are sample collection containers pre-filled at the lab with laboratory-verified PFAS-free water. Trip blanks travel with the field samples and are analyzed in the same batch to determine if sources, other than the sampling equipment or sampling environment, are contributing detectable concentrations of PFAS to the sample.

- Typically, trip blanks are collected to assess the potential cross contamination from volatile organic compounds.
- Trip blanks could be used to evaluate the potential cross-contamination present at the lab, in the containers or deionized water provided from the lab. A trip blank should be taken at any sampling event at which five or more samples are collected, as identified in the QAPP.

## 6.3 Field Blanks

Field blanks consist of laboratory – verified, PFAS-free, water in a laboratory supplied sample container.

● - Prohibited ■ - Allowable ▲ - Needs Screening

- A field blank is opened at the sampling site and exposed to ambient conditions for approximately the same amount of time as an actual sampling container (generally 1 to 3 minutes). Alternately, the PFAS-free water can be poured from one sample container into another to mimic sample collection activities. The field blank then travels with the field samples and is analyzed in the same batch.
- A field blank must be collected once every twenty samples or once during any sampling event, when an ambient source of PFAS (particularly atmospheric) is suspected, or as identified in the QAPP.
- If an atmospheric source of PFAS is suspected, collect the field blank downwind of the suspected source.

### 6.4 Field Duplicates

Field duplicates are two samples collected at the same location at the same time (i.e., from the same tank, sump, or vault). The same sampling equipment should be used to collect both the original sample and the field duplicate; they should be handled, stored, and transported identically following collection.

- Field duplicates are used as a check on analytical consistency, since it is assumed that both the duplicate and the original sample represent the same location. Duplicates are analyzed in the same batch and serve as a quality check on the accuracy and precision of sampling procedures.
- Field duplicates should be collected at the rate of one in every ten environmental samples, with a minimum of one collected per field event or at a different frequency as specified in the QAPP.

Field duplicates should be labeled to prevent the laboratory from identifiying which sample it is a duplicate of (known as a ‘blind duplicate’). For example, if the original sample is labeled “Sump-3-062018” (the location and date of sample collection), the field duplicate may be labeled “Dup-XX-062018”, “Sump-7-062018” (where there are only three sumps at the facility, for example), or some other naming convention that prevents laboratory personnel from identifying which sampling location is being duplicated.

## 7. Sample Shipment

The following procedures should be used for sample shipment:

■ Regular ice should be used to cool and maintain the sample at or below 42.8°F (6°C).

▲ Chemical or blue ice may be used if it is known to be PFAS-free and it is absolutely certain that the sample is cooled and maintained at or below 42.8°F (6°C) during collection and through transit to the laboratory.

■ Check the cooler periodically to ensure samples are well iced and at the proper temperature.

■ Refresh with regular ice, if needed, double-bagged in LDPE (e.g., Ziploc®) resealable storage bags, if needed.

- Chain of Custody and other forms should be single-bagged in LDPE (e.g., Ziploc®) resealable storage bags and taped to the inside of the cooler lid.
- The cooler should be taped closed with a custody seal and shipped by overnight courier.
- Samples should be shipped as soon as possible (e.g., overnight) to ensure the samples arrive within the analytical holding time specified by the lab.

## 8. Equipment Decontamination After Sampling

It is standard procedure to decontaminate leachate sampling equipment at the end of the sampling event, whether it is a single sampling location or the conclusion of the workday. This is to ensure sampling equipment is decontaminated ahead of time for the next sampling event.

- Do not put equipment away without decontaminating it.
- Decontaminate sampling equipment after sampling at each location, and at the end of the workday. Follow the decontamination guidelines in **Section 3, Equipment Decontamination** of this Guidance.

**Figure 1**. Leachate Riser Detail