

FOR TECHNICAL STAFF AND CONTRACTORS - RESIDENTIAL WELL PFAS SAMPLING

Introduction

This sampling guidance discusses the processes and acceptable items and materials that should be used by Michigan Department of Environment, Great Lakes, and Energy (EGLE) and local health department staff conducting residential well sampling for per- and polyfluoroalkyl substances (PFAS). This guidance will be used to support the sampling objectives and procedures based on any Quality Assurance Project Plan (QAPP) developed before starting field activities.

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

This guidance assumes staff have a basic understanding of residential well sampling procedures. If you are a homeowner or resident interested in sampling your own well, please see the separate document **For Residents – Residential Well PFAS Sampling Guidance**.

EGLE intends to update the information contained within this Residential Well PFAS Sampling Guidance document as new information becomes available. The user of this Residential Well PFAS Sampling Guidance is encouraged to visit the Michigan PFAS Action Response Team (MPART) webpage (Michigan.gov/PFASResponse) to access the most current version of this document.

PFAS has been detected in groundwater in Michigan from residential wells with concentrations from non-detect to over 60,000 parts per trillion (ppt). Many commercial laboratories have low PFAS reporting limits of about 2 ppt. Therefore, there is a high potential of false positives if proper procedures are not followed during sample collection.

This Residential Well PFAS Sampling Guidance discusses the potential for cross contamination that can occur from:

- Field clothing and personal protective equipment (PPE)
- Sampling equipment
- Sample collection and handling
- Sample shipment

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NOTE: Additional information about PFAS testing can be found on the Michigan PFAS Response website:
[Michigan.gov/PFASResponse](https://www.michigan.gov/PFASResponse)

1. Typical Well Construction

There are several different types of drinking water well construction methods found in Michigan—rotary drilling, cable tool, auger drilling, hand driving, jetting, hollow-rod and dug wells. Well construction does not affect sampling methods but may provide additional insight into the meaning of the results.

Before sampling, staff should obtain the well construction record through the EGLE’s statewide groundwater database, Wellogic (<https://secure1.state.mi.us/wellogic>), or by contacting the local health department. Records for wells constructed since the year 2000 are typically located in Wellogic. Older well records may be found in the Scanned Water Well Record Retrieval System (see link in Wellogic). The well record will indicate the drilling method, well depth, type of formations encountered, grout (present or absent), type of pumping equipment, and more.

2. Potential Sources for PFAS Cross Contamination

Potential sources for PFAS cross contamination include sampling equipment, field clothing, personal protective equipment (PPE), sun and insect repellent, personal hygiene and personal care products (PCP), and food packaging. A high-level summary of PFAS cross contamination is presented in this guidance; however, a more detailed discussion can be found in the **General PFAS Sampling Guidance** document and should be read before continuing on with this document.

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 sub-divided 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 practical and 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.

2.1 Field Clothing, Personal Protection Equipment (PPE), and Residential Well Sampling Materials and Equipment

Materials, field clothing, and equipment screening should be performed during the QAPP development or the planning phase of sampling programs. The screening should be performed on all items and materials that are expected to come into contact with the samples. Due to the extensive use of PFAS in many products, some PPE may contain PFAS. *However, the safety of staff is our primary concern and should not be compromised by fear of PFAS-containing materials without any scientific basis. 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.*

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 website: 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 repellent characteristics. They are likely to contain PFAS.

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®.

- 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.

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.**

Staff should follow the **EGLE PFAS Sampling Quick Reference Field Guide** table for approved and prohibited items for documenting and sampling residential wells for PFAS. The following materials or items are allowable:

- 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.
- Use PFAS-free bottles containing Trizma® preservative provided by the laboratory.
- Use powderless nitrile gloves.
- ▲ Latex gloves should be screened before use.

2.2 Personal Care Products (PCP)

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 into 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 into 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 personal care products becomes necessary.
- Wash hands thoroughly after the handling or application of PCPs. When finished, put on a fresh pair of powderless nitrile gloves.

2.3 Food Packaging

PFAS has 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 into 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 pre-wrapped 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.

3. Residential Well Sample Collection and Handling Procedures

Obtain Sample Bottles – All bottles used for PFAS sampling must come from the laboratory that will be performing the PFAS analysis. Bottles used for sample collection should contain the preservative Trizma®.

Schedule the Sampling Visit – Before scheduling a sampling visit:

- Obtain a copy of the well record if available. Well records may be obtained through the on-line tool Wellogic or by contacting the local health department.

● - Prohibited ■ - Allowable ▲ - Caution

- Contact the well owner by telephone or send a postcard or letter to the owner on record's mailing address proposing a sample collection date and request that any loose pets be secured on the day of sample collection to protect staff. Provide staff with contact information if a different sampling day or special instructions are needed.
- If **investigatory** samples will be collected: If possible, inquire ahead of time about any treatment systems installed on the residential water system and/or ask the resident to bypass the treatment system on the day of sample collection. This is so staff can get a representative sample of the untreated water being produced by the well.

The typical residential well sample will either be collected from inside the residents' home or from an outside tap. The sample should not be taken from a hose. Gain access to the interior of the home, if possible, to identify any treatment systems such as in-line filtration, softening, iron removal, or other treatment systems before selecting the sample tap location. The choice of an appropriate sample tap depends on the purpose of the sample. For example, a **screening** sample may be collected from a location most likely to represent the water consumed by the resident. This type of sample may not represent the water produced by the well and, therefore, should not be utilized for an environmental investigation. Primary consideration for screening sample location should be the kitchen faucet; however, acceptable sample locations include a laundry sink, outside tap, or other commonly used distribution points-of-use within the home.

- ▲ Avoid using leaky or spraying faucets, if possible.
- ▲ When swivel or single lever faucets are used for sampling, please ensure that only cold water is used for flushing and sample collection.
- The sampling of residential wells in a known PFAS-impacted area should be selected in order from least to most contaminated well, if known.

Primary consideration for an **investigatory** sample should be a location as near to the well as possible and prior to treatment, such as a sample tap at the pressure tank. This may be one of the acceptable locations listed in the paragraph above, but only if it is representative of the water from the drinking water well. If there is no untreated tap available at the residence and the treatment system cannot be bypassed, consider utilizing the kitchen sink tap, bathroom faucet, or outside tap. Note on the sample request form if the sample was collected from a treated tap.

The sampling of irrigation wells might be required if the resident is using the water for gardening, for occasional drinking, or to better understand a PFAS plume.

- Do not collect the sample from any garden hose or other devices used for irrigation.
- The sample should be located as close to the well as possible.

Flush the Tap – USEPA Method 537.1, Section 8.2.2 states that the sampler open the tap and allow the system to flush until the water temperature has stabilized (approximately 3 to 5 minutes). Samples are collected from the flowing system after it has been flushed.

- Options for flushing include running water at the sample tap itself, at a nearby laundry sink, at another household sink or bathtub, flushing a toilet, opening the outside tap, or a combination of any of these taps.
- If an outside tap is used, collect flushed water in a bucket and dispose of the water in the yard.

Sample Collection – Careful planning must be done in advance of the sample collection to minimize the potential for cross contamination. Use powderless nitrile gloves during sample collection. Powderless nitrile

● - Prohibited ■ - Allowable ▲ - Caution

gloves should be changed frequently and at any time there is an opportunity for cross contamination of the sampling, including the following activities:

- Before sample collection.
- While handling any sample, including quality assurance/quality control (QA/QC) samples, such as field reagent blanks.
- Handling of any non-dedicated sampling equipment (equipment used for more than one specific location), contact with non-decontaminated surfaces, or when judged necessary by staff.

The following considerations should be taken during sample collection to prevent contamination:

- Dust and fibers must be kept out of sample bottles.
- Never set the cap down or let anything touch the rim of the bottle or inside the cap.
- Splashed drops of water from the sink or ground must be kept out of sample bottle.
- Do not let the sample bottle overflow; if the bottle overflows, the Trizma[®] preservative will be flushed out and may result in QC failure in the laboratory.
- Do not use markers other than Fine or Ultra-Fine point Sharpies[®], which have been proven to be PFAS-free.
- Use PFAS-free markers to label the empty sample bottle prior to or immediately after the sample collection. Allow the ink to dry completely before proceeding. Preprinted labels from the laboratory can also be used. After labelling, a recommended practice is to place the labeled container on the polyethylene bag used below.
- Ensure that the sample tap is protected from dust, dirt, and debris, and ensure the sample tap is not too close to the sink bottom or the ground so that splashing is avoided.
- Relevant notes should be taken, including the presence of Teflon[®] tape on the piping.
- A residential well sample should be collected from the cold water tap only.
- Whenever possible, note and remove any attachments from the taps including aerators, screens, washers, hoses, and water filters.
- Use HDPE or polypropylene sample bottles provided by the laboratory containing Trizma[®] preservative.
- Glass bottles or containers may be used if they are known to be PFAS-free. However, PFAS have 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, then transferring the sample to a non-glass sample bottle), the adsorption is minimal.
- Fill the bottle to the shoulder or neck, taking care to not flush out the Trizma[®] preservative.
- If the bottle has been over-filled, do not dump out any sample. Headspace is not a requirement.
- Cap the bottle, then gently agitate by hand until the preservative is dissolved. Do not reopen the bottle.
- Samples should be double bagged using resealable LDPE bags (e.g., Ziploc[®]).
- Prior to shipment, samples need to be chilled, and must not exceed 50° F (10°C) during the first 48 hours after collection. (USEPA Method 537.1).

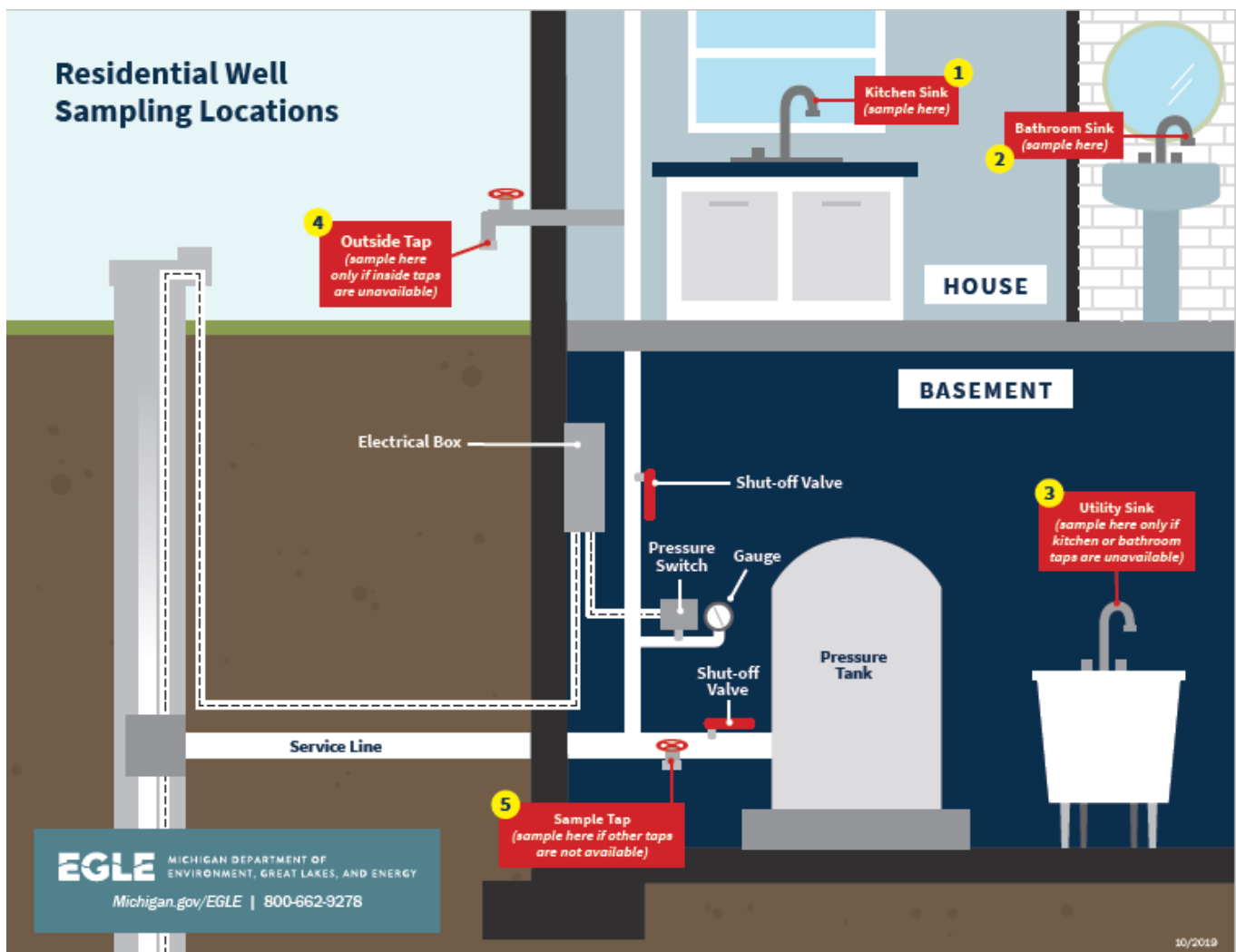
4. Sample Shipment

The following recommendations should be used for the sample shipment:

- Wet ice should be used to cool and maintain the sample at or below 50°F (10°C) during the first 48 hours after collection. (USEPA Method 537.1).

● - Prohibited ■ - Allowable ▲ - Caution

- ▲ 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 50°F (10°C) during collection and through transit to the laboratory. Chemical or blue ice should be frozen for at least 24 hours prior to use.
- Use wet ice that is double bagged using resealable LDPE bags (e.g., Ziploc®).
- 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 resealable storage bags (e.g., Ziploc®).
- Samples must be chilled **during shipment** and must not exceed 50°F (10°C) during the first 48 hours after collection. (USEPA Method 537.1).
- Chain of Custody (COC) should be single-bagged in resealable LDPE bags (e.g., Ziploc®) and taped to the inside of the cooler lid.
- The cooler should be taped closed with a custody seal and shipped by an overnight courier.
- Residential well samples should be shipped to the laboratory as soon as possible (e.g., overnight), so the laboratory may perform the necessary steps within the 14-day holding time beginning the date of sample collection (USEPA Method 537.1).



EGLE PFAS Sampling Quick Reference Field Guide¹
All Items Used During Sampling Event

● Prohibited
<ul style="list-style-type: none"> • Items or materials that contain fluoropolymers such as <ul style="list-style-type: none"> ○ Polytetrafluoroethylene (PTFE), that includes the trademarks Teflon® and Hostafion® ○ Polyvinylidene fluoride (PVDF), that includes the trademark Kynar® ○ Polychlorotrifluoroethylene (PCTFE), that includes the trademark Neoflon® ○ Ethylene-tetrafluoro-ethylene (ETFE), that includes the trademark Tefzel® ○ Fluorinated ethylene propylene (FEP), that includes the trademarks Teflon® FEP and Hostafion® FEP • Items or materials that contain any other fluoropolymer

Pumps, Tubing, and Sampling Equipment

● Prohibited	■ Allowable	▲ Needs Screening ²
<ul style="list-style-type: none"> • Items or materials containing any fluoropolymer (potential items include tubing, valves, or pipe thread seal tape) 	<ul style="list-style-type: none"> • High-density polyethylene (HDPE) • Low-density polyethylene (LDPE) tubing • Polypropylene • Silicone • Stainless steel • Any items used to secure sampling bottles made from: <ul style="list-style-type: none"> ○ Natural rubber ○ Nylon (cable ties) ○ Uncoated metal springs ○ Polyethylene 	<ul style="list-style-type: none"> • Any items or materials that will come into direct contact with the sample that have not been verified to be PFAS-free <ul style="list-style-type: none"> ○ Do not assume that any sampling items or materials are PFAS-free based on composition alone

Sample Storage and Preservation

● Prohibited	■ Allowable	▲ Needs Screening ²
<ul style="list-style-type: none"> • Polytetrafluoroethylene (PTFE): Teflon® lined bottles or caps 	<ul style="list-style-type: none"> • Glass jars⁴ • Laboratory-provided PFAS-Free bottles: <ul style="list-style-type: none"> ○ HDPE or polypropylene • Regular wet ice • Thin HDPE sheeting • LDPE resealable storage bags (i.e. Ziploc®) that will not contact the sample media⁶ 	<ul style="list-style-type: none"> • Aluminium foil⁴ • Chemical or blue ice⁵ • Plastic storage bags other than those listed as <ul style="list-style-type: none"> ■ Allowable • LDPE bottles

Field Documentation

● Prohibited	■ Allowable	▲ Needs Screening ²
<ul style="list-style-type: none"> • Clipboards coated with PFAS • Notebooks made with PFAS treated paper • PFAS-treated loose paper • PFAS-treated adhesive paper products 	<ul style="list-style-type: none"> • Loose paper (non-waterproof, non-recycled) • Rite in the Rain® notebooks • Aluminium, polypropylene, or Masonite field clipboards • Ballpoint pens, pencils, and Fine or Ultra-Fine Point Sharpie® markers 	<ul style="list-style-type: none"> • Plastic clipboards, binders, or spiral hard cover notebooks • All markers not listed as <ul style="list-style-type: none"> ■ Allowable • Post-It® Notes or other adhesive paper products • Waterproof field books

Decontamination

● Prohibited	■ Allowable	▲ Needs Screening ²
<ul style="list-style-type: none"> • Decon 90® • PFAS-treated paper towels 	<ul style="list-style-type: none"> • Alconox®, Liquinox®, or Citranox® • Triple rinse with PFAS-free deionized water • Cotton cloth or untreated paper towel 	<ul style="list-style-type: none"> • Municipal water • Recycled paper towels or chemically treated paper towels

Clothing, Boots, Rain Gear, and PPE

● Prohibited	■ Allowable	▲ Needs Screening ²
<ul style="list-style-type: none"> • New or unwashed clothing • Anything made of or with: <ul style="list-style-type: none"> ○ Gore-Tex™ or other water-resistant synthetics • Anything applied with or recently washed with: <ul style="list-style-type: none"> ○ Fabric softeners ○ Fabric protectors, including UV protection ○ Insect resistant chemicals ○ Water, dirt, and/or stain resistant chemicals 	<ul style="list-style-type: none"> • Powderless nitrile gloves • Well-laundered synthetic or 100% cotton clothing, with most recent launderings not using fabric softeners • Made of or with: <ul style="list-style-type: none"> ○ Polyurethane ○ Polyvinyl chloride (PVC) ○ Wax coated fabrics ○ Rubber/Neoprene ○ Uncoated Tyvek® 	<ul style="list-style-type: none"> • Latex gloves • Water and/or dirt resistant leather gloves • Any special gloves required by a QAPP • Tyvek® suits, clothing that contains Tyvek®, or coated Tyvek®

Food and Beverages

● Prohibited	■ Allowable
<ul style="list-style-type: none"> • No food should be consumed in the staging or sampling areas, including pre-packaged food or snacks. <ul style="list-style-type: none"> ■ If consuming food on-site becomes necessary, move to the staging area and remove PPE. After eating, wash hands thoroughly and put on new PPE. 	<ul style="list-style-type: none"> • Brought and consumed only outside the vicinity of the sampling area: <ul style="list-style-type: none"> ○ Bottled water ○ Hydration drinks (i.e., Gatorade®, Powerade®)

Personal Care Products (PCP) - for day of sample collection⁶

● Prohibited	■ Allowable	▲ Needs Screening ²
<ul style="list-style-type: none"> • Any PCPs⁶, sunscreen, and insect repellent applied in the sampling area. 	<p>PCPs⁶, sunscreens, and insect repellents applied in the staging area, away from sampling bottles and equipment followed by thoroughly washing hands:</p> <p>PCPs⁶:</p> <ul style="list-style-type: none"> • Cosmetics, deodorants/antiperspirants, moisturizers, hand creams, and other PCPs⁶ <p>Sunscreens:</p> <ul style="list-style-type: none"> • Banana Boat® for Men Triple Defense Continuous Spray Sunscreen SPF 30 • Banana Boat® Sport Performance Coolzone Broad Spectrum SPF 30 • Banana Boat® Sport Performance Sunscreen Lotion Broad Spectrum SPF 30 • Banana Boat® Sport Performance Sunscreen Stick SPF 50 • Coppertone® Sunscreen Lotion Ultra Guard Broad Spectrum SPF 50 • Coppertone® Sport High Performance AccuSpray Sunscreen SPF 30 • Coppertone® Sunscreen Stick Kids SPF 55 • L'Oréal® Silky Sheer Face Lotion 50 • Meijer® Clear Zinc Sunscreen Lotion Broad Spectrum SPF 50 • Meijer® Sunscreen Continuous Spray Broad Spectrum SPF 30 • Meijer® Clear Zinc Sunscreen Lotion Broad Spectrum SPF 15, 30 and 50 • Meijer® Wet Skin Kids Sunscreen Continuous Spray Broad Spectrum SPF 70 • Neutrogena® Beach Defense Water+Sun Barrier Lotion SPF 70 • Neutrogena® Beach Defense Water+Sun Barrier Spray Broad Spectrum SPF 30 • Neutrogena® Pure & Free Baby Sunscreen Broad Spectrum SPF 60+ 	<ul style="list-style-type: none"> • Products other than those listed as <ul style="list-style-type: none"> ■ Allowable

● - Prohibited ■ - Allowable ▲ - Needs Screening

	<ul style="list-style-type: none"> ● Neutrogena® UltraSheer Dry-Touch Sunscreen Broad Spectrum SPF 30 <p>Insect Repellents:</p> <ul style="list-style-type: none"> ● OFF® Deep Woods ● Sawyer® Permethrin 	
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¹ This table is not considered to be a complete listing of prohibited or allowable materials. All materials should be evaluated prior to use during sampling. The manufacturers of various products should be contacted in order to determine if PFAS was used in the production of any particular product.

² Equipment blank samples should be taken to verify these products are PFAS-free prior to use during sampling.

³ **For surface water foam samples:** LDPE storage bags may be used in the sampling of foam on surface waters. In this instance, it is allowable for the LDPE bag to come into direct contact with the sample media.

⁴ **For fish and other wildlife samples:** Depending on the project objectives, glass jars and aluminum foil might be used for PFAS sampling. PFAS has been found to bind to glass and if the sample is stored in a glass jar, a rinse of the jar is required during the sample analysis. PFAS are sometimes used as a protective layer for some aluminum foils. An equipment blank sample should be collected prior to any aluminum foil use.

⁵ Regular ice is recommended as there are concerns that chemical and blue ice may not cool and maintain the sample at or below 42.8°F (6°C) (as determined by EPA 40 CFR 136 – NPDES) during collection and through transit to the laboratory.

⁶ Based on evidence, avoidance of PCPs is considered to be precautionary because none have been documented as having cross-contaminated samples due to their use. However, if used, application of PCPs must be done at the staging area and away from sampling bottles and equipment, and hands must be thoroughly washed after the use of any PCPs prior to sampling.