

Oklahoma Department of Environmental Quality
Protocols for PFAS Sampling
Standard Operating Procedures

Surface Water Sampling SOP

July 2025



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DEQ PFAS Sampling Quick Reference Field Guide

1.0 General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. Due to the high water-solubility and persistence of most PFAS compounds, any surface water hydrologically connected to the target site is susceptible to contamination and should be sampled. PFAS can readily migrate to surface water from drains, stormwater runoff, or leaching to and from groundwater systems. This SOP is based on DEQ's research, USEPA method 537.1, and USEPA Method 1633A. The PFAS General Sampling Guidance should be referred to for what to include in a QAPP for PFAS sampling, information on cross-contamination, additional information on field clothing, and many other details. References for this SOP and the other associated PFAS SOPs can be found in the PFAS General Sampling Guidance document.

2.0 Field Clothing and PPE

Field clothing and other personal protective equipment (PPE) may consist of PFAS-containing materials, especially those advertised as water-resistant, water repellent, or stain-resistant. Refer to Tables 1-7 for general guidance regarding field clothing and PPE.

Sunscreen and biological protection, cosmetics, and skincare also require screening, and recommendations are provided in Tables 8-12. DEQ does not recommend the use of fragrances (e.g., perfumes, colognes) during PFAS sampling, because they can contain PFAS.

While PFAS-containing apparel and PPE should be avoided, the safety of samplers should never be compromised. Any deviation from DEQ's guidance should be recorded in the field notes.

3.0 Equipment

All equipment used during sample collection should be assessed for the presence of PFAS to eliminate or reduce the probability of cross-contamination. Refer to Table 14 for details on sampling containers that are and are not allowed. Internal components of sampling equipment that contain PFAS are acceptable if there is no direct contact with the surface water or the sample, but any equipment that comes into contact with the surface water should be PFAS-free. For surface water sampling, liner-less HDPE or polypropylene containers with HDPE or polypropylene lids are recommended for collection. Sampling container size may vary depending on which analytical laboratory method is used; refer to the Sampling Techniques and Collection Methods section for guidance.

Automated samplers used for surface water sampling, such as telescope/swing samplers, submersible devices (e.g., Kemmerer® and Van Dorn® bottles), or peristaltic pumps, are not recommended for PFAS sampling. Automated samplers typically consist of multiple components that may contain PFAS. If this equipment is necessary for depth-interval sampling, ensure that all the components (e.g., tubing, seals, cables) consist of HDPE, stainless steel, PVC, or silicone. Refer to Table 15 for a list of common sampling materials

which are allowed or prohibited. Food packaging can contain PFAS, so food packaging and products should be kept in a designated eating area as noted in Table 13.

4.0 Sampling Techniques and Collection Methods

The following section provides guidance for surface water sample collection for PFAS analysis. DEQ approves multiple surface water sampling techniques. The selected sampling technique may vary depending on what is most suitable for the sampling entity, selected laboratory, site characterization, and release type. USEPA Method 537.1 and USEPA Method 1633A are the acceptable laboratory analysis methods for surface water, and the differences in sampling methods are highlighted below. Sample preparations should be outlined in a site-specific sampling plan, such as a Sampling Analysis Plan (SAP).

Current research indicates PFAS concentrate in the air-water interface and in any foam/scum present on the surface of the water body (Costanza et al., 2019). Therefore, sampling the foam and/or surface microlayer of a water body will provide a different (generally higher) PFAS concentration than sampling deeper in a water body. The project-specific requirements will clarify whether the air-water interface or water body will be sampled.

USEPA Method 1633A Sampling Equipment: 500-mL HDPE sampling bottles with (HDPE or polypropylene) linerless screw caps will be provided by the laboratory.

USEPA Method 537.1 Sampling Equipment: 250-mL (polypropylene) sampling bottles and (polypropylene) linerless screw caps will be provided by the laboratory.

4.1 Direct Sampling

- Collect the samples in sequence from the locations expected or determined to be least contaminated to most contaminated.
- If collecting samples from a river or a stream, collect the samples from downstream to upstream.
- Submerge the sampling container with a screw cap secured. Open the sampling container underwater if avoiding surface film collection. Replace the screw-cap before bringing the sampling container to the surface.
- If using a preservative, gently agitate the sample to dissolve.
- Sample containers must remain sealed until time of sample collection. The sampling container cap should never be placed on any surfaces unless they are PFAS-free. The sampling container cap must never be placed directly on the ground.

4.2 Sampling with Submersible Equipment

- Collect the samples in sequence from the locations that are expected or determined to be least contaminated to most contaminated.
- If collecting samples from a river or a stream, collect the samples from downstream to upstream.
- Before sampling, decontaminate the sampling equipment per recommended guidance in the Decontamination section.
- Follow proper procedures (e.g., EPA SERAS SOP 2013 – Surface Water Sampling) when using submersible equipment, such as Kemmerer® bottles and Van Dorn® samplers.
- When filling the sampling container, do not place any tubes or other materials inside the bottle. Do not place the screw-cap on any surface. Wait to open the sampling container until ready to collect the sample. Sample containers must remain sealed until time of sample collection.
- If using a preservative, after closing the container, gently agitate the sample to dissolve.
- When collecting samples, either direct sampling when wearing waders or using submersible equipment from a boat, always sample upstream from self or boat.

If further information regarding each sampling technique is desired before sampling, please reference the respective USEPA method documents mentioned.

Note: The EPA SERAS SOP 2013 – Surface Water can be found on the EPA On-Scene Coordinator ERT Standard Operating Procedures webpage.

5.0 Decontamination

Refer to Table 17 for guidance on decontamination methods and materials which are allowed or prohibited while sampling. The following general decontamination principles for PFAS sampling should be followed:

- Sampling equipment must be decontaminated after sampling at each location and at the end of the workday.
- Wash hands with PFAS-free water and put on new nitrile gloves before decontamination.
- Decontaminate equipment with a triple rinse of verified PFAS-free water and remove particulates with a polyethylene or PVC brush.
- PFAS-free detergents such as Alconox®, Liquinox®, Luminox®, or Citranox® may be used.

- Dry equipment with a cotton cloth, untreated paper towels, or place decontaminated equipment on a PFAS-free surface to air-dry.

6.0 Quality Assurance / Quality Control

DEQ recommends following the Quality Assurance/Quality Control (QA/QC) Guidelines outlined in Section 5.0 of the General PFAS Sampling document to ensure project-specific Quality Assurance Project Plan (QAPP), Standard Operating Procedures (SOP), and Sampling Analysis Plan (SAP) consistency between sampling events. Additionally, the following guidelines should be followed for surface water-specific sampling events.

- Collect a rinsate/equipment blank at the rate of 1 per day per sampling team to ensure the sampling has not introduced PFAS cross-contamination to the sampling results. This process should be conducted on each piece of non-dedicated equipment. (Required)
- Laboratory sources of water used for equipment decontamination and blank sample collection should be certified as PFAS-free or addressed for background concentrations of PFAS. (Required)
- Collect field quality control samples such as duplicates at the rate of 1 per 10 samples, trip blanks at the rate of 1 per cooler per sampling team, and field blanks at the rate of 1 per day per sampling team to assist in evaluating soil sampling and handling activities at the investigation site. (Required)
- If possible, a control sample/background sample should be collected from an upstream portion of stream not affected by the possible contaminants of concern and submitted with the other sample(s).

Note: Duplicate samples must have a similar sample number to the other samples to disguise them from the laboratory. The field notes must indicate which sample numbers are duplicates and of which sample number they are a duplicate.

DEQ recognizes that EPA Methods 537, 537.1 V1, and 537.1 V2 have varying requirements for field QC samples as compared to DEQ's.

7.0 Documentation

Keep a sampling log during the sampling event. In the sample log, record the following:

- Date and time of sample collection
- Weather conditions
- Well location
- Sample point location
- Owner's Contact Information (if applicable)
- Sampling equipment
- Dissolved oxygen, temperature, specific conductivity, pH, oxygen reduction potential, and turbidity readings

- Duration of purge
- Duplicate sample(s)
- Visual description of samples
- Use of any unapproved PPE
- Other sampling specific (applicable) observations

Ensure documentation materials are PFAS-free; refer to Table 16. Pre-printed labels for sample containers are preferred.

8.0 Shipment

The following is recommended for sample shipment. Information is also provided in Table 18.

- Use regular ice, double-bagged, in place of chemical (blue) ice and maintain the temperature between +4°C and - 2°C in a cooler.
- Check the cooler periodically to ensure samples are well iced and at the proper temperature.
- The cooler should be taped closed with a custody seal.
- Double bag Chain of Custody and other applicable forms and tape to the inside of the cooler lid.
- Ship within 48 hours or per the holding time determined by the laboratory or the selected laboratory analysis method.

DEQ PFAS Sampling Quick Reference Field Guide

Table 1: Clothing ¹		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> Well laundered clothing (recommended six times prior to sampling) 100% cotton (preferred) Synthetic fabrics² Polyvinyl Chloride (PVC)² Polyurethane Uncoated Tyvek® clothing Wax-coated fabrics Rubber/Neoprene Expanded polyethylene (ePE) Gore-Tex³ 	<ul style="list-style-type: none"> New/unwashed clothing Clothing applied/washed with fabric softeners, fabric protectors including ultraviolet (UV) protection, water, dirt or stain-resistant chemicals, or insect-resistant chemicals Clothing containing Tyvek® Flame resistant (FR) clothing Clothing made of Gore-Tex³ (except ePE line of products) or other known PFAS containing materials. 	<ul style="list-style-type: none"> Tyvek® suits, clothing that contains Tyvek®, or coated Tyvek®

¹Clothing should be kept dust and fiber free.

²Some brands of PVC and synthetic clothing contain PFAS. Check clothing makers' websites to confirm that clothing is PFAS-free.

³Gore-Tex generally contains PFAS, but they do have a PFAS-free line of products containing ePE (expanded polyethylene).

Table 2: Boots		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> Polyurethane boots PVC boots PFAS-free boot covers¹ 	<ul style="list-style-type: none"> Gore-Tex® boots Boots made from water-resistant synthetics 	

¹Samplers must wash their hands with PFAS-free soap and water after putting on boot covers. Boot covers may only be removed in the staging area and after the sampling activities have been completed.

Table 3: Gloves		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> Powderless nitrile gloves¹ 	<ul style="list-style-type: none"> Gore-Tex gloves Any glove made with PFAS-containing materials. 	<ul style="list-style-type: none"> Latex gloves Water and dirt-resistant leather gloves Any special gloves required by a Health and Safety Plan (HASP).

¹Samplers must wash their hands with PFAS-free soap and water before putting on any gloves.

Table 4: PPE ¹		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> Hard hats made of HDPE Hard hat covers/liners (i.e. Head Gaiters) made of cotton or other natural fabric Safety glasses made of HDPE Life jackets made of polyethylene foam and nylon shell fabric Waders made of Neoprene or other PFAS-free material 	<ul style="list-style-type: none"> Waders made of Gore-Tex or other known PFAS containing materials 	<ul style="list-style-type: none"> Hard hats or safety glasses not made of HDPE

¹PPE should be kept dust and fiber free.

Table 5: Suggested Field Clothing and PPE Brand and Product Names	
• Men's L.L.Bean® Upcountry Waxed-Cotton Down Jacket	
• Women's L.L.Bean® Upcountry Waxed-Cotton Down Vest	
• Adults' L.L. Bean® Wool-Lined Waxed-Cotton Fowler's Cap	
• Men's L.L.Bean® Upcountry Waxed-Cotton Down Vest	
• ALPKIT Jura Mountain Smock Men's Jacket	
• ALPKIT Balance Women's Jacket	
• Maier Sports® FOIDIT M Outdoor Men's Pants	
• Men's L.L. Bean® Waxed-Canvas Maine Hunting Shoes	
• Women's L.L. Bean® Signature Waxed-Canvas Maine Hunting Shoes	
• Adults' L.L. Bean® Waxed-Cotton Chopper Mittens	
• Big Agnes® Men's Zetto Jacket	

Note: Perfluorochemicals (PFC) was the widely used designation for PFAS. While PFAS is currently the accepted nomenclature, some brands and research articles still use the term PFC.

Table 6: Brand Names Utilizing DownTek™ PFC-Free Water Repellent Down	
• ALPKIT LTD®	• L.L. Bean®
• Big Agnes®	• Kathmandu®
• Cotopaxi™	• Maier Sports®
• DynaFit®	• Patagonia®
• Fjallraven™	• Salewa®
• Gordini™	• Sync®
• Jottnar™	• Zajo®

Table 7: Prohibited Water-Resistant Field Clothing and PPE Brand and Product Names	
• Ultra Release Teflon®	• Release Teflon®
• Repel Teflon® Fabric Protector	• High-Performance Release Teflon®
• High-Performance Repel Teflon® Fabric Protector	• Advanced Dual Action Teflon® Fabric Protector
• NK Guard® S Series	• GreenShield®
• Tri-Effects Teflon® Fabric Protector	• Lurotex Protector RL ECO®
• Oleophobol CP®	• Repellan KFC®
• Rucostar® EEE6	• Unidyne™
• Bionic Finish®	• RUCO-GUARD®
• RUCOSTAR®	• RUCO-COAT®
• RUCO-PROTECT®	• RUCOTEC®
• RUCO®	• Resist Spills™
• Resists Spills and Releases Stains™	• Scotchgard™ Fabric Protector
• GoreTex® ¹	

Table 8: Sun Protection ¹		
Allowed	Not Allowed	Needs Additional Research
• Approved Sunscreens (See Table 10) ¹	• No unauthorized sunscreen	• Baby sunscreens that are “free” or “natural.”

¹Approved sunscreens must not be applied near the sample collection area. Hands must be well washed with PFAS-free soap and water after application or handling of these products, and afterwards; an uncontaminated clean/new pair of powderless nitrile gloves should be worn.

Table 9: Insect Protection ¹		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> • OFF® Deep Woods • Sawyer® Permethrin 	<ul style="list-style-type: none"> • No unauthorized insect protection 	

¹Approved insect repellents must not be applied near the sample collection area. Hands must be well washed with PFAS-free soap and water after application or handling of these products, and afterwards; an uncontaminated clean/new pair of powderless nitrile gloves should be worn.

Table 10: Allowed/Approved Sunscreens ¹
• 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 SPF 50+
• Meijer® Sunscreen Lotion Broad Spectrum SPF 30
• 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+
• Neutrogena® UltraSheer Dry-Touch Sunscreen Broad Spectrum SPF 30

¹Baby sunscreens that are "free" or "natural" are not guaranteed PFAS-free and need additional research.

Table 11: Approved Personal Care Products (Cosmetics and Skincare) ¹
• Credo (all products)
• Sephora (Clean at Sephora Products)
• Annmarie Skin Care (all products)
• California Baby (all products)
• Crunchi (all products)
• Fluency Beauty (all products)
• H&M (all store brand products)
• Hydropeptide (all products)
• Mi Coco es su Coco (all products)
• Otter Wax (all body and skincare products)
• Reed + Gwen (all personal care products)
• Whole Foods Market (all products)
• X'Factor Skincare By Pharmacists (all products)

*Source: Green Science Policy Institute, 2025

¹If Personal Care Products are used, the sampler must apply these products away from the staging area, sampling bottles, and equipment, and hands shall be thoroughly washed with PFAS-free soap and water after use and before a sampling event. The sampler must also put on a fresh pair of powderless nitrile gloves before sampling.

Table 12: Approved Personal Care Products (Floss) ¹	
• Coco Floss (all products)	• Radius Floss (All Products)
• Dental Lace (all products)	• Rite-Aid (Premium Waxed Mint)
• Dr. Tung's (Smart Floss and Activated Charcoal Floss)	• Tom's of Maine (Anti plaque Spearmint)
• Desert Essence (tea tree oil dental tape)	• Hello Products (all floss)
• Johnson & Johnson Listerine Cool Mint Reach Mint Waxed Reach Waxed Unflavored Reach Clean Paste Icy Mint Woven	• Oral-B Satin Floss Mint

*Source: Green Science Policy Institute, 2025

¹If Personal Care Products are used, the sampler must apply these products away from the staging area, sampling bottles, and equipment, and hands shall be thoroughly washed with PFAS-free soap and water after use and before a sampling event. The sampler must also put on a fresh pair of powderless nitrile gloves before sampling.

Table 13: Food Containers ¹		
Allowed	Not Allowed	Needs Additional Research
• Food packaging and products in a designated eating area set up for food and beverage consumption	• Food packaging and products in the staging or sampling areas	• Bringing foods rewrapped in PFAS-free materials

¹After coming into contact with food packaging, samplers must wash their hands with PFAS-free soap and water and put on a fresh pair of powderless nitrile gloves at the staging area before returning to the sampling area.

Table 14: Sampling Containers ²		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> • HDPE also known as polyethylene high-density (PEHD) • Polypropylene • Stainless Steel • Unlined bottle caps • Low-density polyethylene (LDPE) resealable bags (Ziplock) that will not come in contact with the sample media 	<ul style="list-style-type: none"> • Polytetrafluoroethylene (PTFE) lined bottles or caps (i.e. Teflon® and Hostafion®) • LDPE containers that will contact the sample media • Aluminum foil is not to be used due to the possibility of it being coated with PFAS. Utilize an alternative sample preparation and storage material. 	<ul style="list-style-type: none"> • Glass bottles and containers¹

¹Glass 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 an extended period of time (e.g., 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. Generally, glass bottles or containers should not be used for PFAS samples.

²Sampling containers must remain sealed until point of sample collection. The sampling container cap should never be placed on any surface unless it is PFAS-free. The sampling container cap must never be placed directly on the ground.

Table 15: Sampling Equipment		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> • HDPE (also PEHD) • Polypropylene • Stainless Steel • Acetate • Silicone 	<ul style="list-style-type: none"> • Polytetrafluoroethylene (PTFE) • Polyvinylidene fluoride (PVDF) • Polychlorotrifluoroethylene (PCTFE) • Ethylene-tetrafluoroethylene (ETFE) • Low-density polyethylene (LDPE) which will contact the sample media • Fluorinated ethylene-propylene (FEP) 	<ul style="list-style-type: none"> • Glass equipment

Table 16: Field Materials ¹		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> Aluminum, polypropylene, or Masonite field clipboards Rite in the Rain® notebooks Loose paper (non-waterproof, non-recycled) Ballpoint pens and pencils Interface Meters (a.k.a. oil and water interface probes, depth to water gauges) that are made with PFAS-free materials 	<ul style="list-style-type: none"> Clipboards coated with PFAS-containing materials Notebooks made with PFAS treated paper PFAS treated loose paper Post-It® Notes or other adhesive paper products Sharpie® markers Coated materials, including paper towels Aluminum foil is not to be used due to the possibility of it being coated with PFAS. Utilize an alternative sample preparation and storage material. Interface Meters (a.k.a. oil and water interface probes, depth to water gauges) that are made with PFAS-containing materials 	<ul style="list-style-type: none"> Plastic clipboards, binders, or spiral hardcover notebooks Waterproof field books All markers not listed as allowable

¹Field vehicles may have seats treated with stain-resistant products and could represent a source of cross-contamination. If possible, cover treated vehicle seats with a well-laundered cotton blanket or sheet. Never handle sample containers on the vehicle seats. Always change gloves after exiting a field vehicle.

Table 17: Decontamination Procedures ¹		
Allowed	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> Alconox®, Liquinox®, Luminox®, or Citranox® Triple rinse with PFAS-free water¹ Cotton cloth or untreated paper towels Polyethylene or PVC brush to remove particulates 	<ul style="list-style-type: none"> Decon 90® PFAS treated paper towels Reusing non-dedicated equipment without decontaminating 	<ul style="list-style-type: none"> Municipal water¹

¹Decontamination procedures should include decontaminating equipment with an allowed detergent and triple rinsing with PFAS-free water for equipment such as dippers, balers, spades, etc. Laboratory supplied PFAS-free deionized water is preferred for cleaning and decontamination. However, commercially available deionized water may be used for cleaning and decontamination if the water is verified to be PFAS-free. Municipal drinking water may be used for cleaning or decontamination if the water is known to be PFAS-free. Non-dedicated sampling equipment must be cleaned and decontaminated before each use.

Table 18: Sample Shipment		
Allowed/Required	Not Allowed	Needs Additional Research
<ul style="list-style-type: none"> Coolers filled with regular ice Maintaining sample temperature between +4°C and -2°C Double-bagging of samples and ice using bag materials made of HDPE (preferred) or LDPE (if sample does not come in contact) Chain of Custody and other forms should be single bagged in LDPE (e.g. Ziploc®) storage bags and taped to the inside of the cooler lid. 	<ul style="list-style-type: none"> Aluminum foil is not to be used due to the possibility of it being coated with PFAS. Utilize an alternative sample preparation and storage material. Chemical (blue) ice packs 	<ul style="list-style-type: none"> Chemical (blue) ice packs that are verified PFAS free