

PFAS Sampling Guidance 2019 ACI-NA Airports@Work

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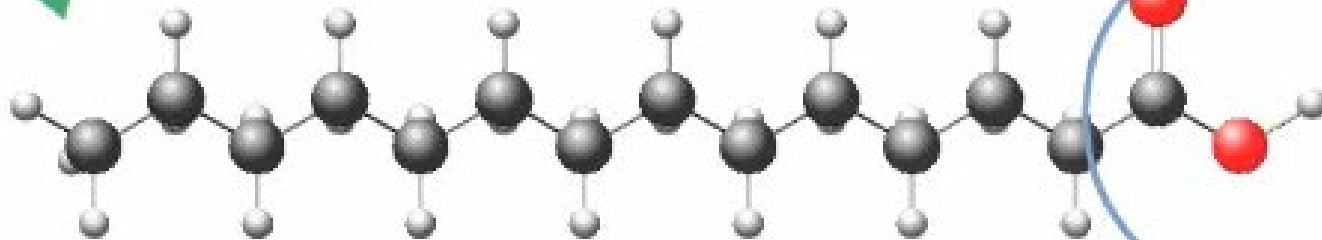
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Per- and Poly-Fluoroalkyl Substances (PFAS)

- Large group of related fluorinated organic chemicals
- PFAS contain chains of carbon-fluorine bonds
 - Perfluorinated tail 2-16 carbon atoms
 - Functional group head
- The **C-F** bond is the shortest and strongest in chemistry

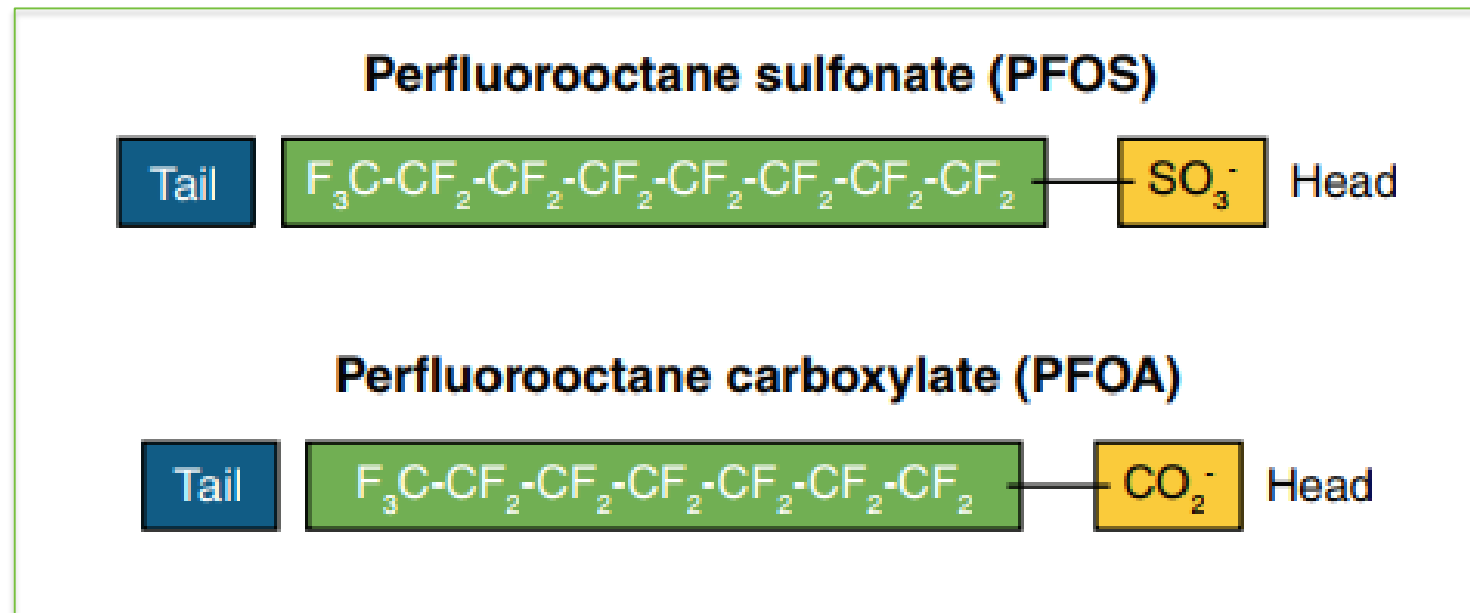
Alkyl chain (of C-F atoms), typically 2 to 16 carbon atoms

Functional Group
(e.g., carboxylate,
sulfonate)



PFOS and PFOA

- Most extensively produced and studied of the PFAS chemicals
- “Long-chain” 6 or more perfluorinated carbons
- EPA Drinking Water Health Advisory 70 ppt



Data Quality Objective Process

Systematic planning process for generating environmental data sufficient for their intended use

- Project Planning
 - Problem statement and Work Plan Development
 - Who should participate in the planning?
 - What social/political issues have an impact on the planning?
 - Resources
- Objective of PFAS sampling
 - What data do you need?
 - Why do need it?
 - How will you use it?
- Appropriate types of data to collect
 - Decision rules
- Tolerable levels of potential errors

Potential PFAS Sampling Matrices

- Liquid Matrices
 - Groundwater
 - Drinking water wells
 - Monitoring wells
 - Chlorinated Public Drinking water
 - Wastewater
 - Landfill Leachate
 - Surface water
 - Pore water
- Aqueous Film Forming Foam: AFFF
 - Concentrate & solutions
- Solid Matrices
 - Soil
 - Sediment
 - Biosolids
 - Biological Tissue
 - Fruit/Vegetables
 - Fish/animals
 - Concrete/demolition debris
- Air – *in development*
 - Currently regulated PFAS are not volatile, however, volatile PFAS (e.g., fluorotelomer alcohols) can be present in the environment. Sampling matrices are included here when volatile PFAS sampling is needed

PFAS Analytical Methods

537.1 v1.0 = PFAS Analyte List for Drinking Water 18 compounds - (Note analyte lists are evolving)

Analyte	Acronym	(CASRN)*
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	—
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	—
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorononanoic acid	PFNA	375-95-1
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorotetradecanoic acid	PFTA	376-06-7
Perfluorotridecanoic acid	PFTTrDA	72629-94-8
Perfluoroundecanoic acid	PFUnA	2058-94-8
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
4,8-dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4

*-Chemical Abstract Services Registry Number

Action Levels – Remedial Limits

- EPA – Health Advisory Level 70 ppt (total PFOS & PFOA)
- Several states have established groundwater and drinking water guidelines
- Additional states are considering similar actions
- Multi-media cleanup standards in development

EPA State Resources

<https://www.epa.gov/pfas/us-state-resources-about-pfas>

Water Quality Association Database

https://www.wqa.org/Portals/0/Government%20Relations/Fact%20Sheets/PFCs_PFASs_Chart.xlsx

Laboratory Selection

- Accreditation for PFAS Method
 - U.S. Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP)
 - American Association for Laboratory Accreditation (A2LA)
 - Perry Johnson Laboratory Accreditation, Inc. (PJLA)
 - ANSI-ASQ National Accreditation Board (ANAB)
 - Laboratory Accreditation Bureau (L-A-B)
- Check out their website
- Call them and talk about their capabilities
- Laboratory must provide “proofed” PFAS-free water and bottleware
- Be wary of low cost

QAQC Sample Collection

Using blanks to evaluate composition or suitable nature of equipment/supplies for sampling, and to assess possibility of cross-contamination during sampling/transport/storage

- **Pre-investigation equipment blanks** (decontamination water, new equipment, anything you are unsure of.)
- **Equipment blanks** to assess adequacy of decontamination process and evaluate potential cross-contamination from equipment.
- **Field blanks*** to assess contamination from field conditions.
Recommended frequency: one blank/day/matrix or one blank/20 samples/matrix, whichever more frequent.
- **Trip blank*** to assess cross-contamination introduced from during shipping procedures (1 per cooler).

**- Depending on client and laboratory contract additional planning may be required regarding blank creation, shipping and analysis.*

Preventing Cross-Contamination

Appropriate Materials and Good Housekeeping

Items in Direct Contact with the Sample Matrix

Pumps

Tubing

Sampling Equipment

Drilling Equipment

Drilling Fluids

Well Construction Materials

Hydrogeological Testing

In-situ treatment

Items with Potential for Contact with Sample Matrix.

PPE

Personal Hygiene Products

Clothing

Items used in coolers for transporting samples

Sampling Equipment Considerations

Do Not Use / Avoid	Acceptable Alternatives
Teflon™/PTFE bailers or fluoropolymer pump bladders	Disposable Equipment Or Dedicated Equipment (w/ no PTFE parts)
Teflon™/PTFE tubing, valves and other parts in pumps	High-density polypropylene, high-density polyethylene (HDPE) and silicone materials (i.e. tubing)
LDPE HydraSleeves and PDBs	HDPE HydraSleeves and passive diffusion bags (PDBs)
Glass containers (due to potential loss of analyte through adsorption)	Polypropylene or HDPE sample bottles fitted with an unlined (no PTFE), polypropylene or HDPE screw cap
“Blue Ice” or Chemical Ice Packs	“Wet” or “Water” Ice should only be used for sample preservation (when needed)

General Housekeeping Practices

Good practices

- Utilize good safety planning and institute Exclusion Zones, Contamination Reduction Zones, and Support Zones (No visitors within 30 feet of sampling)
- Do not eat in or near sampling areas (food packaging may contain PFAS)
- Be vigilant about PPE donning and doffing practices
- Wash hands before and after eating
- Wear powderless nitrile gloves and change them frequently
- Only open sample container during sample collection and never set the sample container lid down
- Keep hands away from the container opening when sampling and keep lid protected

Avoid

- **PTFE, LDPE**, sticky notes, waterproof field books, aluminum foil
- Avoid use of markers, if possible, during sampling use only regular ink pens. If needed, write over regular ink with marker after the sample containers are sealed.

Selection of Personal Protection Products

Safe to use

- Synthetic or natural fibers, well laundered, cotton coveralls, PVC
- Clothing material alternatives, layering with disposable non-water repellent products
- New clothing should be washed at least 6x prior to use in the field with no fabric softening dryer sheets
- Older clothing just needs to be washed and dried w/o the dryer sheets

Avoid

- Water-repellent textiles, GoreTex®, stain-resistant clothing
- Tyvek suits and clothing that contain Tyvek
- Insect repellent, sun screen, personal care products

Other Considerations

- IDW Management
 - Disposal requirements for PFAS contaminated materials is evolving – Hazardous Waste
- Filtering of Water Samples
 - Evidence that PFOS may sorb onto glass fiber filters (avoid glass fiber filters)
 - Filtered/unfiltered data may be misinterpreted as PFAS sorbed to soil or sediment in the water sample when the reduction may actually reflect PFAS sorbed onto the glass fiber filter
 - Consider use of low-flow sampling or use of a centrifuge in the lab
- Field screening technologies
 - Field screening technologies are being developed by a number of different research facilities and may be useful option in the future

Aqueous Film-Forming Foam (AFFF) Solution/Concentrate Sampling

- Collect representative samples of the AFFF concentrate stored in the vessel
 - Circulate the contents of the tank for 5-7 minutes
 - Collect multiple samples
- Notify the laboratory ahead of time – a high dilution rate will be required
- No ice is required for sample transport due to the stability of high concentration AFFF



Resources:

Per-and Polyfluoroalkyl Substances (PFAS) Field Sampling Guidance, Transport Canada (2017)

ACRP Research Report 173 - Use and Potential Impacts of AFFF Containing PFASs at Airports (2017)

EPA Technical Brief PFAS Methods and Guidance for Sampling and Analyzing Water and Other Environmental Media (Feb 2019)

