

Forever chemicals: An overview of PFAS monitoring projects by the USGS in Pennsylvania

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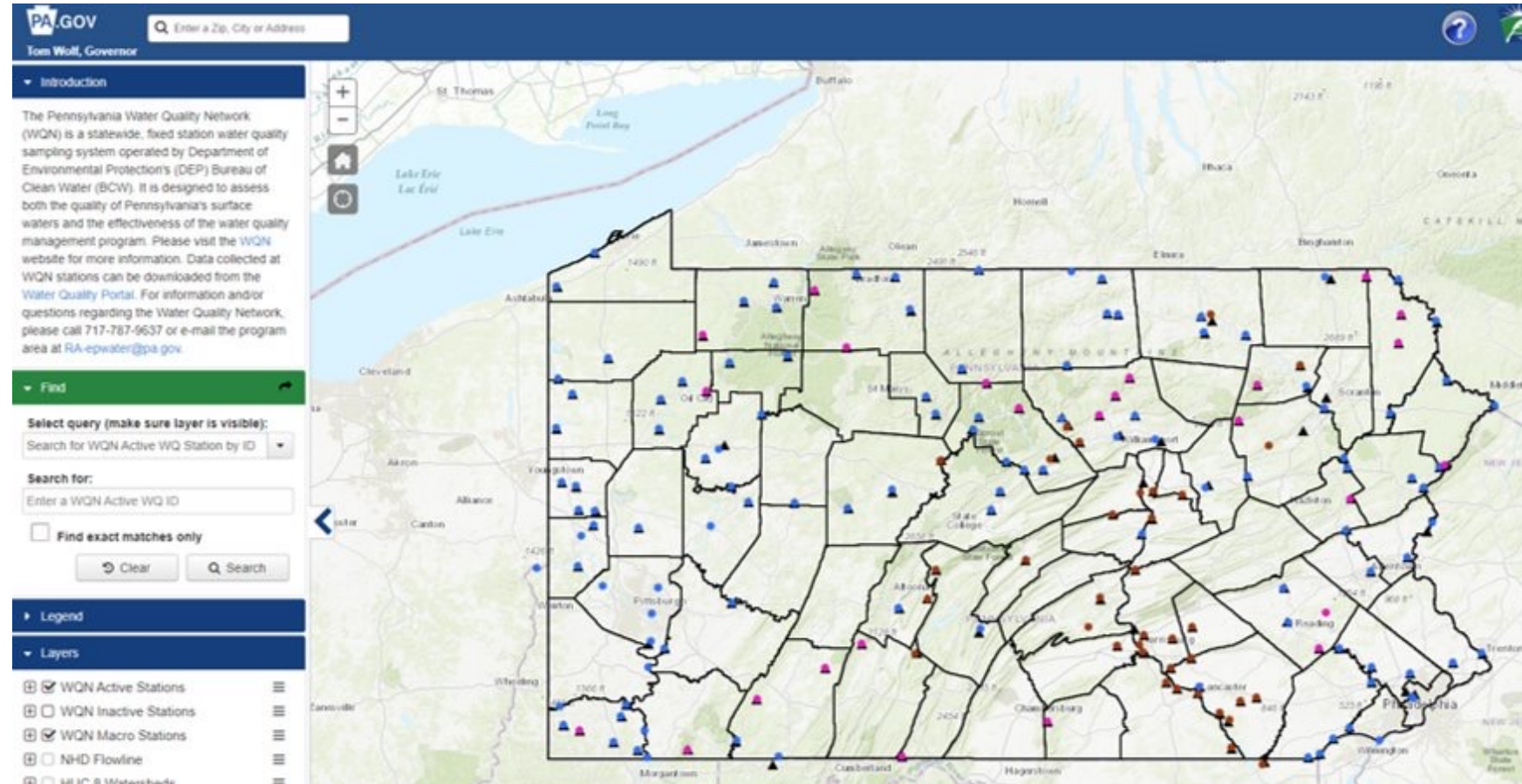
USGS Pennsylvania Water Science Center

Pittsburgh Field Office

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Pennsylvania- Water Quality Network

- Operated by PA Department of Environmental Protection (DEP)
- Bureau of Clean Water
- 178 stations state-wide
- Encompass major drainage basins
- USGS provides sampling expertise for ~130 sites each year
- Includes many parameters: nutrients, metals, **PFAS**, and more.



Per- and Polyfluoroalkyl Substances (PFAS)

- Discovery in the 1930's
- Production started in the 1950's
- >4000 chemicals
- Fluorinated
- Strong C-F bonds

PFAS Emergence Timeline Image from ITRC- <https://pfas-1.itrcweb.org>

		1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s	2020s
Production		Synthesis / Development									
		Manufacturing and Commercial Production								Phase-outs / Reductions / Alternatives	
Health & Environment							Health Concerns				
										Environmental Detection & Analytical Improvements	

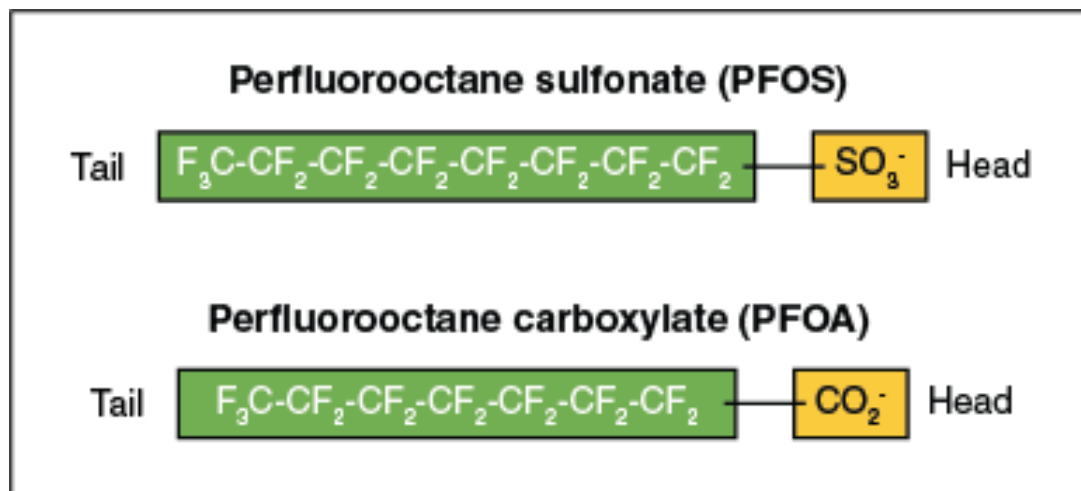
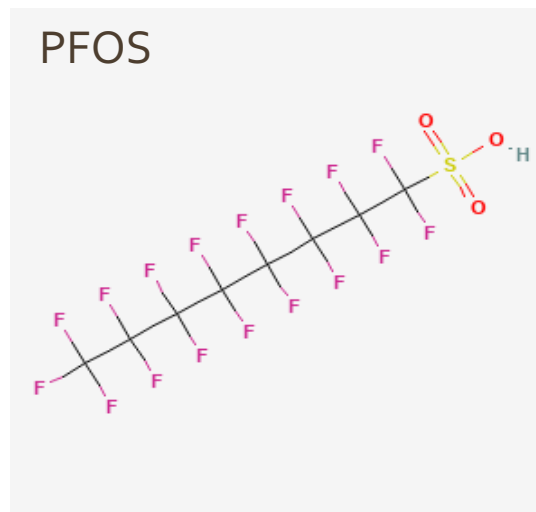
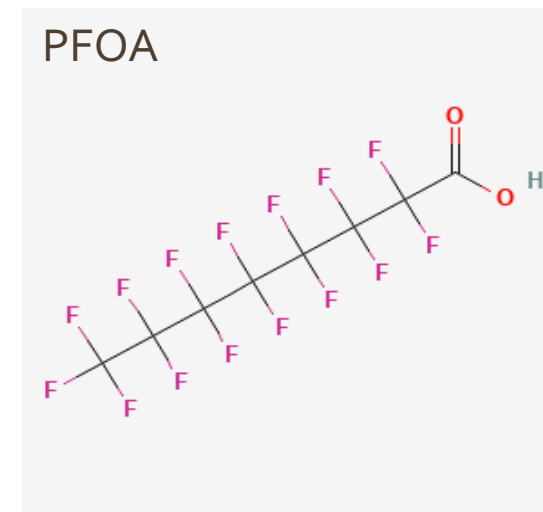


Image from ITRC- <https://pfas-1.itrcweb.org>

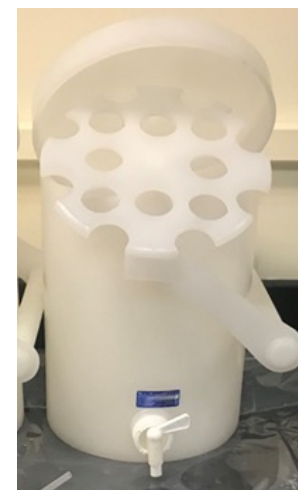
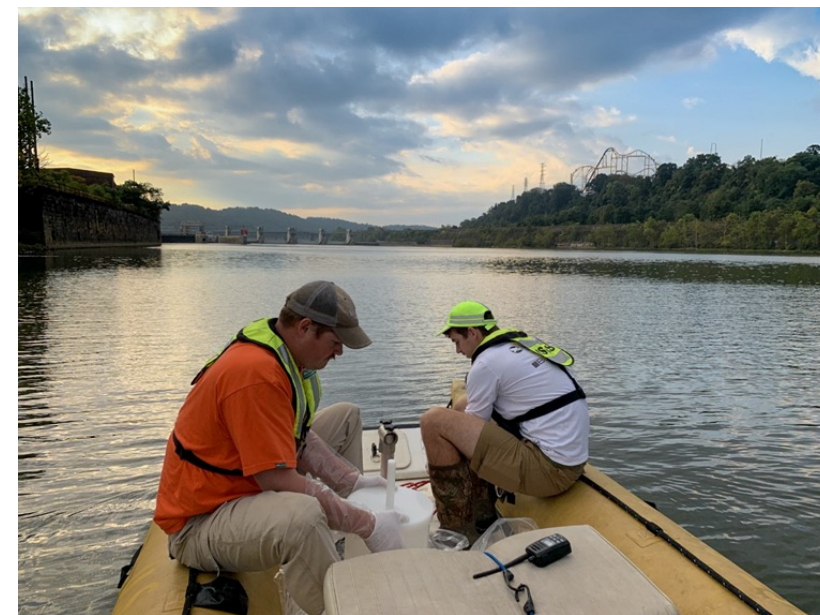


Images from PubChem- <https://pubchem.ncbi.nlm.nih.gov>



Sampling Protocols

- Wading, boat, bridge
- Use poly (HDPE) equipment (cleaned according to PFAS cleaning process) and appropriate sampler (USGS National Field Manual)
- Collect proper number of sections across stream
- Composite in a poly (HDPE) churn splitter
- Dispense water into lab provided PFAS bottles



PAWSC PFAS Monthly Trend Sampling

- Interested in long-term trends (5 yrs) and seasonality
- 2021 focus on 20 selected sites being sampled
- 2022 reduced to 16 sites
- Sites distributed across PA

General Questions:

(season scale, year scale, within site, between sites)

Do we see concentration differences?

Do we see mass differences?

Do we see differences in types of compounds detected?

Any other factors that could affect our understanding?

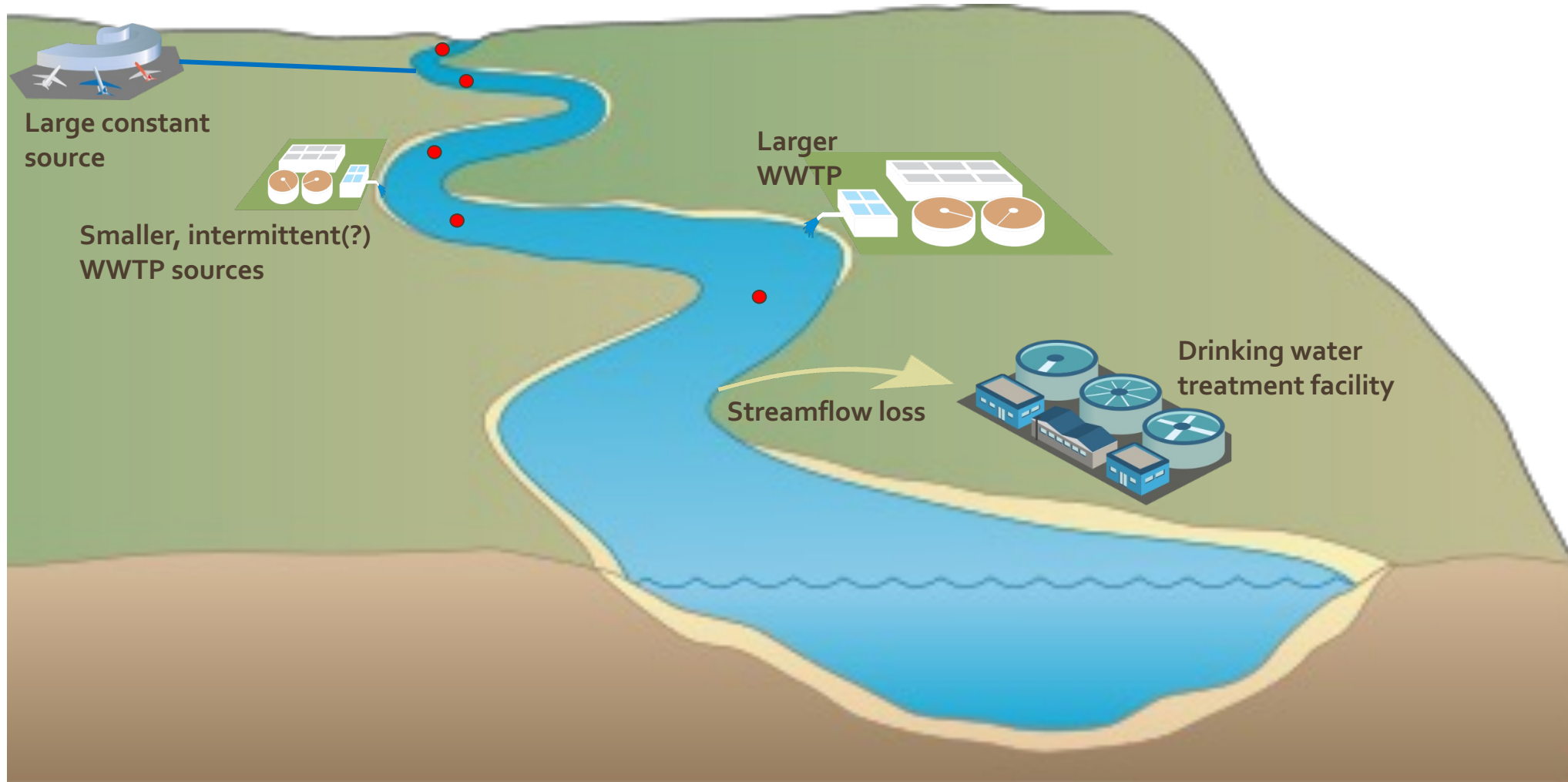


Photographer: Natalie Schmer (USGS)

River Continuum Sampling

- November 2021
- Follow same bolus of water

- Sampling locations upstream and downstream of sources
 - PFAS and other chemical data (pharmaceuticals, ions, organic carbon, and more)
 - Measured discharge of stream to capture mass



PFAS in Natural Foam Study- Delaware River Basin

- Foams can act as a natural sink for PFAS
- Compare PFAS concentrations in stream to PFAS concentrations in foam
- Three different basins in PA
- Year 1 sampling done- Neshaminy Creek Basin

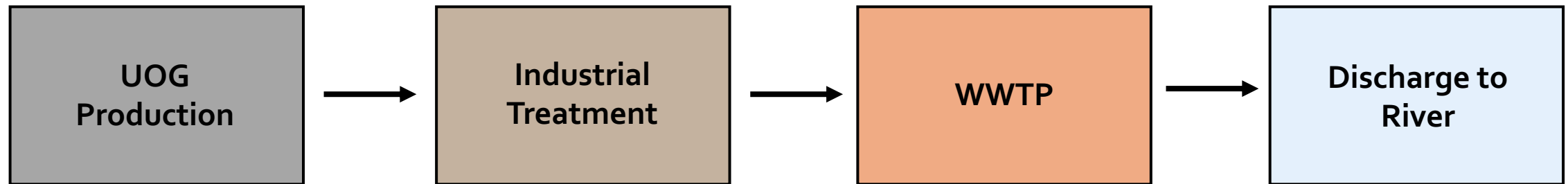


	Approximate Thickness	PFAS Concentration Relative to Water
Air		<water, unless volatile PFAS present
Natural Foam (NF)	Varies by condition	100-1000x water
Surface Microlayer (SML)	~50 uM	Hypothesized Long-Chain Enrichment
Neuston Layer (part of water column)	~1-1000 uM	Unknown
Water Column	Varies by condition	100-1,000 ng/L
Sediment	~0-30 cm	1-100x water (sediment dependent)

Not to scale

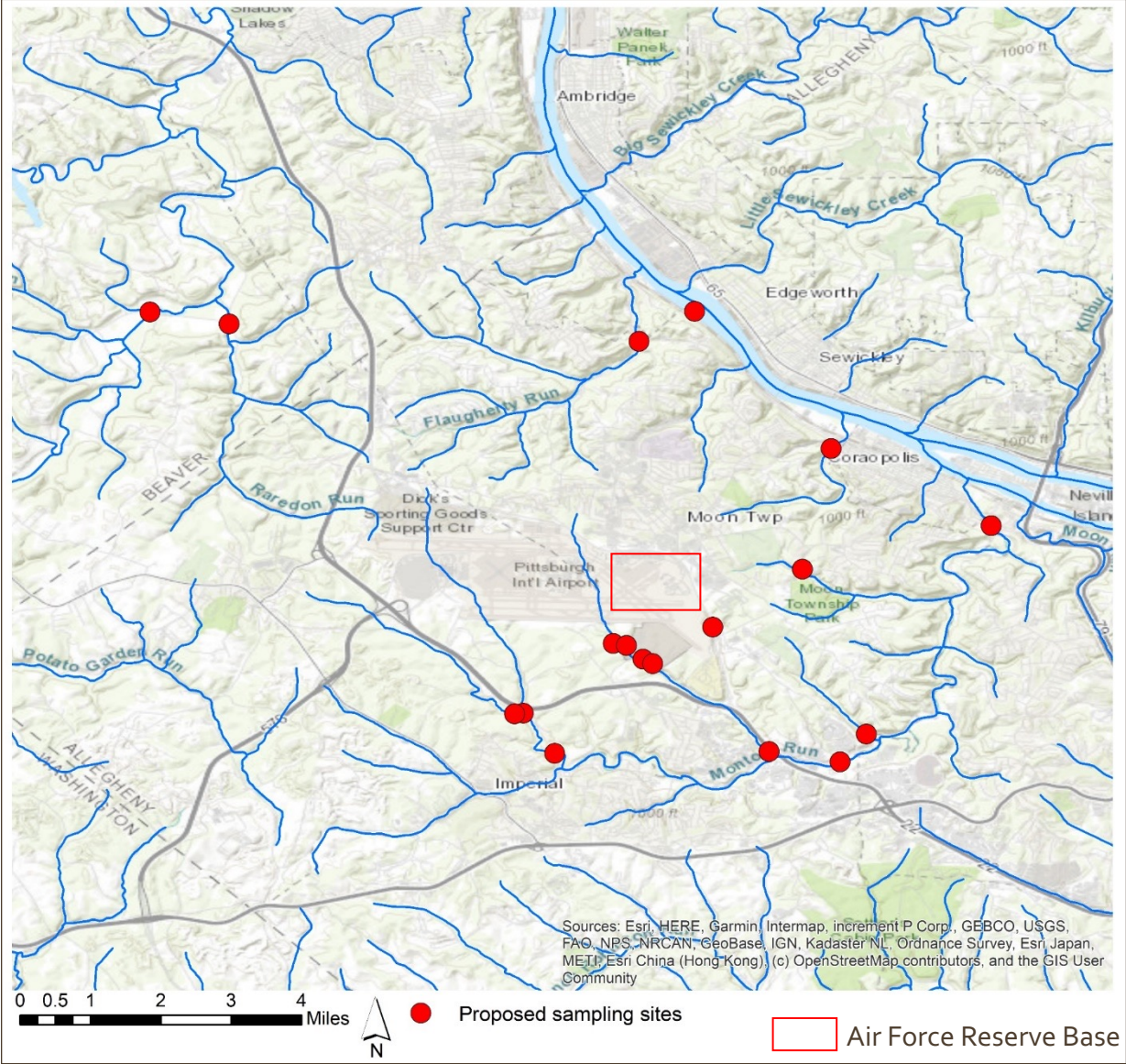
PFAS from Unconventional Oil & Gas Waste (UOG)

- UOG waste is known to contain PFAS
- Preliminary investigation will sample 3-5 locations known to accept UOG waste
- Up to 2 control sites
- Will sample upstream and downstream of WWTP
- Samples collected quarterly
- Work to begin Fall 2022



Pittsburgh Air Force Base Study

- 18 sites surrounding Pittsburgh Air Force Base
- Starting Spring 2023
- Air National Guard, Pittsburgh International Airport, and off-base fire-training area nearby
- Full gage installations at two sites
- PFAS, TOP, nutrients, major ions, glycols



Data Release- PA Statewide 2019 PFAS Data

<https://www.sciencebase.gov/catalog/item/5e4d5e72e4boff554f6d146b>

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Per-and Polyfluorinated Alkyl Substances (PFAS) and associated ancillary data from the Commonwealth of Pennsylvania, USA, 2019 View

Dates

Publication Date : 2021-03-12
Start Date : 2019-09-03
End Date : 2019-09-26

Citation

Duris, J.W., Eicholtz, L.W., Williams, A., and Shull, D., 2021, Per-and Polyfluorinated Alkyl Substances (PFAS) and associated ancillary data from the Commonwealth of Pennsylvania, USA, 2019: U.S. Geological Survey data release, <https://doi.org/10.5066/P9L4AHN2>.

Summary

The USGS Pennsylvania Water Science Center (USGS PAWSC) in cooperation with the Pennsylvania Department of Environmental Protection (PADEP) has assembled this data release in support of ongoing USGS and PADEP evaluations related to the occurrence and distribution of Per-and Polyfluorinated Alkyl Substances (PFAS) within Pennsylvania surface water.

The data is of four general types:

1. Discrete sample (one moment in time) PFAS concentration data from untreated surface water (raw stream and raw lake water) intended to describe environmental occurrence and distribution of PFAS, not to assess risk in drinking water;
2. Quality-control (QC) PFAS data from samples intended to evaluate the effectiveness and reliability of PFAS data collection from surface water;
3. Passive sampler (time weighted average) PFAS concentration data intended to describe a monthly average of PFAS concentrations at a single site, and finally;
4. Site locations and characteristics for each sampling site within the Pennsylvania Surface Water Quality Network (WQN) information that is presented for future interpretations of this data.

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Contacts

Map »



Communities

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Tags

Categories : Data
Harvest Set : USGS Science Data Catalog (SDC)
Theme : Environmental Health, Hydrogeology, Surface Water Quality, Water Resources
Place : Pennsylvania
USGS Scientific Topic Keyword : Environmental Health, Water Quality, Water Resources

Provenance

