



# PFAS Overview and Implications for Private Wells in Connecticut

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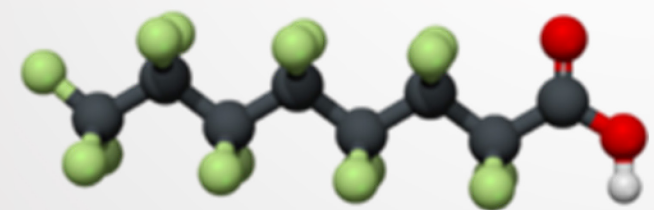
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CT Private Well Conference  
April 23, 2019

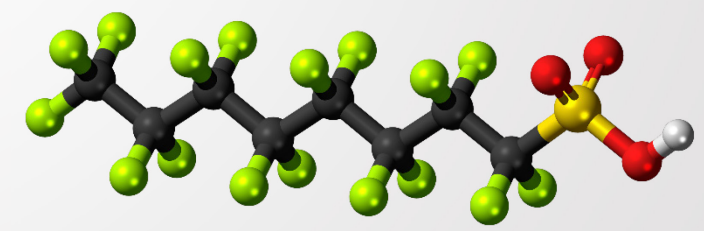


# Overview

- What are PFAS anyway, and why should we care?
- What is EPA doing about PFAS?
- What is CT doing about PFAS?
- PFAS and Private Wells
- Potable Water Sampling for PFAS
- Treatment Methods



PFOA



PFOS

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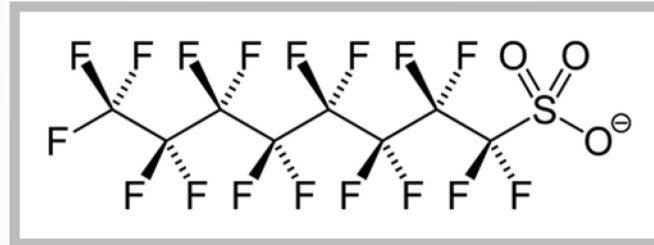


# PFAS Basic Chemistry

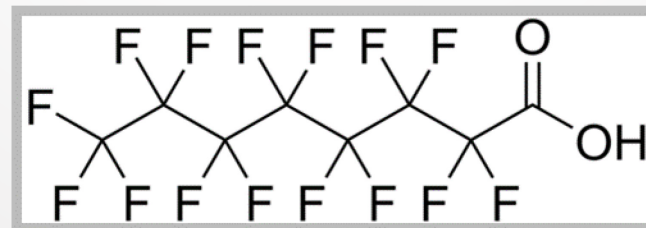
PFAS = Per- and Polyfluorinated Alkyl Substances

**Over 4,700 chemicals!**

➤ PFOS = Perfluorooctane Sulfonate



➤ PFOA = Perfluorooctanoic Acid



**Poly = some F atoms replaced by Hydrogen**



Image Sources: Bing Creative Commons



# PFAS Characteristics

- Repel oil, grease, water, heat

- Stable

BUT....

- Extremely persistent – resists degradation

- Bioaccumulative

- Toxic

- Migrate easily

  - High solubility, low volatility, mobile in soil, leach to groundwater

  - Air emissions a source of soil & groundwater pollution



Image Sources: Bing Creative Commons



# Some PFAS Uses



Image sources: Bing Creative Commons



# Places Where We Might Find PFAS



Image sources: Bing Creative Commons



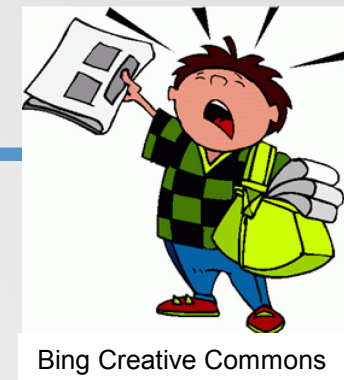
# Aqueous Film-Forming Foam (AFFF)



Image sources: Bing Creative Commons



# Why Should We Care?



- Possible Health effects
  - Developmental effects to fetuses and infants
  - Kidney and testicular cancer
  - Liver, thyroid, cholesterol, immune system effects
- Present in human blood – Worldwide
- Polluted drinking water supplies - Nationwide
- Discovery in waste water treatment plants, biosolids, landfills, soil, surface water, fish tissue, and plants
- Replacement chemicals also a problem (GenX)





# EPA Actions Related to PFAS

- Beginning in 2000 - Phase out of PFOA and PFOS
- 2013-2015 – Third Unregulated Contaminant Monitoring Rule (UCMR3)
  - Nationwide testing of large public water systems for 6 PFAS
  - 1.3% of all public water systems had PFOA + PFOS > 70 ppt
- 2014 - Added fish tissue monitoring to survey of urban rivers
- May 2016 - Lifetime Health Advisory for **PFOA + PFOS** in Drinking Water
  - **70 nanograms per liter (ng/L) or parts per trillion (ppt)**
  - **BUT... NO MCL**
- Developing new lab methods – now only for drinking water



# PFAS National Leadership Summit – May 2018



- ▶ DEEP and DPH attended
- ▶ 4 Step Action Plan
  1. Evaluating need for Maximum Contaminant Level (MCL) for PFOA and PFOS
  2. Evaluating designation of PFOA/PFOS as “hazardous substances” under existing authorities (CERCLA, RCRA)
  3. Developing groundwater cleanup recommendations for PFOA/PFOS at contaminated sites
  4. Developing toxicity values for GenX and PFBS (draft Toxicity Assessments, Nov. 2018, now in public comment)
- ▶ Regional listening sessions held in late 2018



# National PFAS Action Plan - February 2019 – Highlights



- Propose regulatory determination for PFOA/PFOS by end of 2019 (MCL process)
- Move forward with listing as “hazardous substance” under CERCLA
- Develop interim groundwater cleanup standards
- Consider use reporting on Toxics Release Inventory
- Continued new chemical review under Toxic Substances Control Act
- Expand PFAS research
- Develop PFAS Communication Toolbox

**Will take time...**



# CT DPH Actions for Drinking Water

- ➔ Drinking Water Action Level for the Sum of **5 PFAS** (Nov. 2016)
  - 70 parts per trillion (ppt) or nanograms per liter (ng/L)
  - PFOA, PFOS, PFNA, PFHpA & PFHxS
  - May change in future as new toxicological data is developed

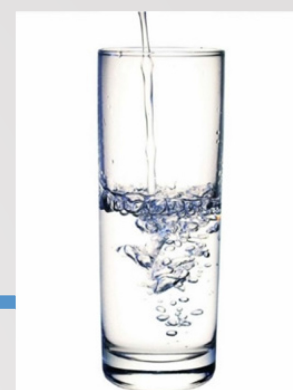
➔ Fact sheets and new webpage

➔ DPH Lab not currently equipped to test for PFAS

The image shows a fact sheet titled "Perfluoroalkyl Substances (PFAS) in Drinking Water: Health Concerns" from the Connecticut Department of Public Health (DPH). The document is dated October 2017 and is part of the Environmental & Occupational Health Assessment Program. It includes a section titled "What are These Chemicals?" which explains that PFAS are a family of man-made chemicals with various properties like water repellency and heat resistance. It also lists common uses such as in food packaging, firefighting foam, and chrome plating. Another section, "How do PFAS get into Drinking Water?", discusses how these chemicals can reach groundwater through industrial activities and firefighting operations. The fact sheet includes the DPH logo and contact information for the Connecticut Department of Public Health.



# CT Public Water Systems



Bing Creative Commons

- **2013-2015 – UCMR3 Results for CT Large Systems**
  - No PFAS detections in 40 large water systems serving >10,000 people
  - Represents service to more than 2.4 million customers
- **DPH Drinking Water Section Circular Letter (Sept. 2018)**
  - Requires Source Water Protection Plan updates for systems serving >1,000 people by 3/31/19
  - Sanitary inspections of suspect PFAS facilities by 3/1/20
  - Recommends all source waters be sampled
- **Strategy** for assessing public, community, non-community wells if PFAS contamination discovered or suspected

# Drinking Water Standards in the Northeast



State	Standard/Guidance Nomenclature	Drinking Water Level (ppt)
Connecticut	Action Level	70 $\Sigma$ (PFOA, PFOS, PFNA, PFHxS, PFHpA)
Maine	Health Advisory	70 $\Sigma$ (PFOA, PFOS)
Massachusetts	Health Guideline	70 $\Sigma$ (PFOA, PFOS, PFNA, PFHxS, PFHpA)
New Hampshire	Proposed Maximum Contaminant Level (MCL)/ Ambient Groundwater Quality Standards (currently in rulemaking process)	38 PFOA 70 PFOS / $\Sigma$ (PFOA, PFOS) 85 PFHxS 23 PFNA
New Jersey	Drinking Water Quality Institute Recommended MCL (currently in rulemaking process)	13 PFOS, PFNA 14 PFOA
New York	Drinking Water Quality Council Recommended MCL (currently in rulemaking process)	10 PFOA 10 PFOS
Rhode Island	Groundwater Quality Standard	70 $\Sigma$ (PFOA, PFOS)
Vermont	Health Advisory	20 $\Sigma$ (PFOA, PFOS, PFNA, PFHxS, PFHpA)



# CT DEEP PFAS Actions

- ▶ **Initial evaluation of possible PFAS sites** based on AFFF use and SIC codes for industry
  - Military sites prioritizing PFAS investigation through DoD
- ▶ **Working closely with DPH**
  - Drinking Water Section, Private Well Program, and Environmental & Occupational Health Assessment Program
  - Drinking water sampling in Greenwich, Windham - community and private wells
  - Joint outreach to CT Airport Authority and Dept. of Emergency Services and Public Protection regarding AFFF
- ▶ **Involvement in Regional and National workgroups**



# CT DEEP PFAS Actions (cont.)

- ▶ **Cleanup Criteria** for soil and groundwater at Remediation Sites available for use (optional)
- ▶ **Outreach** at Remediation Roundtable – LEPs & regulated community
- ▶ **AFFF Initiatives**
  - Coordination with DESPP Commission on Fire Prevention and Control – Committee to select a fluorine-free firefighting foam
  - Possible AFFF Take-Back Program?





# Known PFAS Sites in CT

## Remediation Sites

- 2 National Priority List (NPL) sites (testing of other Superfund sites is pending)

## Landfills

- Hartford (leachate)
- Ellington (2 potable wells polluted, testing on-going)

## Sites Related to AFFF use

- Greenwich wells near Westchester County Airport
- State Fire Training Areas – Willimantic (potable well polluted)
- Northeast Recyclers Fire, Willimantic
- Tire Fire, North Branford
- Naval Submarine Base, Groton



# Private Wells and PFAS



S. Pociu, CT DEEP

- DPH Private Well Program – advisory role
- DPH grant application for future funding to support private well sampling and analysis
- DEEP Authority under CGS 22a-432 and 22a-471
  - Focus will be on getting responsible parties to test private wells and provide treatment, when needed



# Private Wells and PFAS

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- ▶ Coordination will be needed between DPH, DEEP Remediation Division, and Local Health Depts.
  - ✓ Identification of at-risk wells
  - ✓ Communication/coordination with property owners
  - ✓ Communicating results to residents
  
- ▶ Could get referrals from Drinking Water Section Source Water Protection Plan updates



# Potable Water Sampling for PFAS

- ➔ EPA Method 537.1 (SPE-LC/MS/MS)
  - 18 compounds including 2 replacement compounds of interest
- ➔ Acceptable labs for public system vs. private well sample analysis
  - [EPA Approved UCMR3 Labs Registered in CT](#)
- ➔ Typical Cost \$175 - \$400/sample
  - Depends on number of compounds reported
- ➔ UCMR3 List of 6 PFAS vs. Full Method 537.1 List



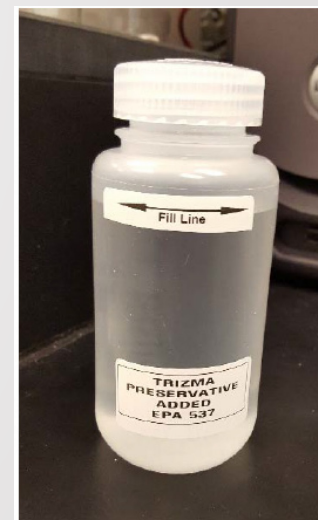


# Collecting PFAS Potable Water Samples

**High potential for cross-contamination!**

**Collect PFAS samples first!**

- ✓ Sample Container – 250 mL polypropylene bottles & caps, Trizma preservative
- ✓ Wash hands, wear nitrile gloves & change often!
- ✓ Need for Field Reagent (Pour) Blanks
- ✓ Put samples in individual sealed plastic bags
- ✓ Recommendations for follow-up sampling



EPA EIASOP-EPA537-0

# Guidance for Collecting PFAS Potable Water Samples



AVOID	USE INSTEAD
Teflon™ materials	HDPE, silicon tubing
Waterproof field books	Loose paper (non-waterproof)
Plastic clipboards, binders or spiral hardcover notebooks	Aluminum field clipboards
Post-It Notes, Sharpies	Ballpoint pens
New clothing or water resistant, waterproof or stain-resistant clothing GoreTex™ boots Fabric softener Tyvek™ No waterproof or resistant rain gear	Well-laundered clothes washed 6+ times after purchase, no fabric softener. Boots with polyurethane and PVC.
Cosmetics, moisturizers, hand cream, or similar personal products day of sampling	Sunscreens – Organic, “free” or “natural” Insect Repellants – Natural, DEET
Chemical (blue) ice packs	Regular ice
Food and drink, esp. pre-packaged or fast food wrappers	Bottled water and hydration drinks

Various Sources: SGS Laboratory, NH DES, MA DEP



# Treatment for PFAS in Drinking Water

- Bottled Water
- Granular Activated Carbon (GAC)
  - Shorter-chain PFAS breakthrough faster
  - Also Powdered Activated Carbon (PAC)
- Ion Exchange Resins
- Reverse Osmosis



S. Pociu, CT DEEP

**Contact DPH Environmental & Occupational Health Assessment Program for site specific guidance on bathing/showering**

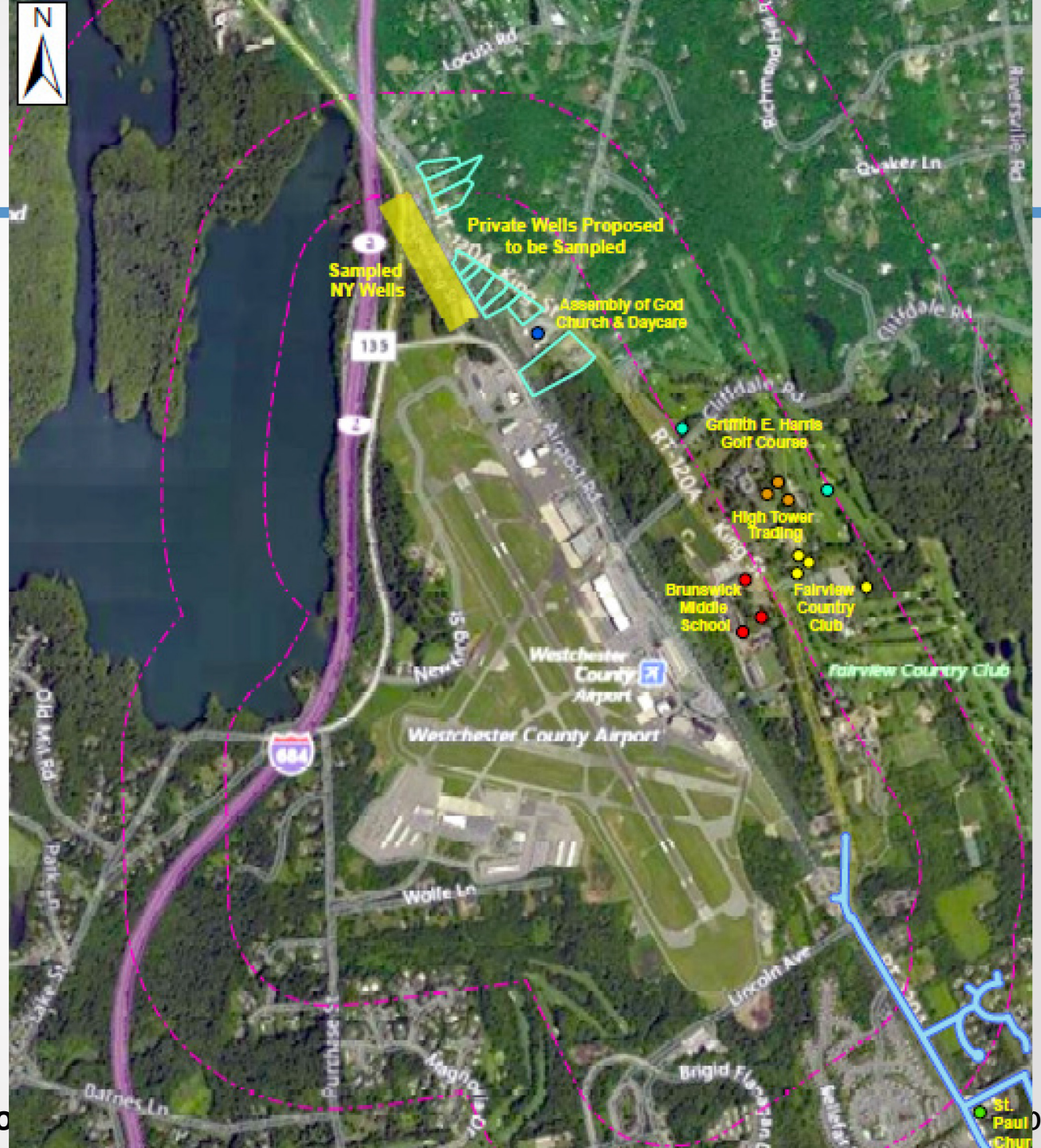


# Greenwich

## Westchester County Airport

Sampled:

- 10 private wells
- 15 public wells (7 water systems)
- 1 private well polluted above DWAL







# Windham

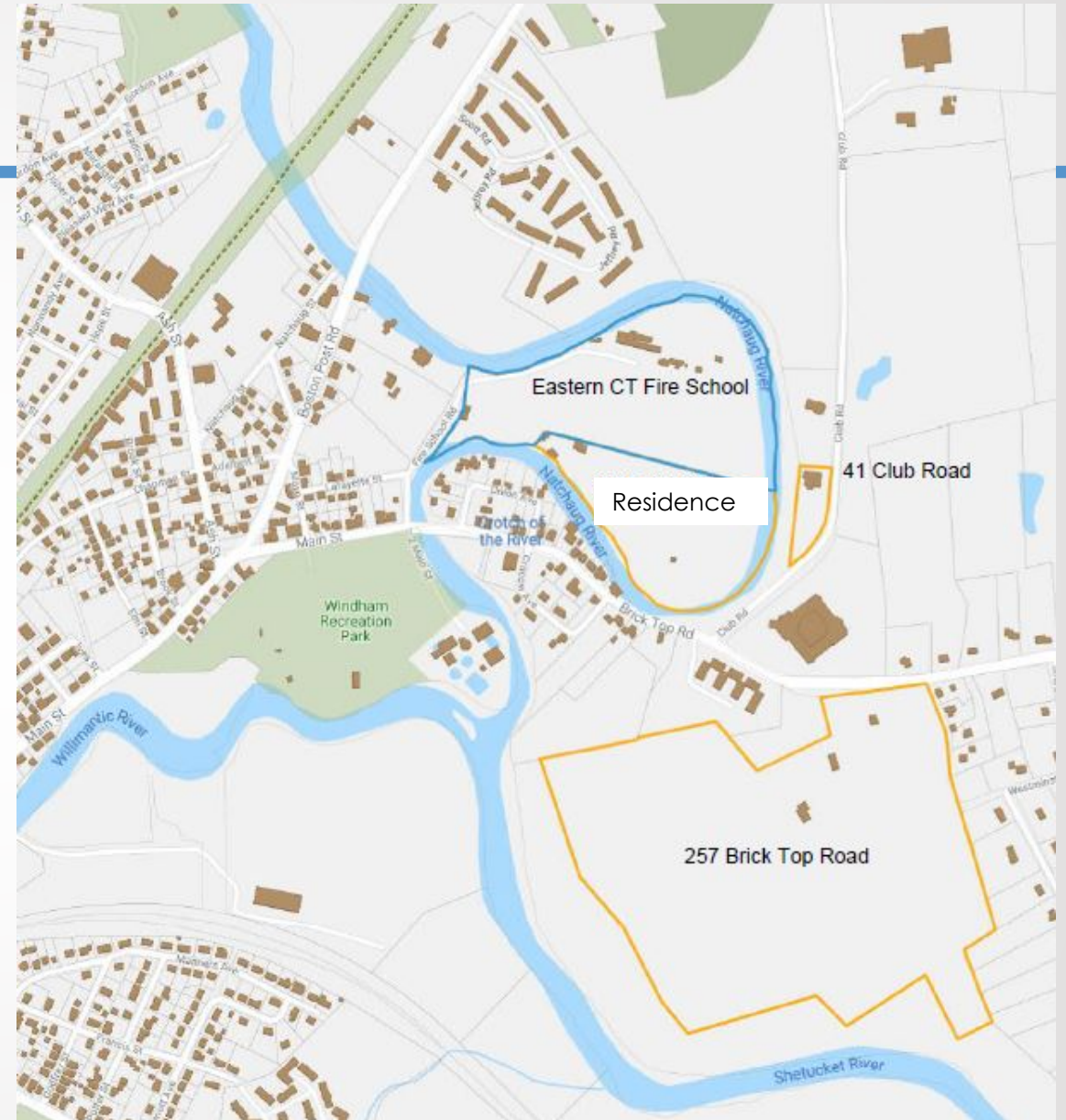
Eastern CT Fire School

Sampled:

- 1 Private well – polluted above DWAL
- 2 Community wells – ND

Public Water available

Investigation on-going





# PFAS Resources on the Web

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[DPH Drinking Water Section PFAS webpage](#)

[DEEP Emerging Contaminants webpage](#)

[EPA PFAS webpage](#)

[EPA PFAS Action Plan](#)

[Interstate Technology and Regulatory Council \(ITRC\)  
PFAS Fact Sheets](#)



# DPH PFAS Webpage



CT.GOV HOME / DEPARTMENT OF PUBLIC HEALTH / PER- AND POLYFLUOROALKYL SUBSTANCES

- DRINKING WATER >
- Contact Information >
- Forms and Applications >
- Publications and Reports >
- Resources and Links >
- Drinking Water Topics A to Z >
- DPH Homepage >

Search Department of Public Health

by Keyword

## Per- and Polyfluoroalkyl Substances

Per- and polyfluoroalkyl substances are a group of manufactured chemicals that are collectively referred to as PFAS. PFAS are used in a variety of products and applications including non-stick cookware, upholstered furniture, clothing, food packaging, and firefighting foam used to extinguish petroleum fires. These substances are not found naturally in the environment. They do not break down easily and are extremely persistent in both the environment, especially in water, and the human body. It is estimated that there are approximately 3,000 PFAS in production. The terminology for this family of substances has been evolving. The current accepted acronym for this family of chemicals is PFAS, but references to “perfluorinated compounds,” or PFC’s remain in older literature and fact sheets.

The United States Environmental Protection Agency ([EPA](#)) has issued a [life time health advisory](#) (HA) of 70 parts per trillion (ppt, equivalent to nanogram per liter or ng/l) in drinking water for two PFAS: perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS) or the sum of PFOA+PFOS for public drinking water. The CT DPH Environmental and Occupational Health Assessment Program has found the U.S. EPA Health Advisory of 70 ppt to be protective. Further, it has developed a [CT DPH Drinking Water Action Level](#) for drinking water in Connecticut in which the sum of five PFAS chemicals (PFOA and PFOS, plus perfluorononanoic acid, PFNA, perfluorohexane sulfonate, PFHxS, and perfluoroheptanoic acid, PFHpA) should not exceed the limit of 70 ppt.

Beginning in 2013, the [EPA required](#) that all public water systems (PWSs) serving more than 10,000 individuals test for six PFAS compounds. Connecticut’s large PWSs conducted multiple rounds of



# DEEP Emerging Contaminants Webpage

**Emerging Contaminants**

According to EPA, an emerging contaminant is a chemical or material characterized by a perceived, potential, or real threat to human health or the environment or by a lack of published health standards. A contaminant also may be "emerging" because of the discovery of a new source or a new pathway to humans.

The Remediation Standard Regulations do not contain numeric cleanup standards for emerging contaminants, but do require remediation using the procedures for [Additional Polluting Substances \(APS\)](#). Regulated parties and their environmental professionals should consider whether emerging contaminants are constituents of concern when evaluating Phase I information and test for those emerging contaminants where warranted. Doing so will help avoid uncertainty, audits, and further work in the future. If emerging contaminants are detected, please contact the Department in advance of submitting APS criteria approval to clarify any issues.

[General Information on Chemicals of Emerging Concern](#)      [1,4-Dioxane](#)  
[Per- and Polyfluorinated Alkyl Substances \(PFASs\)](#)      [Perchlorate](#)  
[Pharmaceuticals and Personal Care Products](#)      [Nanomaterials](#)

Contaminant	Where are they found?	Analytic Method/Media/Notes
<b>1,4-Dioxane</b>	<ul style="list-style-type: none"><li>Associated with chlorinated solvent contamination</li><li>Stabilizer for TCA, possibly other</li></ul>	<ul style="list-style-type: none"><li>EPA Method 522 – drinking water</li><li>Modified EPA Method 8260 or 8270 with SIM</li></ul>

PFAS



# Closing Remarks on PFAS

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- ❖ PFAS has emerged! Many possible sources!
- ❖ We need to be alert for suspect industries or uses near areas with wells. This includes areas with public water where not everyone has connected.
- ❖ Analysis is tricky, but costs should come down over time as more labs come online.
- ❖ Expect DWALs to change in the future – possibly lower numeric standards or additional PFAS included as new toxicological data is developed.
- ❖ Future legislation is possible.



# Questions or Comments?

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Thanks for your attention!

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