Per- and Polyfluoroalkyl Substances (PFAS)

October 23, 2023

What are PFAS?

- Per- and polyfluoroalkyl substances (PFAS) are a family of thousands of human-made chemicals with many useful properties including the ability to repel water, prevent staining and increase heat resistance.

- Some of the most studied PFAS in terms of health effects are: perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), hexafluoropropylene oxide-dimer acid (HFPO-DA, also known by the trade name GenX), perfluorohexanoic acid (PFHxA), perfluorobutane sulfonic acid (PFBS), and perfluorobutanoic acid (PFBA).

- These PFAS are found with the highest frequencies and concentrations in the environment, in humans, and/or in wildlife.

- While PFOS and PFOA have been phased out of production in the US, they are still produced internationally and imported into the US in consumer products. In addition, they are very persistent chemicals and can remain in the environment for long periods after being removed from the marketplace.

Information for Public Water Systems

- 2013: The United States Environmental Protection Agency (EPA) required that all public water systems (PWSs) serving more than 10,000 individuals test for six PFAS compounds

- 2013-2015: Connecticut's large PWSs conducted multiple rounds of testing and did not detect PFAS in the water from their sources of supply. These sources of supply provide drinking water for over 2.4 million daily customers in CT

- 2018: In collaboration with the CT DPH, PWSs conducted risk assessments to determine potential areas where PFAS contamination could be present

Information for Public Water Systems Cont.

- Improving technologies and laboratory techniques allow for the detection of PFAS at lower concentrations, therefore the CT DPH requested follow-up sampling by PWSs to determine if PFAS are present in the water systems near those areas

- 2019: Governor Ned Lamont asked the Commissioners of the Department of Public Health and the Department of Energy and Environmental Protection to lead an Interagency Task Force that included representatives from a broad variety of state agencies to address PFAS in Connecticut

Task Force

- The Task Force developed a PFAS Action Plan and delivered this plan to Governor Lamont on November 1, 2019. This Action Plan contains a comprehensive strategy to:

    1. Minimize human health risk for Connecticut residents,
    2. Minimize future releases of PFAS to the environment, and
    3. Identify, assess, and clean up historic releases of PFAS to the environment.

Action Plan Implementation

- The CT DPH has derived individual health-based drinking water Action Levels for 10 PFAS.

- Action Levels are guidelines for drinking water that are protective of public health and also feasible based upon analytical detection and treatment technology.

- This means that an Action Level concentration can be detected in drinking water by certified laboratories and that treatment systems are available to remove the contaminant(s) to a concentration that is below the Action Level.

Action Plan Implementation Cont.

- The 10 PFAS for which CT has developed Action Levels have enough toxicological data available to support development of health-based Action Levels.

- These PFAS include the most widely studied PFAS that have also been detected in human blood more frequently and at higher concentrations than other PFAS.

- CT DPH established Action Levels for four PFAS (PFOA, PFOS, PFNA, PFHxS) in June 2022 and for another six PFAS (GenX, PFHxA, PFBS, PFBA, 6:2 Cl-PFESA, 8:2 Cl-PFESA) in June 2023

Current Action Levels

CASRN	Analyte	CT Drinking Water Action Level (nanograms per liter; ng/L)^
756426-58-1	6:2 chloropolyfluoroether sulfonic acid (6:2 Cl-PFESA, 9Cl-PF3ONS,* F-53B major)	2
763051-92-9	8:2 chloropolyfluoroether sulfonic acid (8:2 Cl-PFESA, 11Cl-PF3OUdS,** F-53B minor)	5
1763-23-1	Perfluorooctane sulfonic acid (PFOS)	10
375-95-1	Perfluorononanoic acid (PFNA)	12
335-67-1	Perfluorooctanoic acid (PFOA)	16
13252-13-6	Hexafluoropropylene oxide dimer acid (HFPO-DA; GenX)	19
355-46-4	Perfluorohexane sulfonic acid (PFHxS)	49
307-24-4	Perfluorohexanoic acid (PFHxA)	240
375-73-5	Perfluorobutane sulfonic acid (PFBS)	760
375-22-4	Perfluorobutanoic acid (PFBA)	1,800

* EPA Methods 533 & 537.1 use9Cl-PF3ONS (9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid) for this PFAS.
** EPA Methods 533 & 537.1 use11Cl-PF3OUdS (11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid) for this PFAS.

Current Action Levels

- CT DPH develops its drinking water Action Levels by considering health impacts to the most sensitive and most exposed populations across all stages of human development.

- These PFAS Action Levels are based on the most sensitive, human-relevant effects seen in laboratory animals exposed to PFOS (immune effects); PFNA, PFOA, PFHxA (developmental effects); PFHxS, PFBS, PFBA (thyroid effects); or GenX, 6:2 Cl-PFESA (liver effects).

- The chemical-specific approach reflects the evolving scientific evidence on the toxicity of PFAS and is more protective of public health than the summed approach used previously in CT.

- The resulting individual Action Levels are within the range of drinking water guidance and standards most recently derived by the federal Agency for Toxic Substances and Disease Registry (ATSDR) and by other states, including most of CT's neighboring states.

Recommended Actions for Public Water Systems that have tested for PFAS

- **Steps to Assess Contamination:**
  If water sampling results confirm that drinking water contains PFAS concentrations greater than the Action Levels, water systems should quickly undertake additional sampling to assess the level, scope, and localized source of contamination to inform next steps.

- **Steps to Inform:**
  Drinking water systems should promptly provide consumers with information about the levels of PFAS in their drinking water. This notice should include specific information on the risks to fetuses during pregnancy and to infants (breastfed and formula-fed) from exposure to drinking water with a PFAS concentration above Action Levels. In addition, the notification should include actions the public water system is taking and identify options that consumers may consider reducing risk.

- **Steps to Limit Exposure:**
  A number of options are available to drinking water systems to lower concentrations of PFAS in their drinking water supply. Public water systems can treat source water with activated carbon, ion exchange systems or high-pressure membrane systems (e.g., reverse osmosis) to remove certain PFAS from drinking water. These treatment systems are currently used by some public water systems to mitigate other contaminants but should be carefully designed and maintained to ensure that they are effective for treating the target PFAS.

  We can be exposed to PFAS not only through drinking PFAS contaminated water, but also through pathways such as: eating foods packaged in PFAS containing materials; using consumer products such as non-stick cookware, stain resistant carpeting, and water repellant clothing; and eating fish contaminated with PFAS.

How can PFAS affect my health?

- The main health concerns from ingestion of the PFAS compounds for which CT DPH has drinking water Action Levels come from studies in laboratory animals which consistently show effects on the liver and immune system, and on growth, reproduction, and fetal development. PFAS can also affect the endocrine (e.g., thyroid) and hormonal systems and can disturb blood lipids such as cholesterol in lab animals.

- If your drinking water has PFAS at levels greater than the CT drinking water Action Levels and you have been drinking the water or using it for cooking for many years, you may have an increased chance of experiencing health problems. However, it is important to understand that consuming water with PFAS levels greater than the Action Levels does not mean that health effects will occur.

- PFAS are not readily absorbed by your skin, so dermal absorption through bathing, showering, swimming, and washing dishes in water containing PFAS is not a significant source of exposure.

Why have states set different acceptable levels for PFAS in drinking water?

- A number of states that have identified PFAS contamination have developed health-based guidelines and enforceable standards for PFAS in drinking water.

- Some states have established their own PFAS drinking water standards and guidelines because of the absence of an enforceable federal Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) for PFAS. Currently there are EPA lifetime health advisories (guidelines, not enforceable standards) for PFBS and GenX, as well as interim ones for PFOA and PFOS. In March 2023, EPA proposed MCLs (enforceable standards) for six PFAS. However, the proposed MCLs are not final.

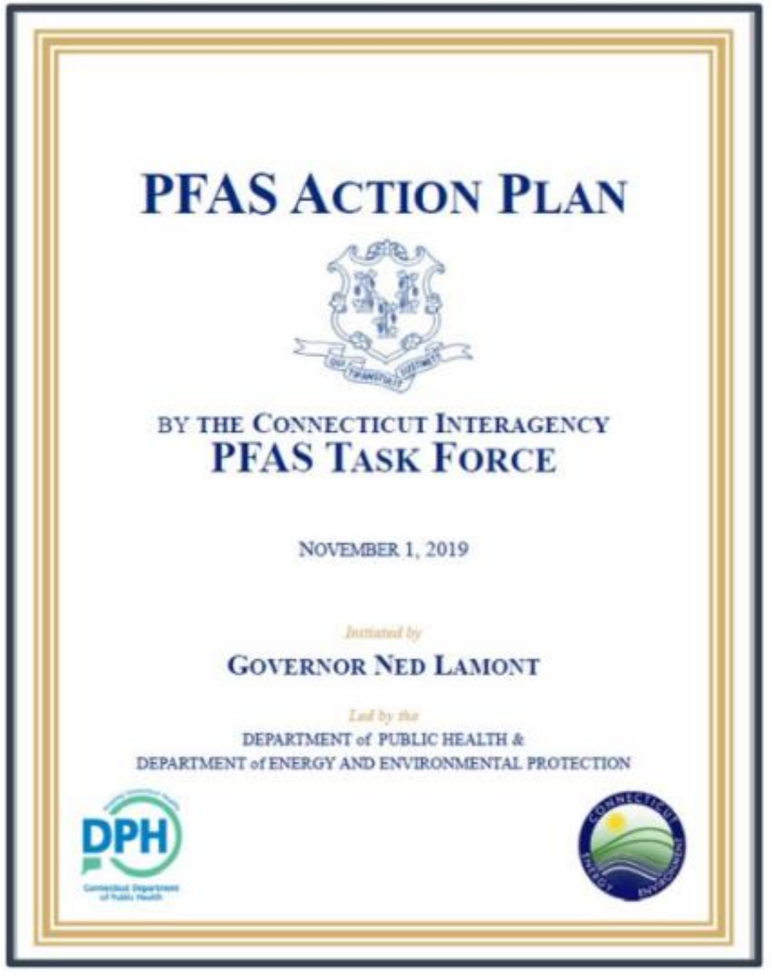
- The EPA draft MCLs have no immediate impact on public water systems in the state, and no immediate action is required. Until final MCLs for PFAS are released, DPH will continue to provide guidance to public water systems with PFAS detections based on our current health-based Action Levels.

How can I limit my overall exposure to PFAS?

- The best way to limit your exposure to PFAS is to become knowledgeable about your potential sources of PFAS exposure.

- We can be exposed to PFAS not only through drinking PFAS contaminated water, but also through pathways such as: eating foods packaged in PFAS containing materials; using consumer products containing PFAS such as non-stick cookware, stain resistant carpeting, and water repellant clothing; and eating foods contaminated with PFAS, such as fish and seafood. Nearly everyone has low levels of PFAS in their blood. These background levels likely come from consumer products and food packaging. You may still have some PFAS in your body years after the chemicals have been phased out because of their persistence in the environment and their slow removal from the body.

2019 PFAS Action Plan Review



Comprehensive strategy for protecting Connecticut's citizens from PFAS exposure and protecting the environment from the effects of PFAS pollution.

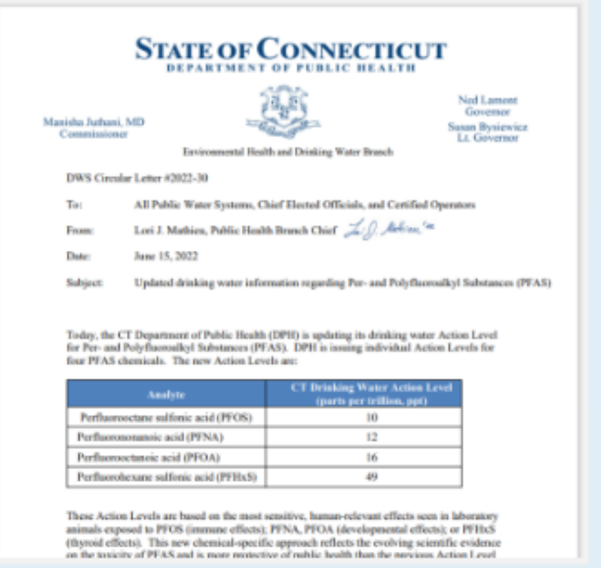
- 34 recommended actions
- 4 Strategic Focus Areas:
  - Protecting the health of CT Citizens
  - Pollution Prevention
  - Remediation
  - Education, Outreach and Communication

Department of Public Health

What we have done:

- New individual **Action Levels** announced *June 15, 2022*

		CT Action Levels
PFOS	perfluorooctane sulfonic acid	10 parts-per-trillion
PFNA	perfluorononanoic acid	12 ppt
PFOA	perfluorooctanoic acid	16 ppt
PFHxS	perfluorohexane sulfonic acid	49 ppt



STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

Manisha Juthani, MD
Commissioner

Ned Lamont
Governor
Susan Bysiewicz
Lt. Governor

Environmental Health and Drinking Water Branch

DWS Circular Letter #2022-30

To: All Public Water Systems, Chief Elected Officials, and Certified Operators

From: Lori J. Mathieu, Public Health Branch Chief

Date: June 15, 2022

Subject: Updated drinking water information regarding Per- and Polyfluoroalkyl Substances (PFAS)

Today, the CT Department of Public Health (DPH) is updating its drinking water Action Level for Per- and Polyfluoroalkyl Substances (PFAS). DPH is issuing individual Action Levels for four PFAS chemicals. The new Action Levels are:

Analyte	CT Drinking Water Action Level (parts per trillion, ppt)
Perfluorooctane sulfonic acid (PFOS)	10
Perfluorononanoic acid (PFNA)	12
Perfluorooctanoic acid (PFOA)	16
Perfluorohexane sulfonic acid (PFHxS)	49

These Action Levels are based on the most sensitive, human-relevant effects seen in laboratory animals exposed to PFOS (immune effects); PFNA, PFOA (developmental effects); or PFHxS (thyroid effects). This new chemical-specific approach reflects the evolving scientific evidence on the toxicity of PFAS and is more protective of public health than the previous Action Level

- Grounded in sound science for the most commonly found PFAS in Connecticut
- Based on the most sensitive, human-relevant effects in laboratory animal studies
- The *previous* **Action Level** was set in *2016* at **70 ppt** for the sum of 5 PFAS: PFOS, PFNA, PFOA, PFHxS, and PFHpA

Department of Public Health

What we have done:

- New staff in the Environmental Health and Drinking Water Branch focused on PFAS:
  - Environmental Analysts
  - Toxicologist
  - Laboratory Consultant
- Katherine A. Kelley State Public Health Laboratory
  - Analytical Equipment – *installed, optimized and validated*
  - New Chemist – *hired*

Department of Public Health

Continued Efforts:

- **Require** all new public drinking water sources test for PFAS
- **Recommend** all Public Water Systems (PWS) test for PFAS
  - **121** PWSs serving **1.7 million** people have voluntarily tested their drinking water for PFAS

Moving forward:

- Work with Academia
  - Memorandum of Agreement with UCONN on PFAS **communication and outreach**
- **PFAS testing** at Public Water Systems serving disadvantaged communities, vulnerable populations and areas of high social vulnerability
- EPA draft drinking water rule for PFOA and PFOS *expected* in December 2022

NEXT STEPS FOR DEEP

- **Focused sampling** of private wells in high-risk areas
- **Update** Remediation Standards and establish Water Quality Criteria
- **Implement** the 1/1/24 Toxics in Packaging Law ban on intentionally-added PFAS in food packaging
- **Expand** landfill monitoring
- **Continue outreach and aid** to municipalities and the regulated community
- **Seek/leverage funding opportunities** to support PFAS initiatives
  - Continue State & Municipal AFFF Take-Back Program – municipal fire trucks, other state facilities, airports
  - Surface water and fish tissue sampling
  - Data management assistance

CT Agricultural Experiment Station (CAES)

Jason C. White, Ph.D.; Director (Jason.White@ct.gov)

- Used $600,000 of CT CEPF to acquire a LC-Triple Quad for PFAS analysis ($600,000)
- CAES has or has leveraged federal funding and initiated 7 research projects and 2 surveillance projects on PFAS-related topics

CT Agricultural Experiment Station (CAES)

- NIEHS-funded project on nanotechnology-enabled phytoremediation of PFAS in soil and water (Research)
- FDA-leveraged funds to investigate methods to decrease PFAS availability in soil with engineered biochar (Research)
- Yale- and WVU-led project on PFAS analysis in surface and ground water in areas affected by natural gas and coal industries (Research)
- CAES-led project studying engineered biochar for PFAS removal from drinking water (Research)

Contacts

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