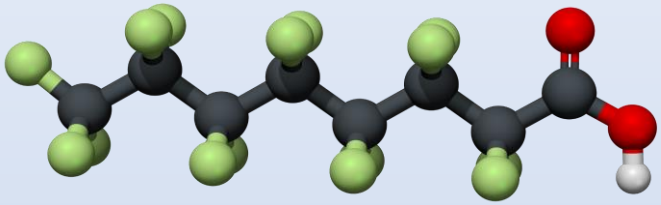
PFAS in Drinking Water Update

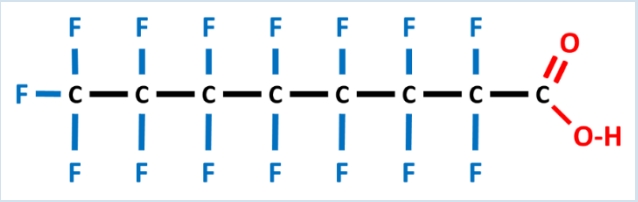


MHOA Seminar
February 2024

A. Margaret Finn, P.E.
Environmental Engineer
MassDEP Drinking Water Program

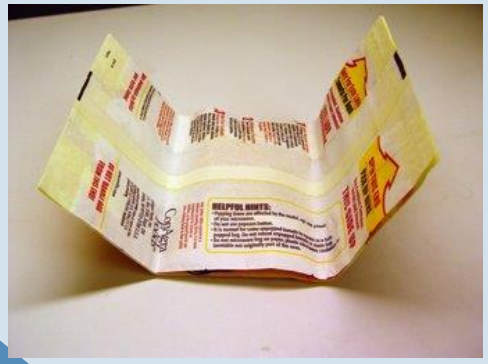
What are Per and Polyfluoroalkyl Substances (PFAS)?

- Manufactured chemicals, widely used since the 1950s
- Family of thousands of compounds
- **"Forever chemicals"** - Very persistent, do not biodegrade
- Water Soluble – Travel easily in water
- Found in water, air, fish, and soil at locations across the globe
- Long-chain PFAS are voluntarily being phased out by industry
- Some States have banned their use in food packaging and consumer products



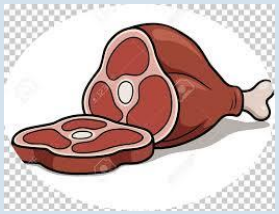
Uses of PFAS

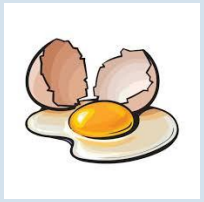
- Aqueous film-forming foam (AFFF)
- Textile and leather treatments
  - stain resistance/water repellency
- Paper coatings - grease resistant
- "Waxes" - floor, car, ski
- Manufacturing



Why Focus on Drinking Water and Not Food?

- Diet is the largest source of PFAS exposure.
- Drinking water contributes 20% and up to 75% near contaminated sites.
- Drinking water is main source for infants.

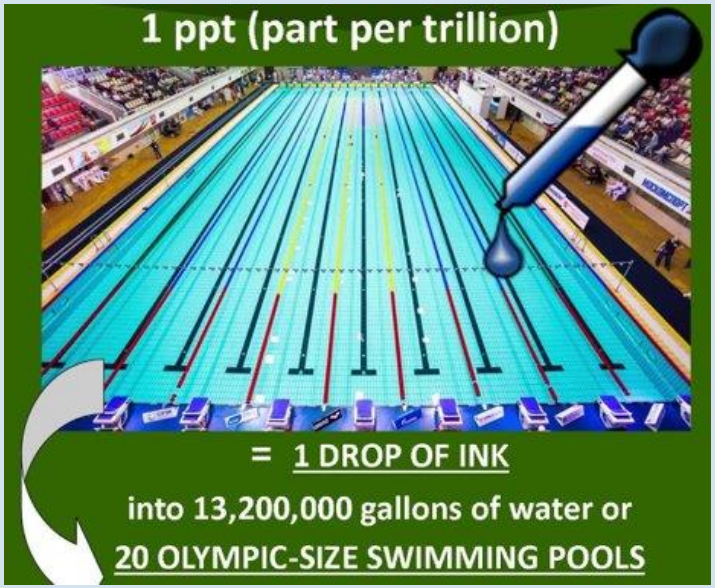

Largest sources in the diet:

- Seafood, meat, milk, eggs, and drinking water

Mass. Dept. of Public Health Fish Consumption Advisories:
https://www.mass.gov/lists/fish-consumption-advisories

Low Levels are a Concern

- **PFAS bioaccumulates**
- Primarily in the blood, liver and kidney
- People exposed to parts-per-trillion levels of
  PFAS have measured blood levels in the parts-per-billion range
- We also know that ppt levels of some chemicals in blood have significant effects

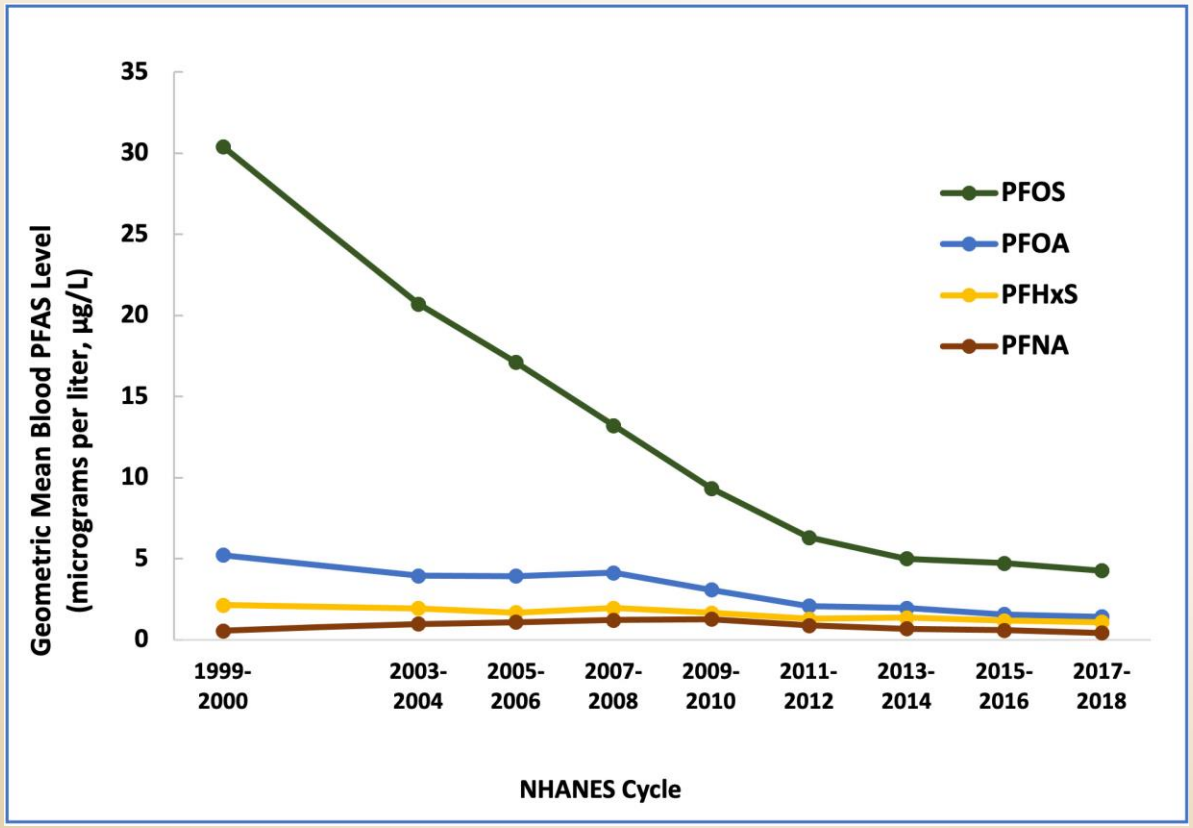


Chemical	Levels
Normal estradiol in women of child-bearing age	15-350 ppt
Normal insulin in adults	56 - 560 ppt

Potential Health Effects

- Reproductive effects such as decreased fertility or increased high blood pressure in pregnant women.
- Developmental effects or delays in children, including low birth weight, accelerated puberty, bone variations, or behavioral changes.
- Increased risk of some cancers, including prostate, kidney, and testicular.
- Reduced ability of the body's immune system to fight infections, including reduced vaccine response.
- Interference with the body's natural hormones.
- Increased cholesterol levels and/or risk of obesity.

Good News!
Blood levels of PFAS in the US are dropping.

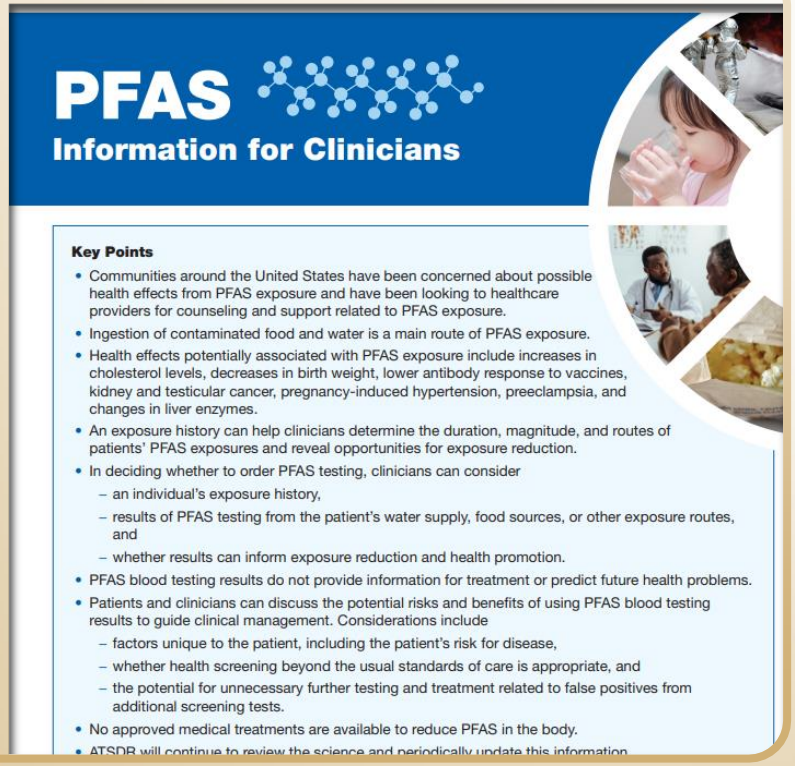


Graph courtesy of CDC. See https://www.atsdr.cdc.gov/pfas

But 98% of Americans have some amount of PFAS in their blood.

AND mean blood levels for PFOS are 4.25 ng/mL, that's 4,250 ppt. Bad news for vampires, they should switch to water.

CDC Information for Clinicians



PFAS

Information for Clinicians

Key Points

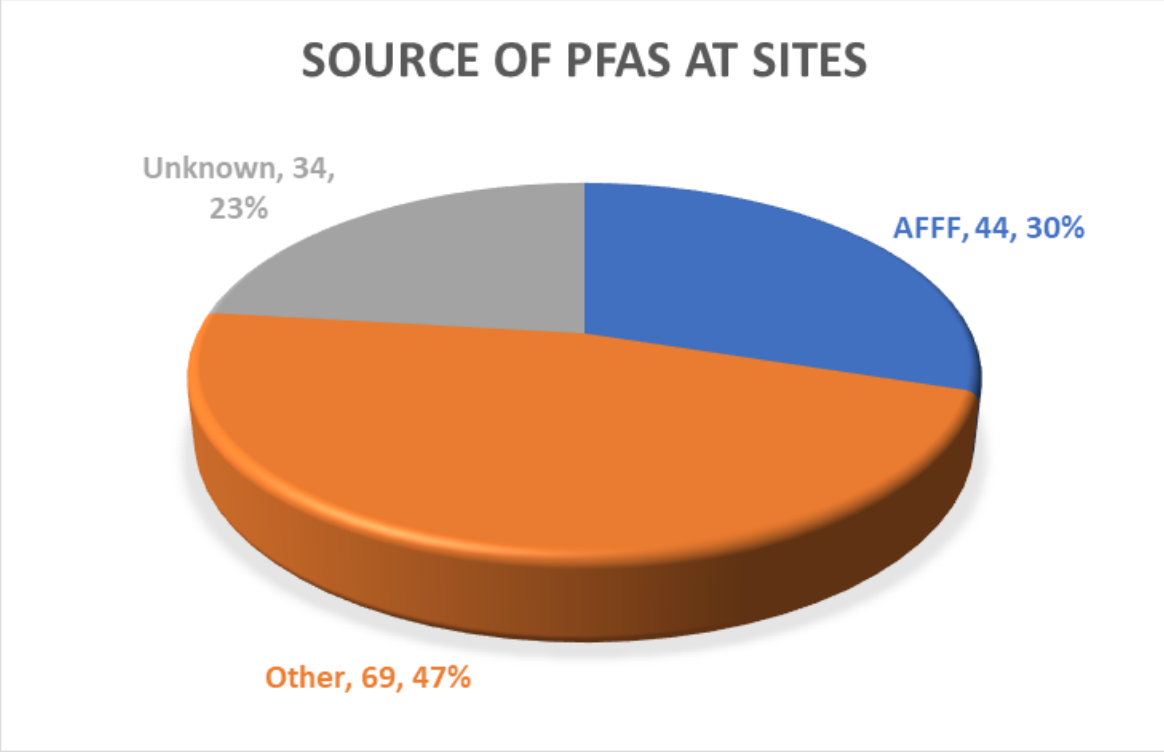
- Communities around the United States have been concerned about possible health effects from PFAS exposure and have been looking to healthcare providers for counseling and support related to PFAS exposure.
- Ingestion of contaminated food and water is a main route of PFAS exposure.
- Health effects potentially associated with PFAS exposure include increases in cholesterol levels, decreases in birth weight, lower antibody response to vaccines, kidney and testicular cancer, pregnancy-induced hypertension, preeclampsia, and changes in liver enzymes.
- An exposure history can help clinicians determine the duration, magnitude, and routes of patients' PFAS exposures and reveal opportunities for exposure reduction.
- In deciding whether to order PFAS testing, clinicians can consider
  - an individual's exposure history,
  - results of PFAS testing from the patient's water supply, food sources, or other exposure routes, and
  - whether results can inform exposure reduction and health promotion.
- PFAS blood testing results do not provide information for treatment or predict future health problems.
- Patients and clinicians can discuss the potential risks and benefits of using PFAS blood testing results to guide clinical management. Considerations include
  - factors unique to the patient, including the patient's risk for disease,
  - whether health screening beyond the usual standards of care is appropriate, and
  - the potential for unnecessary further testing and treatment related to false positives from additional screening tests.
- No approved medical treatments are available to reduce PFAS in the body.
- ATSDR will continue to review the science and periodically update this information

- Health effects
- Blood testing
- Clinical evaluation and management

https://www.atsdr.cdc.gov/pfas/resources/pfas-information-for-clinicians.html

How is PFAS Getting into our Drinking Water?

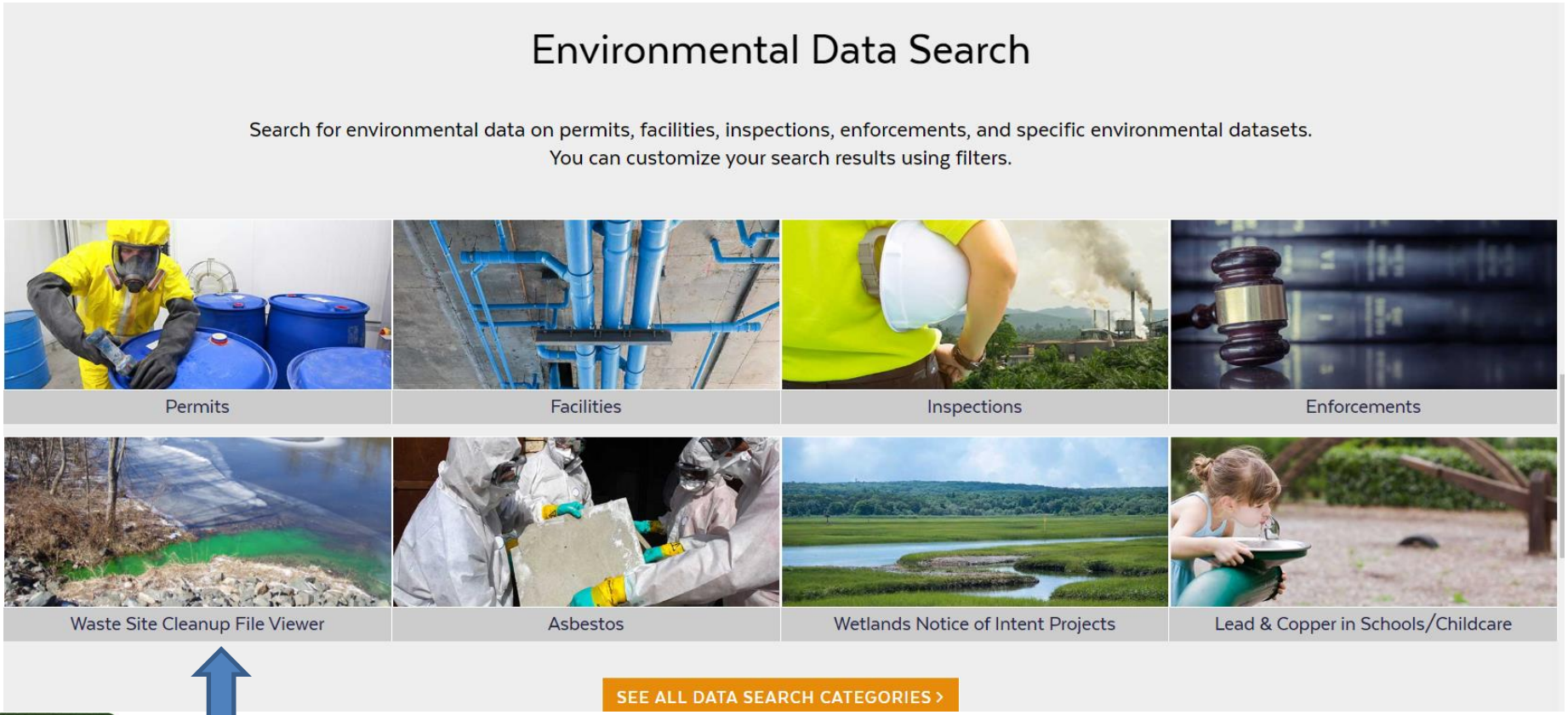
MassDEP investigations of the sources of PFAS in drinking water supplies.



- AFFF = Aqueous Film-Forming Foam used for firefighting, at training areas, airports, etc.
- Other = manufacturing sites, landfills, industrial paper waste composting, scrap/waste metal facilities, fertilizer from biosolids, etc.

Documents regarding Investigation of PFAS Contaminated Sites

https://eeaonline.eea.state.ma.us/portal#!/home



Slide #2
How is PFAS Getting into our Drinking Water?

- New Hampshire DES tested discharges to groundwater from carpet cleaning and floor stripping/refinishing activities
- NHDES regulates > 2,500 wastewater discharges to groundwater
- Carpet cleaning activities can generate high levels of PFAS
- Floor stripping/refinishing can generate very high levels of PFAS
- PFAS in the cleaning products and extracted off the carpets and floors

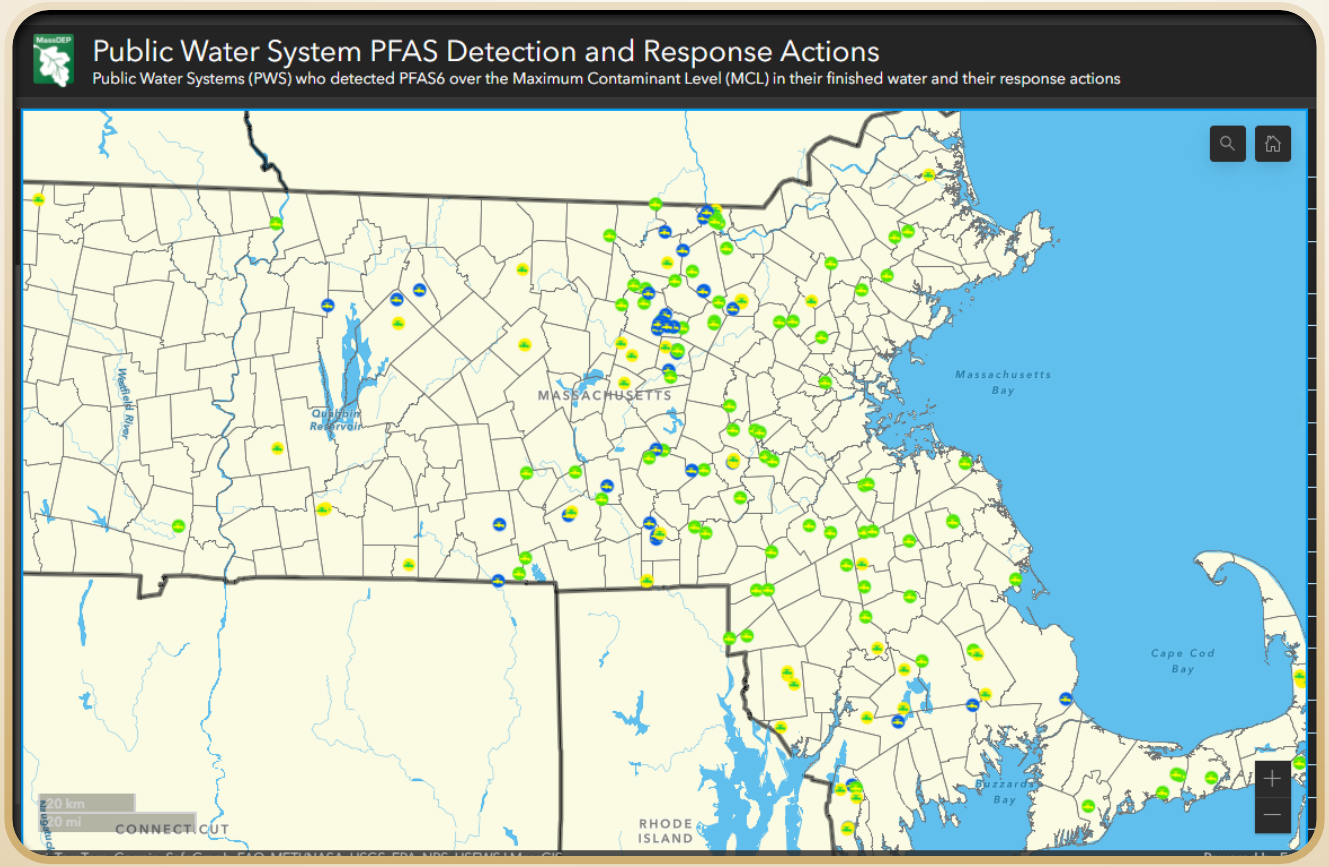
NEW HAMPSHIRE DEPARTMENT OF Environmental Services

https://www.des.nh.gov/news-and-media/blog/nhdes-investigates-lesser-known-sources-pfas-groundwater#

Massachusetts PFAS Drinking Water Standard

- Maximum Contaminant Level (MCL) for PFAS6 established in October 2020
- MCL = 20 parts-per-trillion (nanograms per liter)
- "PFAS6" MCL is the sum of six PFAS:
  - PFOS: perfluorooctane sulfonic acid
  - PFOA: perfluorooctanoic acid
  - PFHxS: perfluorohexane sulfonic acid
  - PFNA:perfluorononanoic acid
  - PFHpA: perfluoroheptanoic acid
  - PFDA: perfluorodecanoic acid
- Transient Non-Community PWS are not subject to the MCL but were required to test

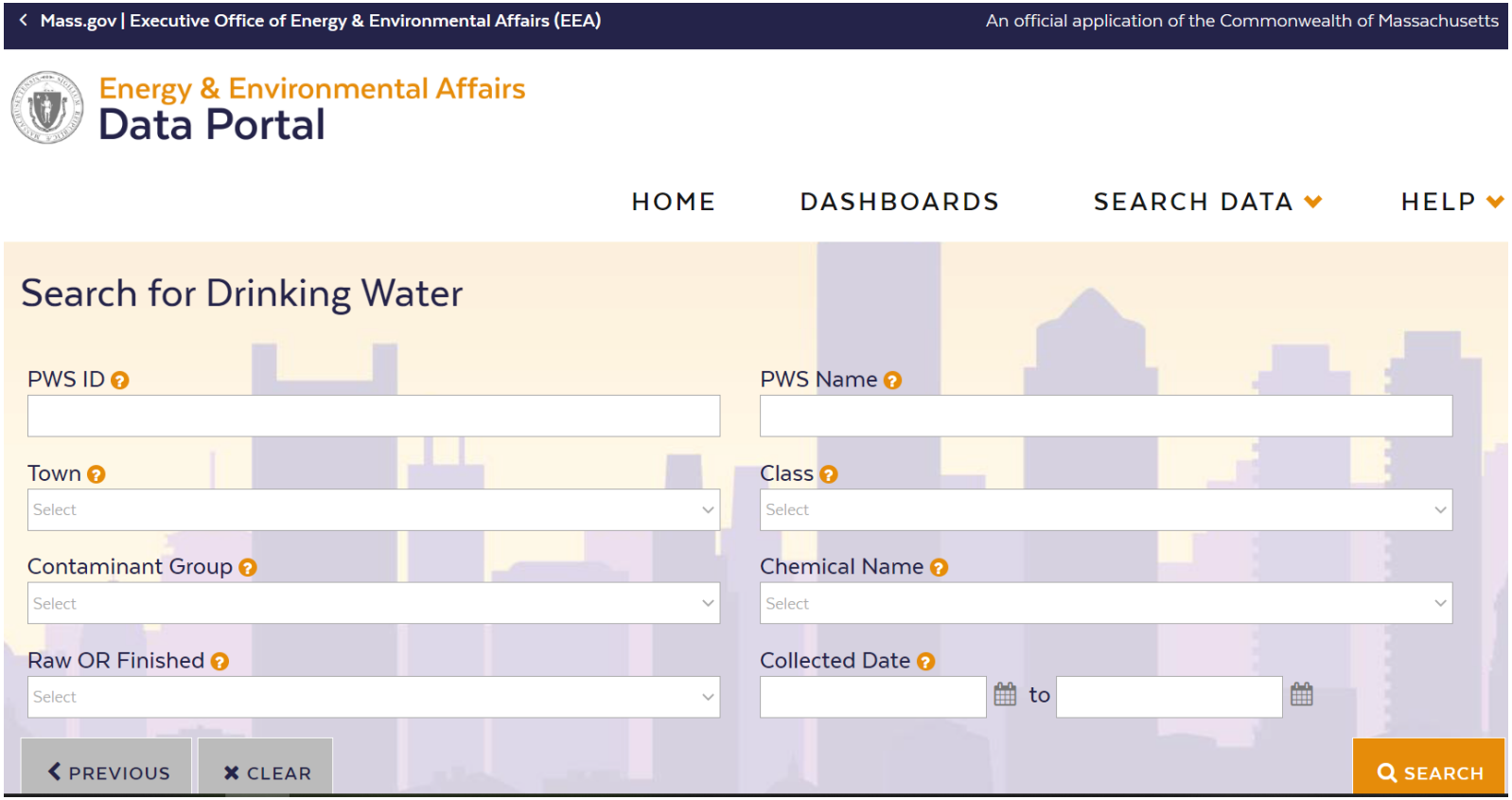
PFAS level over the Massachusetts MCL detected by 173 PWS



https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas

or Google *MassDEP PFAS* for our webpage w/maps

PWS Testing Results on the Web



PWS testing results are available in the EEA data portal. Search under the chemical name: "PFAS6" or to see all the PFAS chemicals, search under the contaminant group "PFAS".
https://eeaonline.eea.state.ma.us/Portal/#!/search/drinking-water

Actions Being Taken by PWS

- 53 new water treatment facilities or additions to existing facilities have been constructed
- Granulated Activated Carbon and Ion Exchange Resin being used to remove PFAS
- Other actions: shutting off wells, interconnections to other PWS, blending water, new water mains, and new wells

Vessels containing GAC at a school

Financial Investment by the Commonwealth and EPA to assist PWS

- The State Revolving Loan Fund Program has issued 30 loans totaling over $230 million at zero % interest rate for construction projects to address PFAS in drinking water.
- The program received 31 PFAS-related projects for the 2024 project period.
- Starting this year, the EPA Emerging Contaminants in Small and Disadvantaged Communities Grant Program (administered by MassDEP) will offer $32 million to PWS to address PFAS.

Federal Regulations are Coming this Year

PFAS	MCL
PFOA	4.0 ppt
PFOS	4.0 ppt
PFBS	1.0 (unitless) Hazard Index
PFNA	
GenX (HFPO-DA)	
PFHxS	

EPA Proposed PFAS MCLs

Equation

$$\text{Hazard Index} = \left(\frac{[\text{GenX}_{\text{water}}]}{[10\text{ ppt}]}\right) + \left(\frac{[\text{PFBS}_{\text{water}}]}{[2000\text{ ppt}]}\right) + \left(\frac{[\text{PFNA}_{\text{water}}]}{[10\text{ ppt}]}\right) + \left(\frac{[\text{PFHxS}_{\text{water}}]}{[9.0\text{ ppt}]}\right)$$

Impact of Federal PFAS MCLs

Public Water Suppliers (PWS)

- States have 2 years to write regulations once the Federal MCLs become final but an extension of up to 2 years is available.
- 181 Community and NTNC PWS (24%) in Massachusetts have one or more current testing results over the proposed EPA MCLs.
- 86 of these are already working with us because they exceeded the Massachusetts MCL.
- 95 PWS will need to address PFAS for the first time.

Nationwide PFAS sampling results

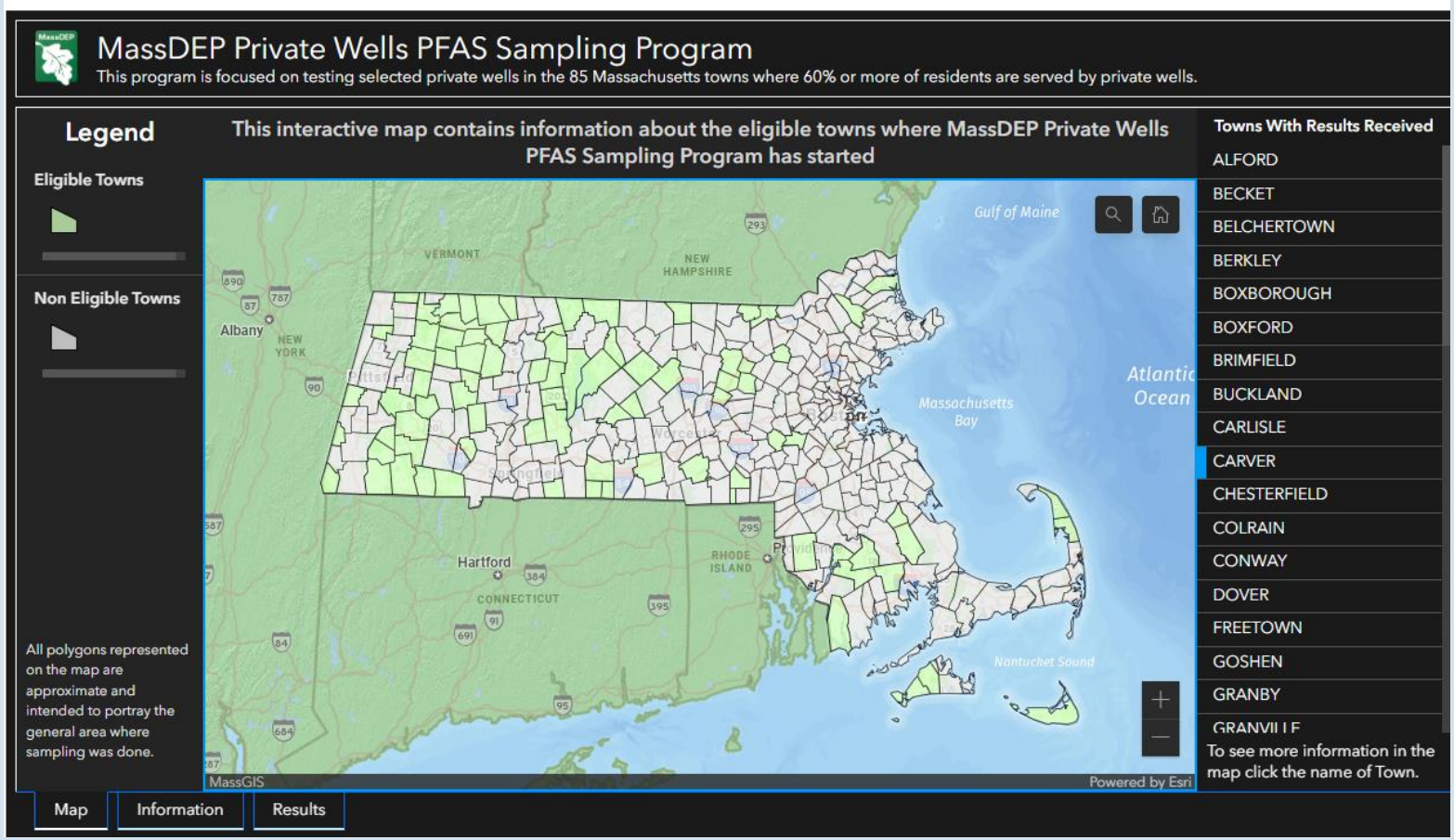
- EPA Fifth Unregulated Contaminant Monitoring Rule sampling underway 2023-2025
- Monitoring data being collected from PWS for 29 PFAS and lithium.
- A data viewer/map is available that can be sorted by State, PWS, water type, Region etc.
- PFOA and/or PFOS were measured above the proposed MCLs for 16.1% of PWSs nationally

https://www.epa.gov/dwucmr/fifth-unregulated-contaminant-monitoring-rule

Private Well Testing Results from the MassDEP-UMass Program

- Meetings/outreach were held with town and state officials in the 85 selected communities with > 60% residents served by private wells.
- 1,668 homeowners sampled.
- 5% exceeded the Massachusetts PFAS6 MCL.
- 15% exceed proposed EPA MCLs
- These percentages may be biased high due to locations of sampling sites included homes near potential sources of PFAS.
- There are approximately 200,000 private wells in Massachusetts serving 600,000 residents.

MassDEP Private Wells Sampling Program



Program ended June 30, 2022

For maps, testing results and the final report, see the PFAS in Private Wells webpage

https://www.mass.gov/info-details/pfas-in-private-well-drinking-water-supplies-faq

Private Wells and Boards of Health

MassDEP documents available:

- MassDEP Private Well Guidelines
- MassDEP Board of Health Model Regulations for Private Wells

Recommendations:

- Test new private wells for PFAS, ongoing testing every 10 years.
- Municipalities adopt requirements that PFAS testing is done during transfer of property.

https://www.mass.gov/info-details/private-well-guidelines

Bottled Water and Home Water Filtration Devices

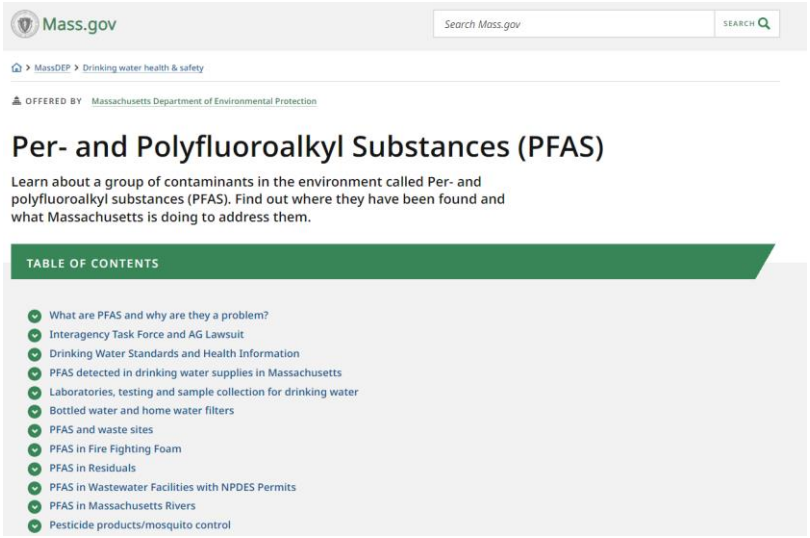
- The Massachusetts Department of Public Health licenses companies to sell or distribute bottled water.
- All bottled water must meet the Massachusetts PFAS6 MCL and EPA's proposed MCLs.
- https://www.mass.gov/info-details/water-quality-standards-for-bottled-water-in-massachusetts

- The National Sanitation Foundation standards currently only certify devices to remove PFOS and PFOA to concentrations below 70 ng/L (the former EPA Health Advisory Level).
- Studies have shown that some of these filtration devices can effectively reduce PFAS levels down to non-detect.

MassDEP partnered with UMass Amherst on one study:

https://www.mass.gov/doc/massdep-umass-amherst-per-and-polyfluoroalkyl-substances-pfas-point-of-use-treatment-system-study-final-report/download

More Information on our PFAS webpage



Google *MassDEP PFAS*

Questions ??

General PFAS Questions, email the MassDEP Drinking Water Program:

Program.Director-DWP@mass.gov