Investigating PFAS in Maine's Soil and Groundwater

Maine Agricultural Trades Show
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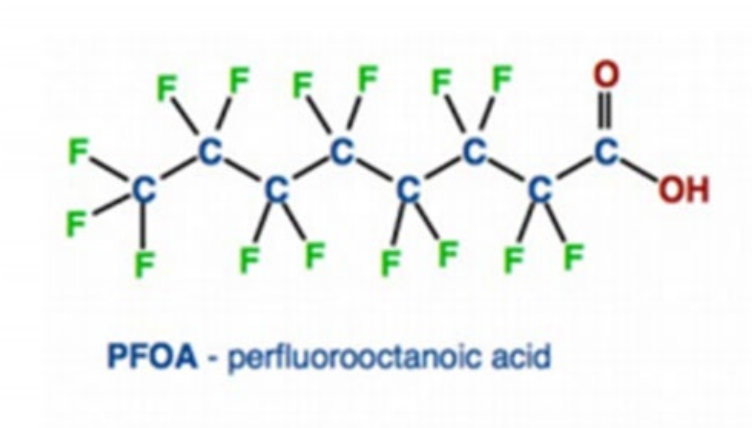
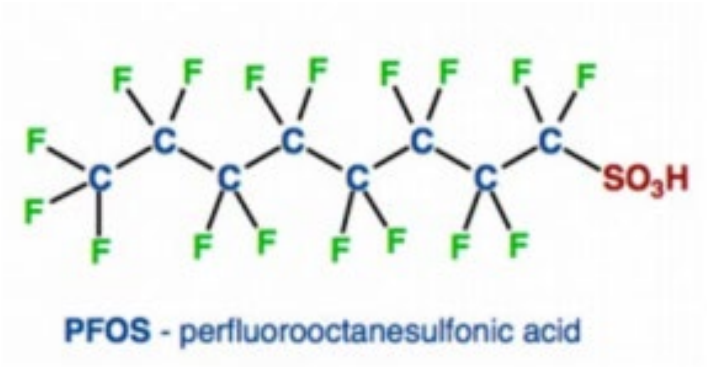
What are PFAS?

PFAS = per- and poly-fluoroalkyl substances

"means substances that include any member of the class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom" (32 MRS §1732, 38 MRS §1612)



PFOA - perfluorooctanoic acid

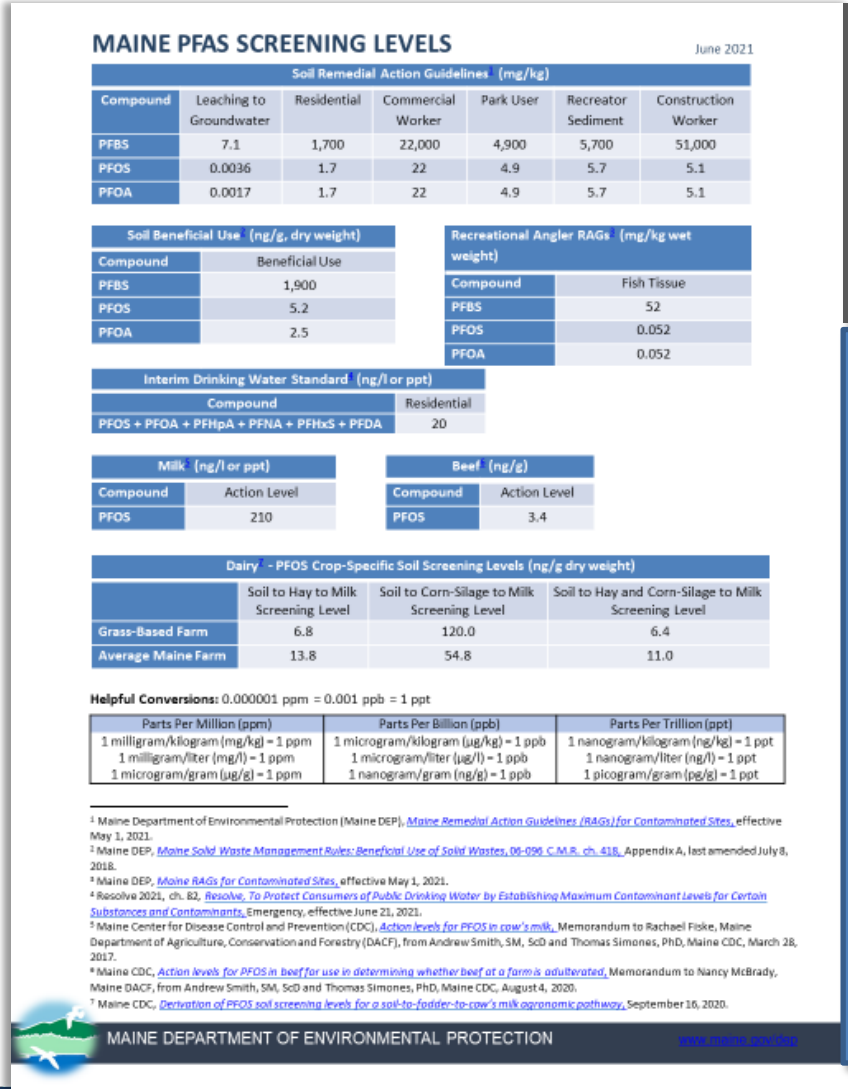


PFOS - perfluorooctanesulfonic acid

Where are PFAS in Maine?

- Surface and Groundwater Sites
  - Public Water Systems and Private Drinking Water Wells
  - Surface Water
- Waste Management Sites
  - Landfills (active and closed)
  - Sludge and Septage Spreading Sites (including Agricultural)
- Contaminated Sites (e.g., AFFF and other sources)
  - Department of Defense Sites
  - Superfund
  - Uncontrolled Sites

How are PFAS Regulated?



MAINE PFAS SCREENING LEVELS

June 2021

Soil Remedial Action Guidelines[1] (mg/kg)

Compound	Leaching to Groundwater	Residential	Commercial Worker	Park User	Recreator Sediment	Construction Worker
PFBS	7.1	1,700	22,000	4,900	5,700	51,000
PFOS	0.0036	1.7	22	4.9	5.7	5.1
PFOA	0.0017	1.7	22	4.9	5.7	5.1

Soil Beneficial Use[2] (ng/g, dry weight)

Compound	Beneficial Use
PFBS	1,900
PFOS	5.2
PFOA	2.5

Recreational Angler RAGs[3] (mg/kg wet weight)

Compound	Fish Tissue
PFBS	52
PFOS	0.052
PFOA	0.052

Interim Drinking Water Standard[4] (ng/l or ppt)

Compound	Residential
PFOS + PFOA + PFHpA + PFNA + PFHxS + PFDA	20

Milk[5] (ng/l or ppt)

Compound	Action Level
PFOS	210

Beef[6] (ng/g)

Compound	Action Level
PFOS	3.4

Dairy[7] - PFOS Crop-Specific Soil Screening Levels (ng/g dry weight)

	Soil to Hay to Milk Screening Level	Soil to Corn-Silage to Milk Screening Level	Soil to Hay and Corn-Silage to Milk Screening Level
Grass-Based Farm	6.8	120.0	6.4
Average Maine Farm	13.8	54.8	11.0

Helpful Conversions: 0.000001 ppm = 0.001 ppb = 1 ppt

Parts Per Million (ppm)	Parts Per Billion (ppb)	Parts Per Trillion (ppt)
1 milligram/kilogram (mg/kg) = 1 ppm 1 milligram/liter (mg/l) = 1 ppm 1 microgram/gram (µg/g) = 1 ppm	1 microgram/kilogram (µg/kg) = 1 ppb 1 microgram/liter (µg/l) = 1 ppb 1 nanogram/gram (ng/g) = 1 ppb	1 nanogram/kilogram (ng/kg) = 1 ppt 1 nanogram/liter (ng/l) = 1 ppt 1 picogram/gram (pg/g) = 1 ppt

[1] Maine Department of Environmental Protection (Maine DEP), *Maine Remedial Action Guidelines (RAGs) for Contaminated Sites*, effective May 1, 2021.
[2] Maine DEP, *Maine Solid Waste Management Rules: Beneficial Use of Solid Wastes*, 06-096 C.M.R. ch. 418, Appendix A, last amended July 8, 2018.
[3] Maine DEP, *Maine RAGs for Contaminated Sites*, effective May 1, 2021.
[4] Resolve 2021, ch. 82, *Resolve, To Protect Consumers of Public Drinking Water by Establishing Maximum Contaminant Levels for Certain Substances and Contaminants*, Emergency, effective June 21, 2021.
[5] Maine Center for Disease Control and Prevention (CDC), *Action levels for PFOS in cow's milk*, Memorandum to Rachael Fiske, Maine Department of Agriculture, Conservation and Forestry (DACF), from Andrew Smith, SM, ScD and Thomas Simones, PhD, Maine CDC, March 28, 2017.
[6] Maine CDC, *Action levels for PFOS in beef for use in determining whether beef at a farm is adulterated*, Memorandum to Nancy McBrady, Maine DACF, from Andrew Smith, SM, ScD and Thomas Simones, PhD, Maine CDC, August 4, 2020.
[7] Maine CDC, *Derivation of PFOS soil screening levels for a soil-to-fodder-to-cow's milk agronomic pathway*, September 16, 2020.

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION www.maine.gov/dep

EPA's Health Advisory
PFOA, PFOS or PFOA+PFOS
= 70 ppt

Maine's Interim Drinking Water Std
= 20 ppt

for the sum of six PFAS:
PFOA
PFOS
PFNA
PFDA
PFHpA
PFxHS

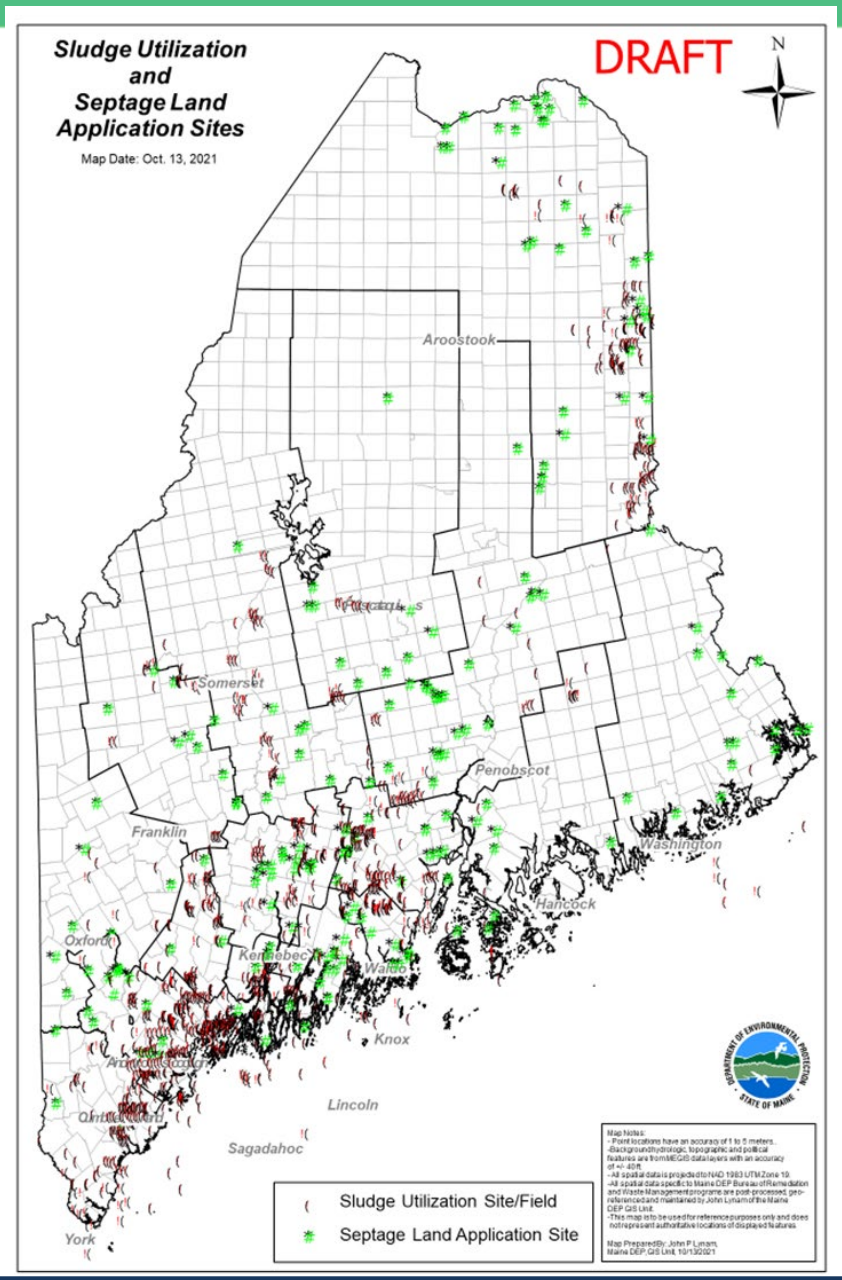
Public Law 2021, Chapter 478

An Act To Investigate Perfluoroalkyl and Polyfluoroalkyl Substance Contamination of Land and Groundwater

- Effective October 18, 2021
- Requires DEP to:
  - Conduct PFAS investigation for contamination derived from application of sludge & septage
  - Ensure landfill leachate is sampled
  - Establish Land Application Contaminant Monitoring Fund (LACMF) and collect fees on sludge and septage handling for this fund

PFAS Investigation

- Estimated over 700 sludge and septage application sites
- Sites often include multiple fields/locations crossing municipal boundaries
- Some sites were used by multiple generators meaning that sludge from multiple sources may have been applied at the same site
- Thousands of data points and several decades of licensing information



Prioritizing Sampling Locations

- Grouped sites into Tiers: I, II, III, IV based upon:
  - Volume of sludge/septage land applied at a site
  - Anticipated presence of PFAS from the application
  - Proximity of known receptors

- Other prioritization factors include:
  - Access to sites (permissions from land/homeowners)
  - Weather (for soil sampling)

Prioritizing Sampling Locations

Breakdown of Tiers - More detail available at www.maine.gov/dep/spills/topics/pfas/index.html				
Tier	**Total volume land application of sludge**	**Nearest homes**	**PFAS likely?**	**Other Considerations**
I	10,000 cy or more	Within ½ mile	Yes	
II	Between 5,000 and 10,000 cy	Within ½ mile	Yes	Site may be downgraded to Tier III OR elevated to Tier I
III	Under 5,000 cy	Within ½ mile	Yes	Site may be elevated to Tier I
IV	Information gathered to date indicates that no sludge was land applied. Additional research and time will be needed to verify. Once verified, these sites may be placed in another Tier as appropriate using the above criteria			

PFAS Investigation Timelines

- Tier I sites: Anticipated to last through early 2023
- Tier II sites: 2023 – 2024
- Tier III & IV sites: 2024 – 2025

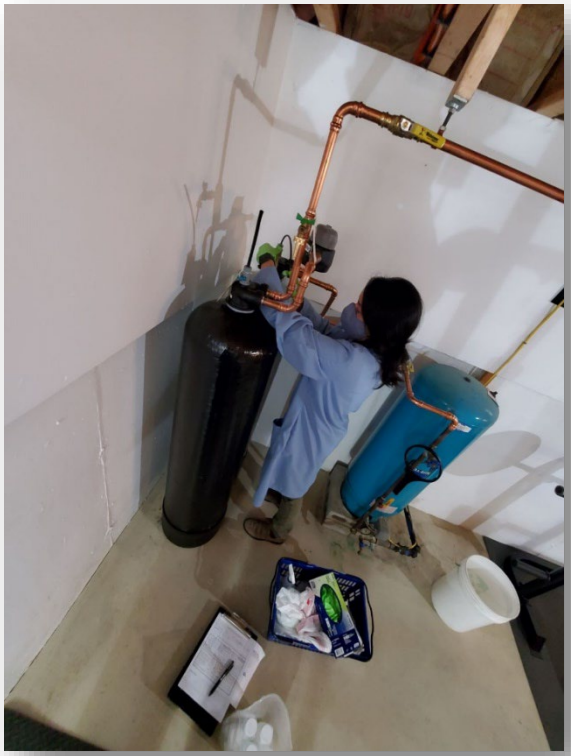
- Timelines are estimated - not exact
  - More work will be contracted out as the process continues
  - Difficult to know where expanded, step-out sampling will be necessary, this will impact pace of investigation

PFAS Investigation Timeframes

- Half of all sites must be sampled by end of 2024; all by end of 2025
- Extremely fast-paced! Narrow focus – soil and water
- Perspective -- 208 weeks between 1/1/2022 and 12/31/2025
- Approximately 3.5 sites per week (water and soil) by each project team under the best of circumstances
  - Keep in mind each "site" may include multiple fields/residences
  - Multiple samples are obtained in each field location
  - Weather conditions/seasons and other factors will impact pace

PFAS Investigation Teams

- Project teams are/will be assigned to each site in each Tier
  - Each Team has a project lead, geology technician and/or a geologist/hydrogeologist
  - Many members of each team are assigned to multiple sites statewide
  - This work is brand new for many existing and new staff
  - Processes continually being refined within DEP and also in coordination with DACF



PFAS Staffing and Funding

- 11 NEW Full Time Equivalents; 6 NEW Limited Period Positions
- Several existing staff also still working on PFAS; impacting other programs
- $20M from General Fund for the sampling, treatment, remediation, and monitoring of PFAS
- $5M from Maine Jobs and Recovery Plan* (still working on obtaining this!)
- Additional Infrastructure money **may** become available relating to remediation of PFAS in drinking water and wastewater *

PFAS Investigation Process

- Review project licenses and annual reports to determine where land applications took place
- Develop a sampling and analysis plan (SAP) for each site
- Contact landowner/homeowner to schedule sampling events
- Coordinate with the Department of Agriculture, Conservation and Forestry Bureau of Agriculture, Food, and Rural Resources
- Conduct sampling event and deliver samples to the laboratory
- Follow up with landowner/homeowner with laboratory results
- Evaluate data to determine need for further sampling nearby

PFAS Post-investigation Process

- Elevated soil results:
  - DEP coordinates with DACF regarding lab results
  - DACF coordinates with landowners to discuss next steps
  - DEP and DACF process still being refined
- Elevated residential water results:
  - DEP coordinates with homeowners to discuss lab results
  - Bottled water provided until filtration systems can be installed and maintained
  - Farm water systems separate from residential, DACF will assist

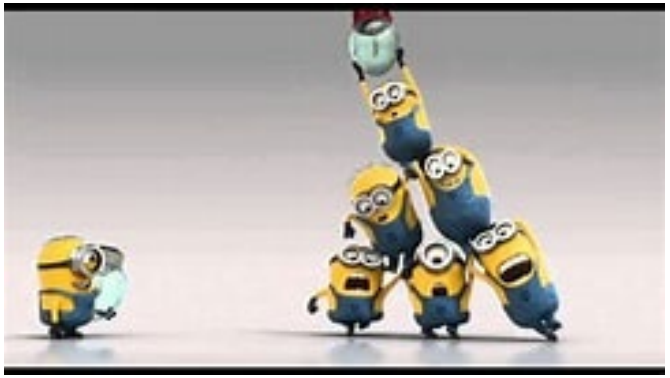

Environmental Chemistry
Chain of Custody

Self-Testing

- DEP can't get to every site at the beginning despite concerns!
- Locations in Tiers II, III, IV:
  - Private drinking water wells can be tested by individual homeowners – guidance is available on DEP website
  - Soil sampling, sampling of animal tissue, sampling of agricultural products is more challenging and will require assistance from the Department of Agriculture, Conservation and Forestry

Interagency Coordination

- Communications are ongoing and frequent between DEP, DACF, DIF&W, DHHS (CDC and DWP)
  - Each agency has different objectives/priorities
  - Inquiries from the public don't fit neatly within each of the agency's areas of expertise
  - Inter-agency website being developed
- DEP and DACF are working together regularly to best assist the agricultural community



Additional Considerations

- Pace of the investigation doesn't meet everyone's needs
- Long term impacts of investigation extend far beyond DEP
  - Agriculture
  - Hunting, Fishing, Gardening
  - Small Businesses
- Some areas with high levels of PFAS – multiple sources may be present – may fall under uncontrolled sites program
- PFAS disposal still a significant question – PFAS not a hazardous waste, but still difficult to get rid of
- EPA Strategic Roadmap for PFAS released in 2021

Contact us at: pfas.dep@maine.gov

www.maine.gov/dep/spills/topics/pfas/index.html