CT DEEP EXPECTATIONS FOR PFAS INVESTIGATIONS

Society for Women Environmental Professionals

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Remediation Division

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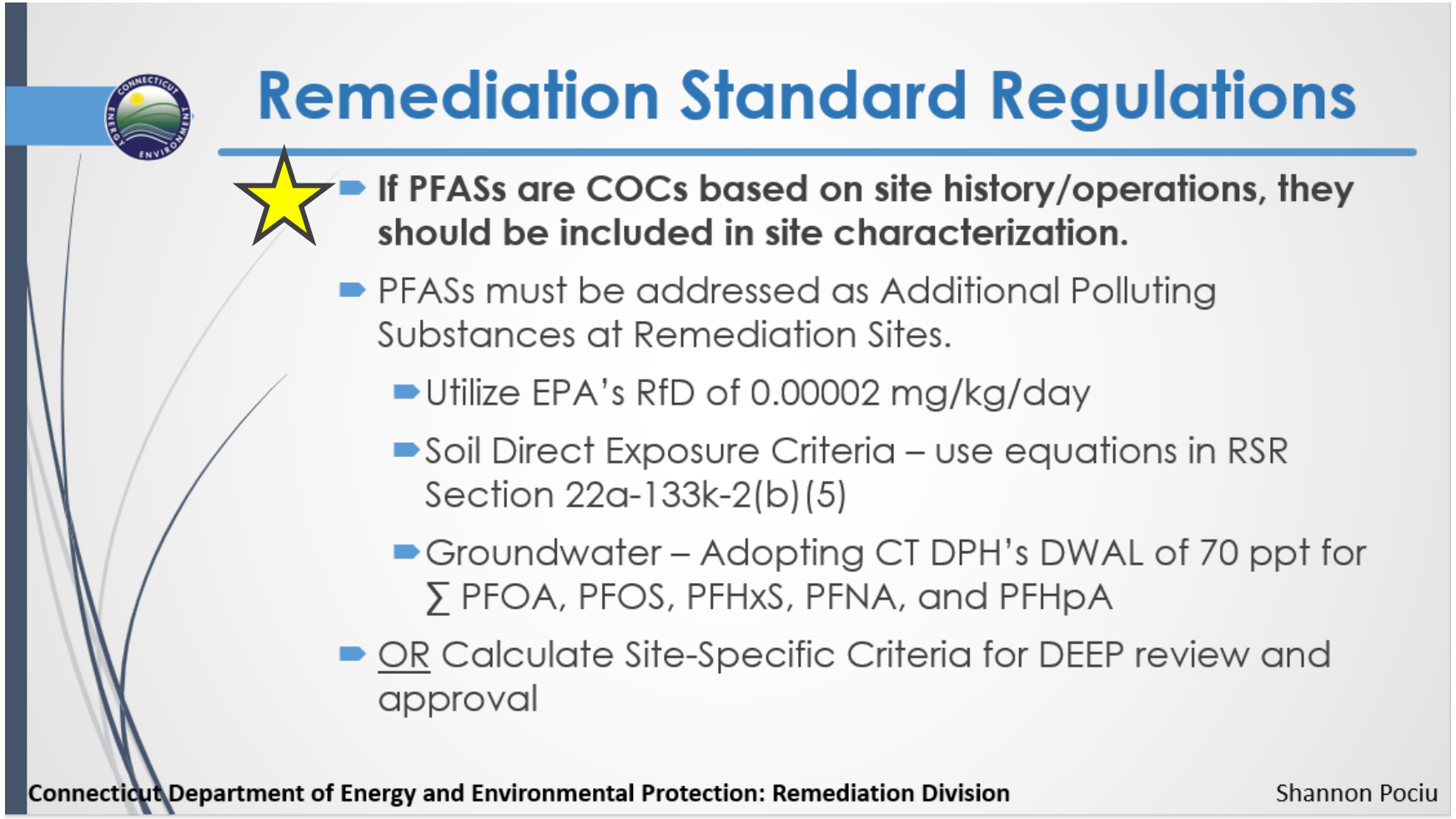
PFAS AS CONTAMINANTS OF CONCERN:
FLASHBACK TO JUNE 20, 2017 REMEDIATION ROUNDTABLE MEETING



PFAS AS CONTAMINANTS OF CONCERN

FROM DEEP Website: Contaminants of Emerging Concern (ct.gov)

"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 PFAS are contaminants of concern based on site history/ operations, they must be included in site characterization.

PFAS AS CONTAMINANTS OF CONCERN

From the **PFAS Information for Environmental Professionals** webpage:

- **If PFAS are contaminants of concern based on site history/ operations, they must be included in site characterization.**
- Environmental professionals should consider whether **emerging contaminants**, including PFAS, are constituents of concern when evaluating Phase I information and test for those emerging contaminants where warranted.
- Phase 1 evaluation of PFAS will help avoid uncertainty, audits, and unanticipated work in the future.
- **Reliance on Safety Data Sheets or anecdotal reports is not sufficient to preclude testing for PFAS.**
  - Safety Data Sheets will not identify PFAS as ingredients if they comprise less than 1% of the product or if they are considered a “trade secret.”

EXAMPLES OF KNOWN PFAS SOURCES

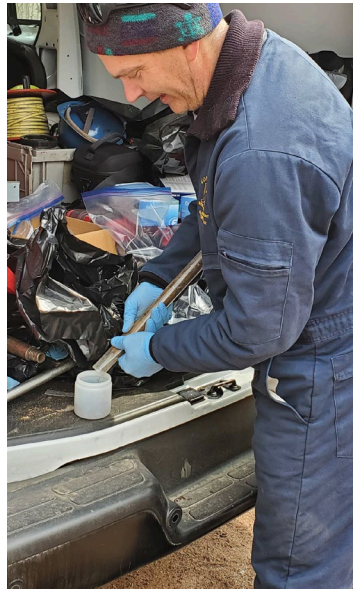
Per- and Polyfluoroalkyl Substances (PFAS) (ct.gov) - Known PFAS Sources

Consumer Products (examples)	
Nonstick cookware	Industrial and household cleaning products
Waterproof, water-resistant, and stain-resistant textiles (e.g., clothing, shoes, upholstery, and carpets)	Grease-resistant and waterproof coatings on food packaging (e.g., popcorn bags, takeout containers, pizza boxes, and fast-food wrappers). Coated paper products
Floor, car, and boat waxes; ski wax	Cosmetics and personal care products
Manufacturing/Industrial Uses and Processes (examples)	
Metal plating and finishing	Engineered coatings used in semiconductor production
Etching of metals, plastics, and glass	Surface coating, paint, varnish, and inks
Plastics, resins, and rubber products	Cable and wire insulation for electronics
Aqueous Film-Forming Foam (AFFF) used to extinguish Class B petroleum & flammable liquid fires	
Waste Management and Disposal Locations	
Landfills	Wastewater Treatment Plants and Septic Systems
Biosolids and biosolids-based agricultural amendments	

RESOURCES TO HELP IDENTIFY PFAS SOURCES AND USES

- **Historical and current usage of per- and polyfluoroalkyl substances (PFAS): A literature review** by Linda Gaines, PhD, PE , May 2022. Am J Ind Med. 2022;1-26.
- **An overview of the uses of per- and polyfluoroalkyl substances** by Glüge, et. al. Environ. Sci.: Processes Impacts, 2020, 22, 2345-2373.
- **ITRC – PFAS Technical & Regulatory Guidance Document**

PFAS SAMPLING & ANALYSIS



Sampling:

Use care to avoid cross-contamination of samples

Excellent sample guidance exists:

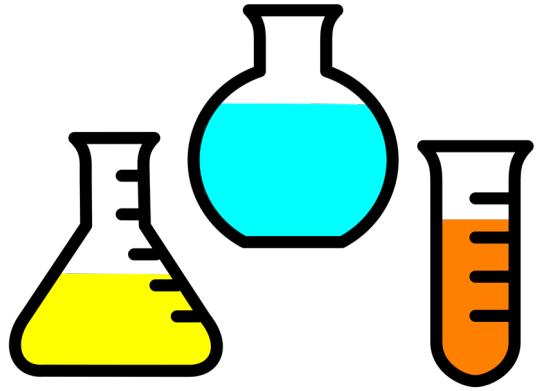
- **Michigan, MassDEP, NYS DEC, ITRC, others**

Analysis:

Analyze for and report ALL PFAS included in a particular lab method, not just the 4 or 5 with APS criteria and Drinking Water Action Levels

- **Why?**
  - ✓Avoid additional sampling costs. Science is evolving → New toxicological information on additional compounds →Future criteria
  - ✓Source identification
  - ✓Treatment system design

LAB METHODS



Drinking Water:

- **EPA Methods 537.1 and 533 - PREFERRED**

Non-Potable Water & Environmental Matrices:

- **EPA Draft Method 1633 – PREFERRED – 40 PFAS, isotope dilution, various matrices**
- **If EPA 1633 is not available, EPA 537 "modified" to include isotope dilution can be used with caution.**
- **EPA 8327 – 24 PFAS, direct injection, external standard, aqueous samples, less desirable, screening**
- **Total Oxidizable Precursor (TOP) Assay – for determining additional PFAS precursor mass**

DEEP Remediation Division recommends use of Modified EPA Method 537.1 with isotope dilution/DoD QSM Table B-15 or Draft EPA Method 1633/DoD QSM Table B-24.

EPA LAB METHODS & CERTIFIED LABS

PFAS Analytical Methods Development and Sampling Research | US EPA - comprehensive list of analytical methods for testing different matrices

DPH Environmental Lab Certification Program

- **CT DPH certified lab must be used for potable water sample analysis for compliance with DPH regulatory programs and is strongly recommended for all other potable water samples.**
- **List of certified labs for EPA 537 rev. 1.1, 537.1, 533**
- **DPH will be certifying EPA Draft 1633 and Draft 1621 (Adsorbable Organic F) in the near future**

DoD Environmental Laboratory Accreditation Program (DoD ELAP)

- **Accredited Labs Search**

Connecticut Department of Energy & Environmental Protection

DRINKING WATER ADVISORY LEVELS AND REMEDIATION CRITERIA

EPA Proposed Rulemaking: Six PFAS

- March 14: EPA issued ***proposed*** enforceable drinking water standards (MCLs) for 6 PFAS
  - PFOA, PFOS, [PFHxS, PFNA, PFBS, GenX]
- Proposal also requires public water systems to monitor for these PFAS, notify the public if these PFAS are found at levels exceeding proposed MCLs, and take action to reduce these PFAS to levels below proposed MCLs.
- **No required actions until proposed rule is finalized**
- Public comment period for 60 days – until May 30, 2023
- EPA anticipates final rule by the end of 2023

EPA Proposed MCLs

PFAS	EPA Draft MCL (parts per trillion, ppt, ng/L)	CT Action Level (parts per trillion, ppt, ng/L)
Perfluorooctanoic acid (PFOA)	4	16
Perfluorooctane sulfonic acid (PFOS)	4	10
Perfluorononanoic acid (PFNA)	1.0 (unitless) Hazard Index*	12
Perfluorohexane sulfonic acid (PFHxS)	1.0 (unitless) Hazard Index*	49
Perfluorobutanesulfonic acid (PFBS)	1.0 (unitless) Hazard Index*	-
Hexafluoropropylene oxide dimer acid (HFPO-DA / GenX)	1.0 (unitless) Hazard Index*	-

*Hazard Index is the ratio between the chemical concentration and its “safe” concentration.

Hazard Index

$$HI = \sum \frac{\text{concentration of each PFAS measured in drinking water}}{\text{EPA's Health-based water concentration (HBWC) for each PFAS}}$$

$$HI = \left[\frac{GenX}{10\ ppt}\right] + \left[\frac{PFBS}{2000\ ppt}\right] + \left[\frac{PFNA}{10\ ppt}\right] + \left[\frac{PFHxS}{9.0\ ppt}\right]$$

Example:

$$\left[\frac{5\ ppt}{10\ ppt}\right] + \left[\frac{200\ ppt}{2000\ ppt}\right] + \left[\frac{5\ ppt}{10\ ppt}\right] + \left[\frac{4\ ppt}{9.0\ ppt}\right] = 1.5$$

For more information

https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

DPH's PFAS Information webpage

DPH.EmergingContaminants@ct.gov or call 860-509-7333

REMEDIATION CRITERIA

From the **Contaminants of Emerging Concern** webpage:

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).

- PFAS
- 1,4-Dioxane
- Perchlorate
- Others

RSR ADDITIONAL POLLUTING SUBSTANCE CRITERIA

Applies to ∑ PFOA, PFOS, PFNA, PFHxS & PFHpA

Remediation Standard	Criterion
Residential Direct Exposure Criterion	1.35 mg/kg
Industrial/Commercial Direct Exposure Criterion	41 mg/kg
GA Pollutant Mobility Criterion	1.4 µg/kg
GB Pollutant Mobility Criterion	14 µg/kg
Groundwater Protection Criterion (adopts DPH's 2016 Drinking Water Action Level for ∑ PFOA, PFOS, PFNA, PFHxS, PFHpA)	70 ng/L
Surface Water Protection Criterion	In Development

- Existing summed PFAS APS criteria will be updated to individual criteria for PFOA, PFOS, PFNA, and PFHxS using the 2022 DPH DWALs and Reference Doses.
- Toxicity information for additional PFAS requested from DPH for use in deriving APS criteria for future inclusion on the Fast Track form.

Requesting APS and Alternative Criteria (ct.gov)

SITE CHARACTERIZATION CONSIDERATIONS

Ambient soil

Site air emission sources

Fate & Transport

- **Transformation of polyfluorinated precursor compounds**
- **Differences in sorption based on functional groups and chain lengths**
- **Partitioning**
- **Air-water interfacial behavior**
- **Micelles**

Septic systems

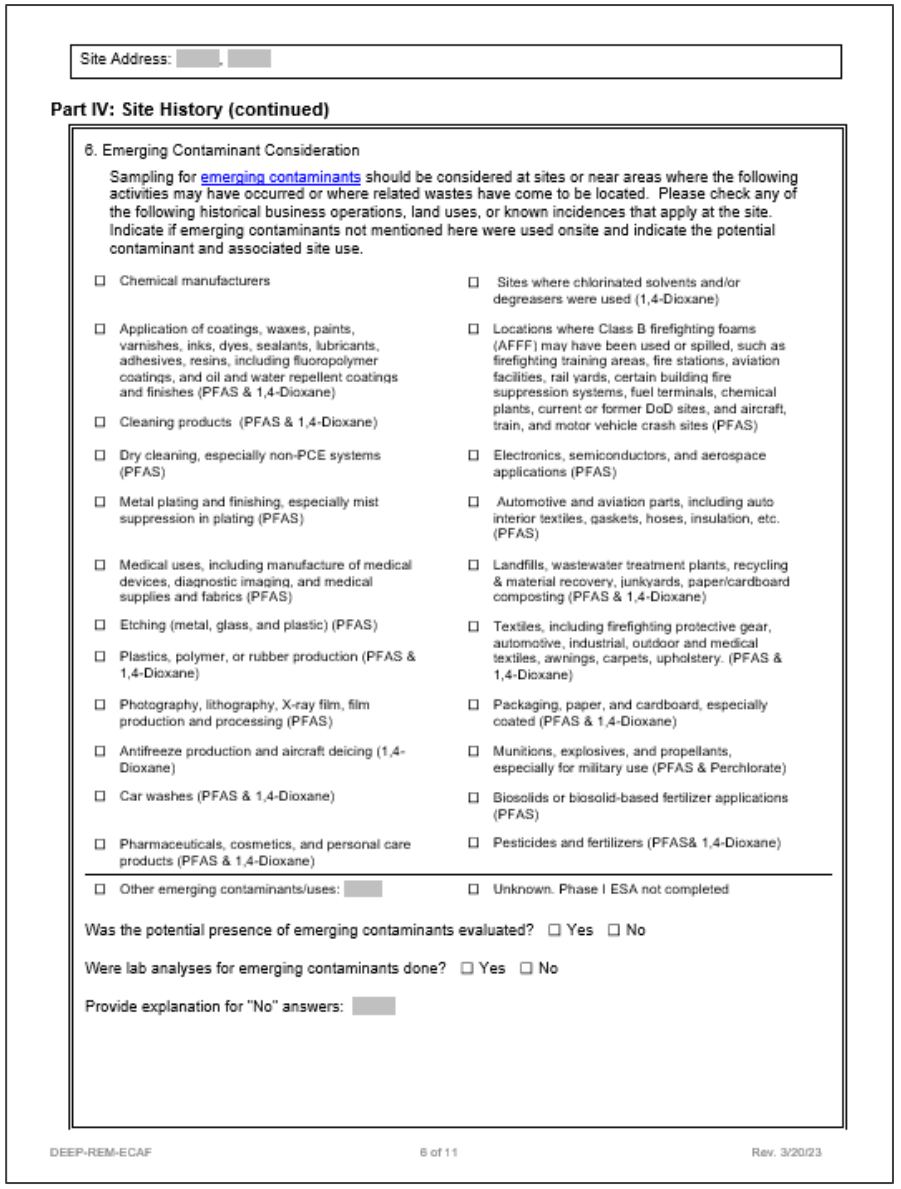
STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

SITE CHARACTERIZATION GUIDANCE DOCUMENT

ENVIRONMENTAL CONDITION ASSESSMENT FORM (ECAF) – EMERGING CONTAMINANT CONSIDERATION

Note: Completion of Investigation (COI) Transmittal Form – to be updated in the future to include PFAS



Site Address: [redacted]

Part IV: Site History (continued)

6. Emerging Contaminant Consideration

Sampling for emerging contaminants should be considered at sites or near areas where the following activities may have occurred or where related wastes have come to be located. Please check any of the following historical business operations, land uses, or known incidences that apply at the site. Indicate if emerging contaminants not mentioned here were used onsite and indicate the potential contaminant and associated site use.

- ☐ Chemical manufacturers
- ☐ Application of coatings, waxes, paints, varnishes, inks, dyes, sealants, lubricants, adhesives, resins, including fluoropolymer coatings, and oil and water repellent coatings and finishes (PFAS & 1,4-Dioxane)
- ☐ Cleaning products (PFAS & 1,4-Dioxane)
- ☐ Dry cleaning, especially non-PCE systems (PFAS)
- ☐ Metal plating and finishing, especially mist suppression in plating (PFAS)
- ☐ Medical uses, including manufacture of medical devices, diagnostic imaging, and medical supplies and fabrics (PFAS)
- ☐ Etching (metal, glass, and plastic) (PFAS)
- ☐ Plastics, polymer, or rubber production (PFAS & 1,4-Dioxane)
- ☐ Photography, lithography, X-ray film, film production and processing (PFAS)
- ☐ Antifreeze production and aircraft deicing (1,4-Dioxane)
- ☐ Car washes (PFAS & 1,4-Dioxane)
- ☐ Pharmaceuticals, cosmetics, and personal care products (PFAS & 1,4-Dioxane)
- ☐ Sites where chlorinated solvents and/or degreasers were used (1,4-Dioxane)
- ☐ Locations where Class B firefighting foams (AFFF) may have been used or spilled, such as firefighting training areas, fire stations, aviation facilities, rail yards, certain building fire suppression systems, fuel terminals, chemical plants, current or former DoD sites, and aircraft, train, and motor vehicle crash sites (PFAS)
- ☐ Electronics, semiconductors, and aerospace applications (PFAS)
- ☐ Automotive and aviation parts, including auto interior textiles, gaskets, hoses, insulation, etc. (PFAS)
- ☐ Landfills, wastewater treatment plants, recycling & material recovery, junkyards, paper/cardboard composting (PFAS & 1,4-Dioxane)
- ☐ Textiles, including firefighting protective gear, automotive, industrial, outdoor and medical textiles, awnings, carpets, upholstery. (PFAS & 1,4-Dioxane)
- ☐ Packaging, paper, and cardboard, especially coated (PFAS & 1,4-Dioxane)
- ☐ Munitions, explosives, and propellants, especially for military use (PFAS & Perchlorate)
- ☐ Biosolids or biosolid-based fertilizer applications (PFAS)
- ☐ Pesticides and fertilizers (PFAS& 1,4-Dioxane)

☐ Other emerging contaminants/uses: [redacted]

☐ Unknown. Phase I ESA not completed

Was the potential presence of emerging contaminants evaluated? ☐ Yes ☐ No

Were lab analyses for emerging contaminants done? ☐ Yes ☐ No

Provide explanation for "No" answers: [redacted]

DEEP-REM-ECAF 6 of 11 Rev. 3/20/23

SIGNIFICANT ENVIRONMENTAL HAZARDS & PFAS

CGS Section 22a-6u(c)

- After July 1, 2015, if a TEP **in the course of investigating and remediating** pollution on or emanating from a parcel determines **pollution has affected** a public or private **drinking water supply well**…**with any substance** from the release **for which there is no RSR criterion**,
  - **TEP shall notify client and owner of property within 7 days.**
  - **Owner of parcel that is the source of pollution to a drinking water well shall, within 30 days:**
    1) Perform confirmatory sampling of well and submit report to Commissioner with a plan for further action, and
    2) Notify Commissioner in writing.

PFAS WASTE DISPOSAL

- **EPA's December 2020 "Interim Guidance on Destroying and Disposing of Certain PFAS and PFAS-Containing Materials" – to be updated by December 2023.**
- **Following EPA developments with respect to hazardous waste and hazardous substance listings**
- **CT Regulated Waste – CR04/CR05 – waste chemical liquids and solids**
- **Contact receiving facility for acceptance guidelines.**
  - Although not a HW in CT, it could be hazardous in the receiving state and require a federal manifest.

TAKE-AWAYS

If PFAS are COCs, sample for PFAS

Analyze and report all PFAS in the method

PFAS Additional Polluting Substance (APS) Criteria to be updated in the near future

Protection of sensitive receptors and human health a priority, especially drinking water

THANK YOU

CT DEEP PFAS webpage

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