# REMTEC & EMERGING CONTAMINANTS SUMMIT

## OCTOBER 15-17, 2024

# Demystifying PFAS in Remedial Regulatory Processes

# Panelists:

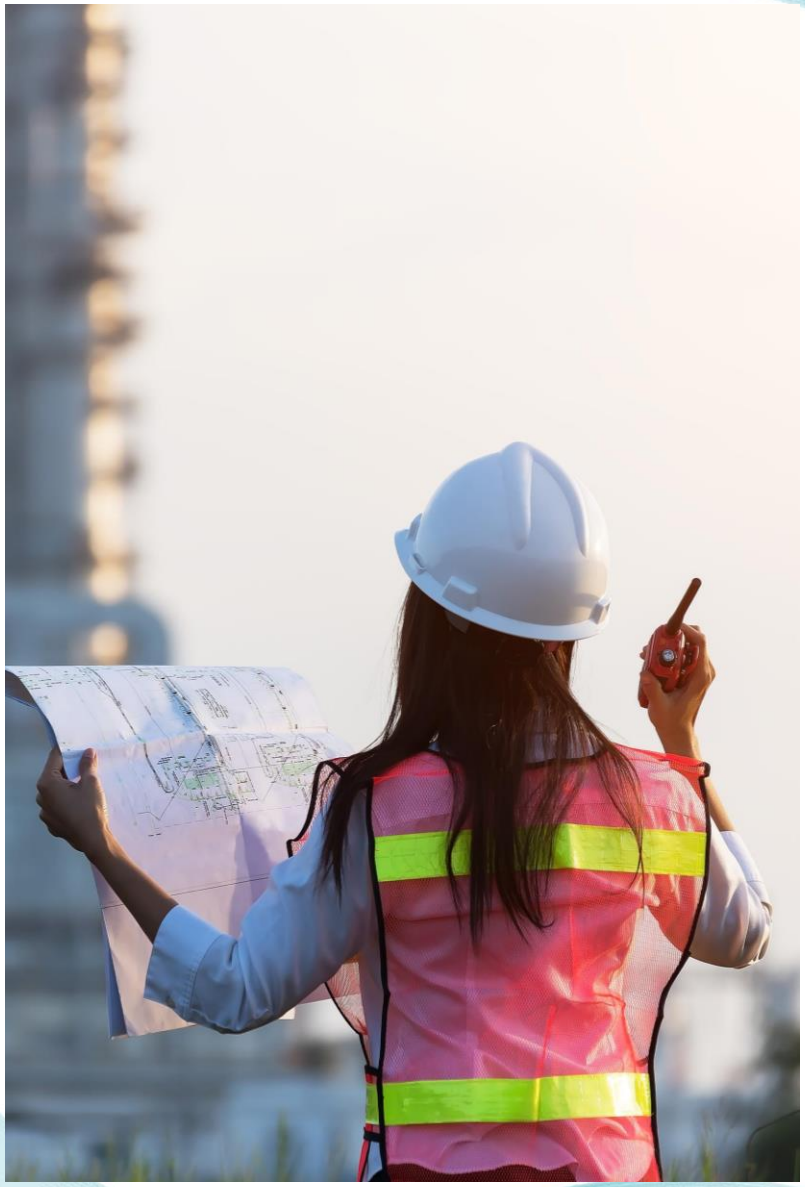
- Mary Cooke, Physical Scientist
  USEPA Federal Facilities Restoration and Reuse Office
- Donald Sobelman, Attorney,
  Farella Braun and Martel LLP
- Cal Baier-Anderson, Physical Scientist,
  USEPA Federal Facilities Restoration and Reuse Office
- Claire Mitchell, PE PMP
  AECOM
- Doug Paquette, Hydrologist,
  Brookhaven National Laboratory, DOE
- Nicole Goers, Remedial Project Manager,
  USEPA Region 5

# EPA Oversight of PFAS Remedial Investigations: EPA PFAS Federal Facility Work Group

Cal Baier-Anderson

EPA/OLEM/FFRRO

October 2024

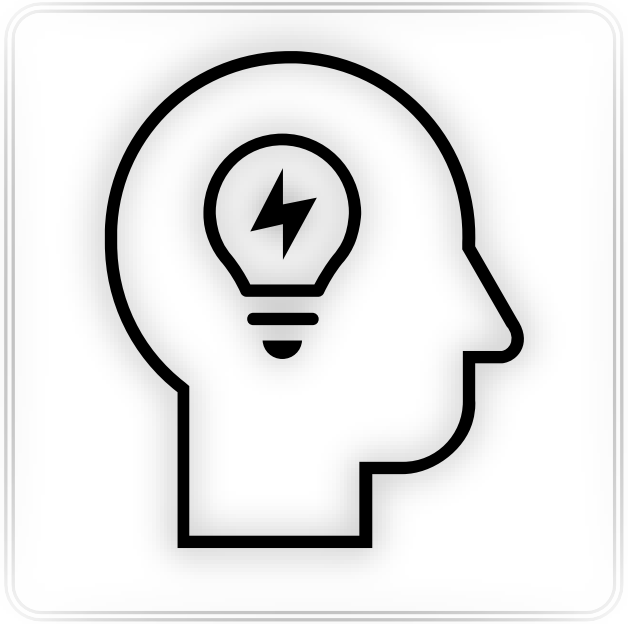


# Challenges of Regulatory Oversight

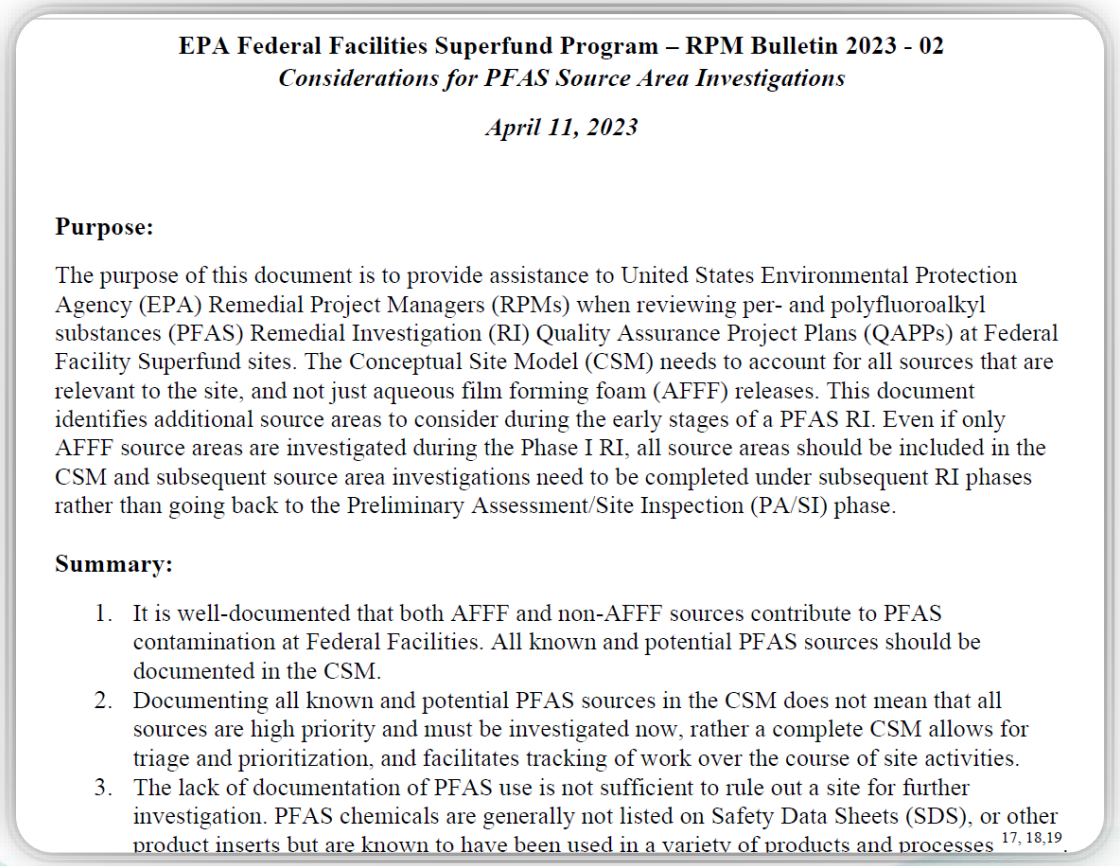
- EPA RPMs had immediate challenges with regulatory oversight of PFAS investigations and actions
  - Data gaps
  - Evolving science

# PFAS Questions and the PFAS RI Work Group

- EPA RPMs and technical staff
- Problem-solving focus
- Identify issues
- Ad hoc teams
- Identify and share best practices



# Scoping



**EPA Federal Facilities Superfund Program – RPM Bulletin 2023 - 02**
***Considerations for PFAS Source Area Investigations***

***April 11, 2023***

**Purpose:**

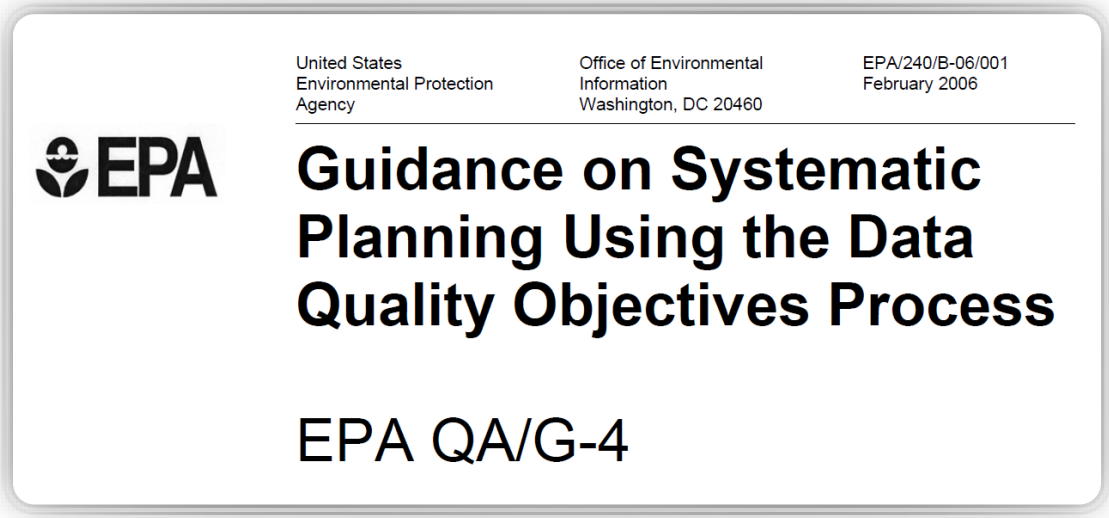
The purpose of this document is to provide assistance to United States Environmental Protection Agency (EPA) Remedial Project Managers (RPMs) when reviewing per- and polyfluoroalkyl substances (PFAS) Remedial Investigation (RI) Quality Assurance Project Plans (QAPPs) at Federal Facility Superfund sites. The Conceptual Site Model (CSM) needs to account for all sources that are relevant to the site, and not just aqueous film forming foam (AFFF) releases. This document identifies additional source areas to consider during the early stages of a PFAS RI. Even if only AFFF source areas are investigated during the Phase I RI, all source areas should be included in the CSM and subsequent source area investigations need to be completed under subsequent RI phases rather than going back to the Preliminary Assessment/Site Inspection (PA/SI) phase.

**Summary:**

1. It is well-documented that both AFFF and non-AFFF sources contribute to PFAS contamination at Federal Facilities. All known and potential PFAS sources should be documented in the CSM.
2. Documenting all known and potential PFAS sources in the CSM does not mean that all sources are high priority and must be investigated now, rather a complete CSM allows for triage and prioritization, and facilitates tracking of work over the course of site activities.
3. The lack of documentation of PFAS use is not sufficient to rule out a site for further investigation. PFAS chemicals are generally not listed on Safety Data Sheets (SDS), or other product inserts but are known to have been used in a variety of products and processes [17, 18, 19].

- EPA concerns regarding focus on AFFF
  - Reviewed existing guidance
  - Reviewed published literature
  - Identified relevant uses at military/industrial sites
  - Shared language for comments
  - Developed best practices and expectations
- RPM Bulletin

# Analytical Methods


United States Environmental Protection Agency | Office of Environmental Information Washington, DC 20460 | EPA/240/B-06/001 February 2006

EPA

**Guidance on Systematic Planning Using the Data Quality Objectives Process**

EPA QA/G-4

- EPA concerns regarding the use of modified EPA methods and development of DQOs
  - Met with chemists and lab quality experts
  - Reviewed existing guidance
  - Developed recommendations for data review
  - Made available national contract to assist with review
- RPM Bulletin

# Use of Lysimeters

- Lysimeters deployed at multiple sites
- Concerns for how data would be used
- Team of scientists from OLEM and ORD
- White Paper to help RPMs consider how lysimeters can (and can’t) be used

**EPA Federal Facilities Superfund Program**

***Using Lysimeters to Determine the Potential of PFAS to Leach from Soil to Groundwater***

April 19, 2023

The Department of Defense (DoD) began installing lysimeters at their installations to investigate per- and polyfluoroalkyl substances (PFAS). These devices were claimed to be appropriate for determining how PFAS move from soil to groundwater (Anderson, 2021). In response to questions from EPA staff about the applicability of these devices for PFAS, the Federal Facilities Restoration and Reuse Office (FFRRO) proposed that a team of EPA scientists review the available information and develop a summary document to help EPA staff when reviewing investigation documents proposing to use lysimeters.

This document was prepared by staff from FFRRO, the Groundwater Characterization & Remediation Division (GCRD) and the Technical Support Coordination Division (TSCD) in the Office of Research and Development (ORD), the Superfund and Emergency Management Division (SEMD) in Region 4, the Laboratory Services and Applied Science Division (LSASD) in Regions 8 and 10, and the Environmental Response Team (ERT) in the Office of Superfund Remediation and Technology Innovation (OSRTI).

# PFAS Five-Year Reviews

Guidance clearly indicates that new contaminants call into question the basis of the protectiveness determinations

Developed a review template

Established best practices

Apply consistently

**Exhibit 4-1: Three Questions Used to Determine Whether a Remedy is Protective**

| When you ask... | you should consider whether... |
|---|---|
| **Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid? | • there are changes in standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the ROD, newly promulgated standards, and/or changes in TBCs identified in the ROD, that could call into question the protectiveness of the remedy;<br>• there are changes in land use or the anticipated land use on or near the site;<br>• new human health or ecological exposure pathways or receptors have been identified;<br>• new contaminants or contaminant sources have been identified;<br>• there are unanticipated toxic byproducts of the remedy not previously addressed by the decision documents;<br>• there are changes in the physical site conditions; and<br>• there are changes in the toxicity factors for contaminants of concern. |

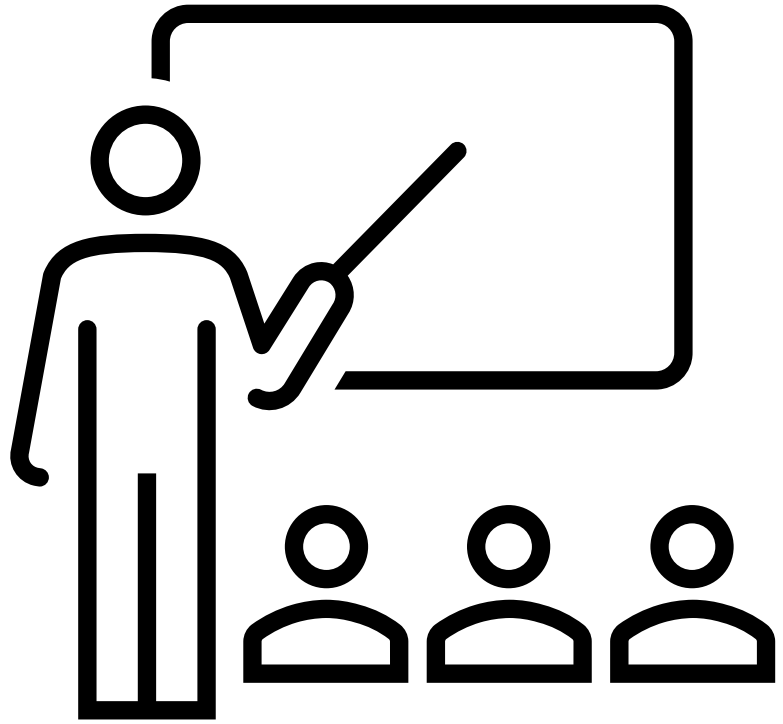
# Crosswalks – Legacy and PFAS Co-occurrence

**TABLE 1-1**
**KNOWN AND POTENTIAL OVERLAP BETWEEN OU-11 PLUMES AND OU-13 PFAS SITES**

| OU-11 Plume (Basewide Groundwater) | Potential Co-Located PFAS Site | | Notes[1] |
|---|---|---|---|
| | Site ID | Site Name | |
| OU-1 | FT001P | Current and Former Fire Protection Training Areas | Same source area |
| OU-2 | FT001P | Current and Former Fire Protection Training Areas | OU-2 is downgradient |
| OU-4 | -- | -- | No known PFAS impacts, OU-4 is located downgradient of SS609P (Delta Taxiway West Crash); however, PFAS groundwater concentrations were below screening levels in 2018 and the recommendation was "no further response action planned" (Aerostar 2019). |
| OU-6 | WP604P | Landfill No. 5 | Known co-occurrence |
| OU-7 | -- | -- | No known PFAS impacts |
| OU-10 | SS600P | None | No samples collected in this area |

# Lessons from PFAS Problem Solving

- Apply EPA guidance
- Clearly document expectations
- Identify best practices
- Convey potential consequences



# Questions?

- Cal Baier-Anderson

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- Mary Cooke

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# Managing Headwinds in DoD PFAS Remedial Investigations

16 October 2024

**Claire Mitchell, PE PMP (AECOM)**

REMTEC & EMERGING CONTAMINANTS SUMMIT
OCTOBER 15-17, 2024

## Claire Mitchell, PE PMP

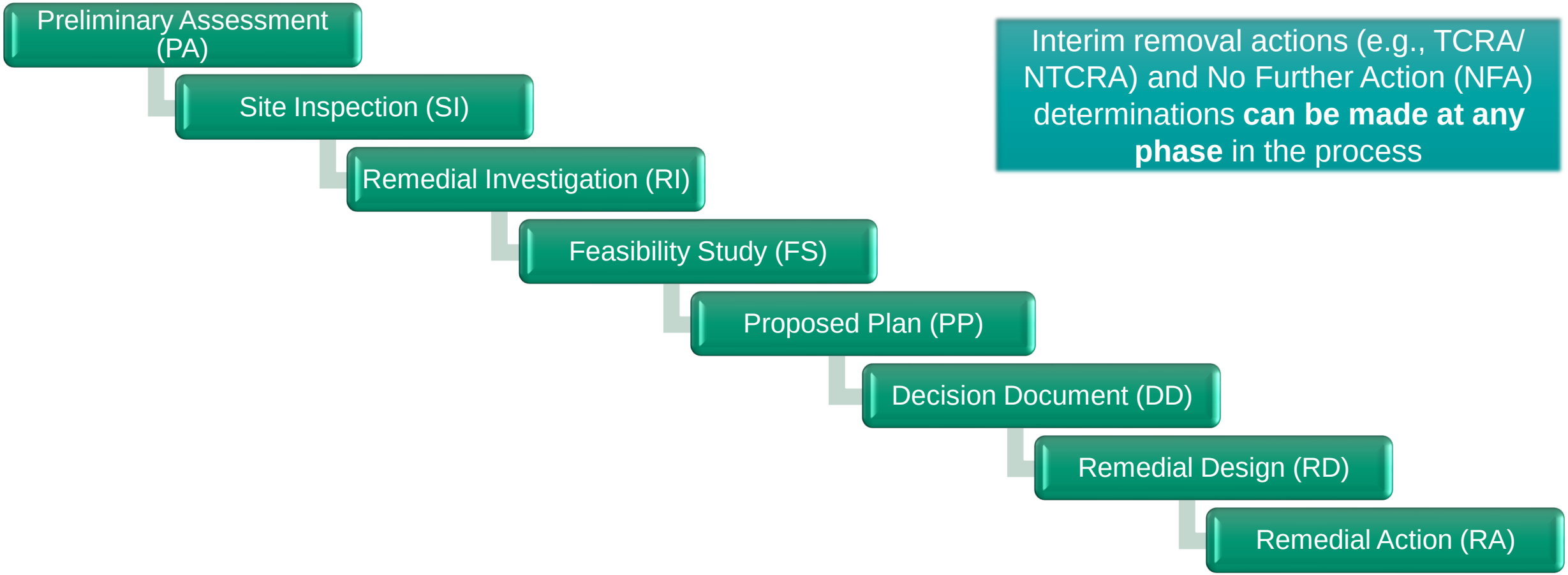
- 15 years of engineering consulting experience in private and US DoD cleanup programs
- Serves as AECOM's Program Manager for Army National Guard PFAS projects
- Focused on guiding AECOM's Federal clients' PFAS sites through the CERCLA process
- Oversees the technical and financial execution of over 30 PFAS RIs nationwide
- Has delivered multiple TCRAs/NTCRAs for PFAS as US regulations change
- Cofounder and coleader of AECOM's Federal Remediation PFAS Work Group
- Holds a Bachelor of Science in Civil Engineering

# Agenda

Headwinds for CERCLA PFAS Investigations
Timing for Taking an Action
Leveraging Existing Data for Confident Remedial Decisions

# Headwinds for CERCLA PFAS Investigations

## Summary of CERCLA Work Phases



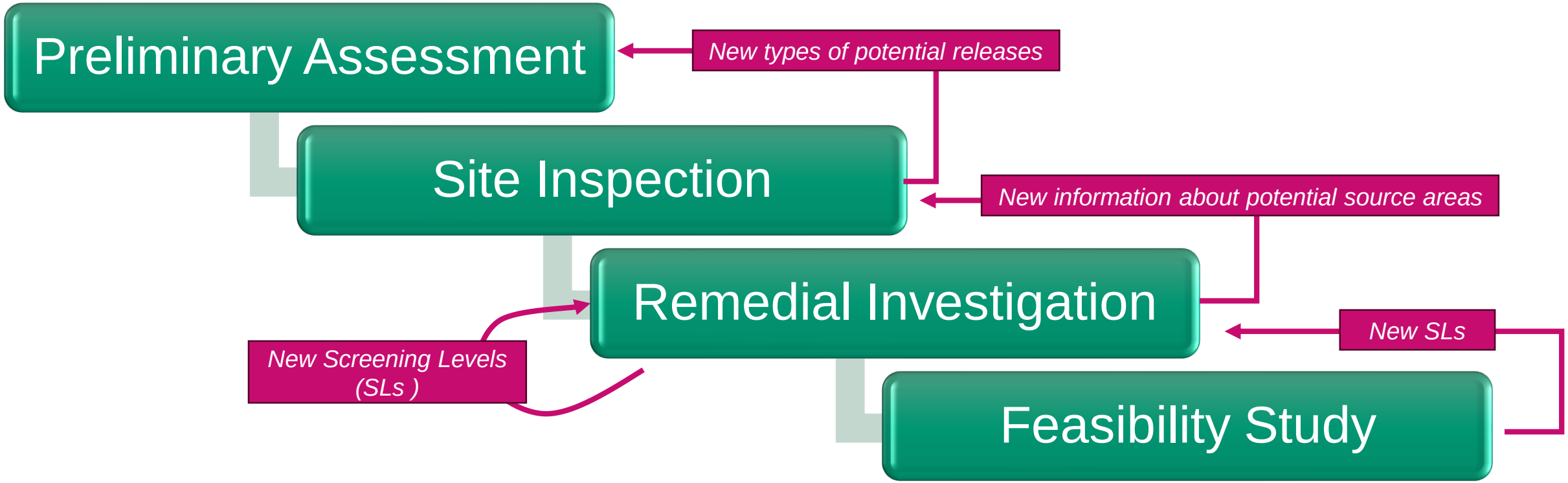

Interim removal actions (e.g., TCRA/ NTCRA) and No Further Action (NFA) determinations **can be made at any phase** in the process



Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Non-Time Critical Removal Action (NTCRA)
Time Critical Removal Action (TCRA)

# Headwinds for CERCLA PFAS Investigations

PFAS CERCLA “Do Loops”



# Headwinds for CERCLA PFAS Investigations

Impact of regulatory updates on RIs

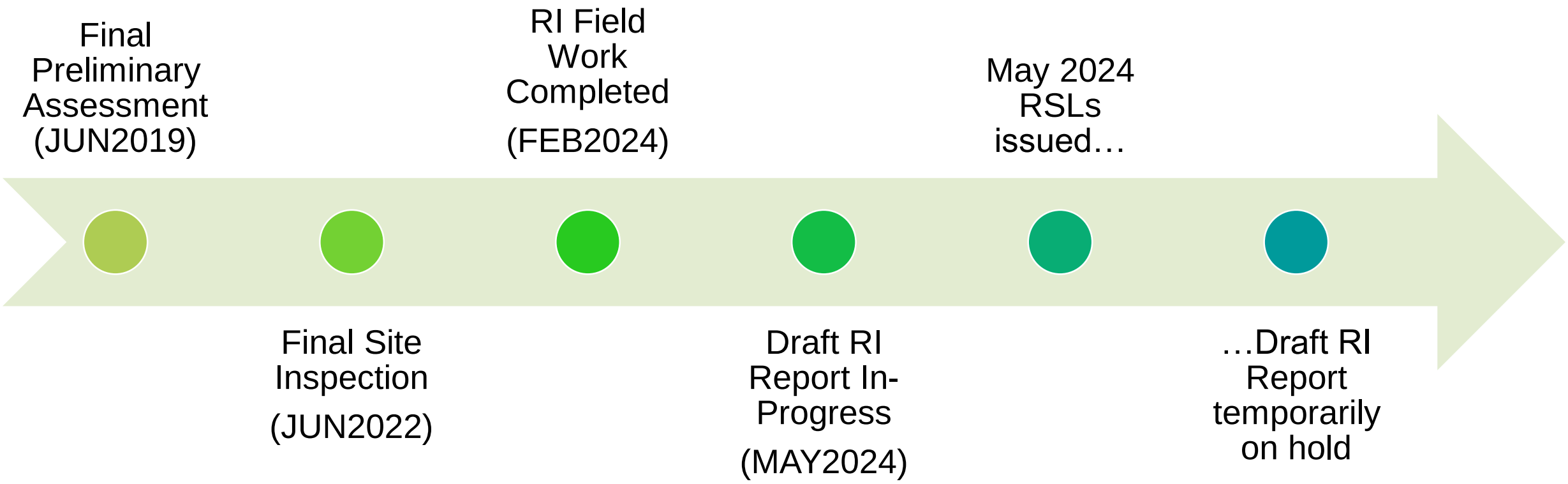
## May 2024 USEPA Regional Screening Level (RSL) update significantly reduced SLs for PFOS and PFOA

| Analyte | Resident Soil (µg/kg) | Industrial Soil (µg/kg) | Tap Water (ng/L) |
|---|---|---|---|
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 350 | 1.5 |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 25,000 | 600 |
| Perfluorobutanoic acid (PFBA) | 7,800 | 120,000 | 1,800 |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 1,600 | 39 |
| Perfluorohexanoic acid (PFHxA) | 3,200 | 41,000 | 990 |
| Perfluorononanoic acid (PFNA) | 19 | 250 | 5.9 |
| Perfluorooctanesulfonic acid (PFOS)* | 0.63 (previously 13) | 8.2 (previously 160) | 0.2 (previously 4.0) |
| Perfluorooctanoic acid (PFOA)* | 0.019 (previously 19) | 0.078 (previously 250) | 0.0027 (previously 6.0) |

* relative to November 2023 USEPA RSLs

# Headwinds for CERCLA PFAS Investigations

## Impact of regulatory updates on RIs - DoD Facility Example



# Headwinds for CERCLA PFAS Investigations

Impact of regulatory updates on RIs - DoD Facility Example

| Metric | Prelim. RI Conclusions **2023 RSLs** | Prelim. RI Conclusions **2024 RSLs** |
|---|---|---|
| **Nature and Extent** | ✓ Delineated in all media | ✗ Not delineated |
| **Risk Assessment Results** | ✓ No risk (NFA) | ✗ Risk (FS) |

# Headwinds for CERCLA PFAS Investigations

## Impact of regulatory updates on RIs - DoD Facility Example

### Preliminary Cancer Risk and Non-Cancer Hazard Results for Draft HHRA

| Receptors | Potential Cancer Risk | | Non-Cancer Hazard Index | |
|---|---|---|---|---|
| | Tox values from 2023 RSLs | Tox values from 2024 RSLs | Tox values from 2023 RSLs | Tox values from 2024 RSLs |
| **Onsite Worker/Military Personnel** | 3E-09 | **1E-03** | 0.2 | **6** |
| **Construction/Utility Worker** | 2E-13 | 2E-07 | 0.003 | 0.09 |
| **Hypothetical Resident (Child/Adult)** | Lifetime: 9E-09 | Lifetime: **4E-03** | Child: 0.9 Adult: 0.5 | Child: **30** Adult: **18** |
| **Recreational Wader (Child/Adult)** | No COPCs | Lifetime: 5E-06 | No COPCs | Child: 0.09 Adult: 0.01 |
| **Recreational Swimmer (Child/Adult)** | No COPCs | Lifetime: 4E-05 | No COPCs | Child: 0.4 Adult: 0.07 |

Results in **red font** exceed a cancer risk level of 1E-04 or a hazard index of 1.
Cancer risk and non cancer HI results are unitless.
**Results are preliminary and subject to change.

# Headwinds for CERCLA PFAS Investigations

Impact of regulatory updates on RIs - ARNG Facility Example

## Timing for Taking an Action

What can we do now and in the future to minimize “do loops”?

- Implement TCRA/ NTCRAs **to take an action now** versus years from now when the RI is complete

**Now**

- Use data and statistics **to leverage your current data sets** to avoid additional data collection to support FS and remedial designs

**Future**

# Timing for Taking an Action

Pros and Cons of Taking an Action Now versus Later

## Non-Time-Critical Removal Action

### Pros:

- Immediately reduces exposure
- Can be readily implemented
- Community support/ approval

### Cons:

- Does not benefit from on-going PFAS remediation technology development
- Doesn't fully evaluate the most efficient/ effective alternatives

## Feasibility Study/ Remedial Design

### Pros:

- Leverages ongoing technical development in PFAS remediation
- Opportunity to identify a more cost-effective, targeted remedy
- Alternatives analysis uses 9 evaluation criteria

### Cons:

- Delayed implementation can lead to longer exposure duration
- Community frustration over long CERCLA process

# Leveraging Existing Data for Confident Remedial Decisions

## Potential USEPA changes:

– Add or remove compounds

– Increase or decrease screening levels

## What can we do?

– Identify compounds driving risk

– Mine *existing* data for insights

**Let the data lead the way**

# Leveraging Existing Data for Confident Remedial Decisions

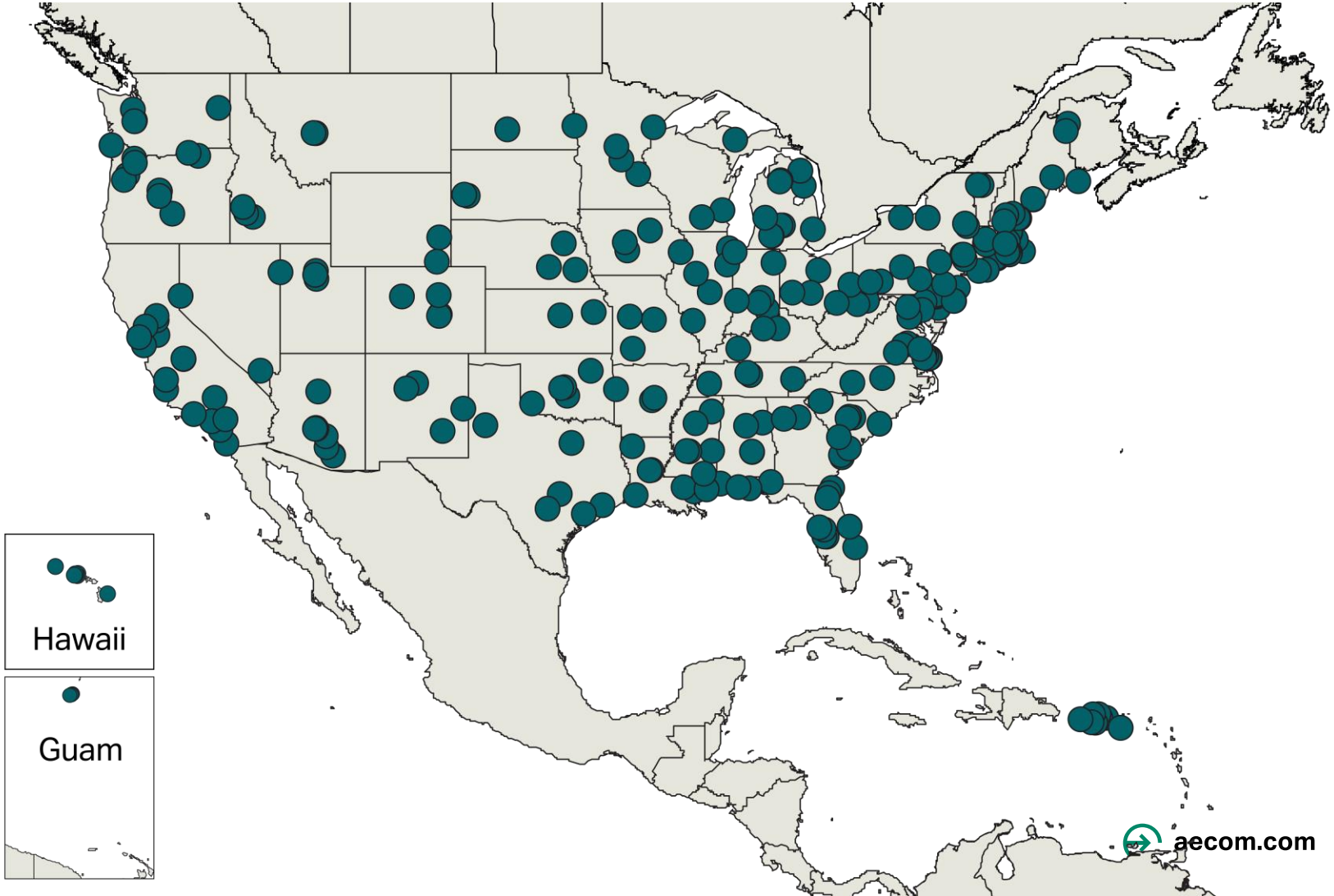
What value can we extract from a compilation of DOD PFAS samples?

Compiled results from a subset of ~30 facilities where PFAS data were collected for DOD CERCLA activities

Focused on data collected via USEPA Method 1633, only

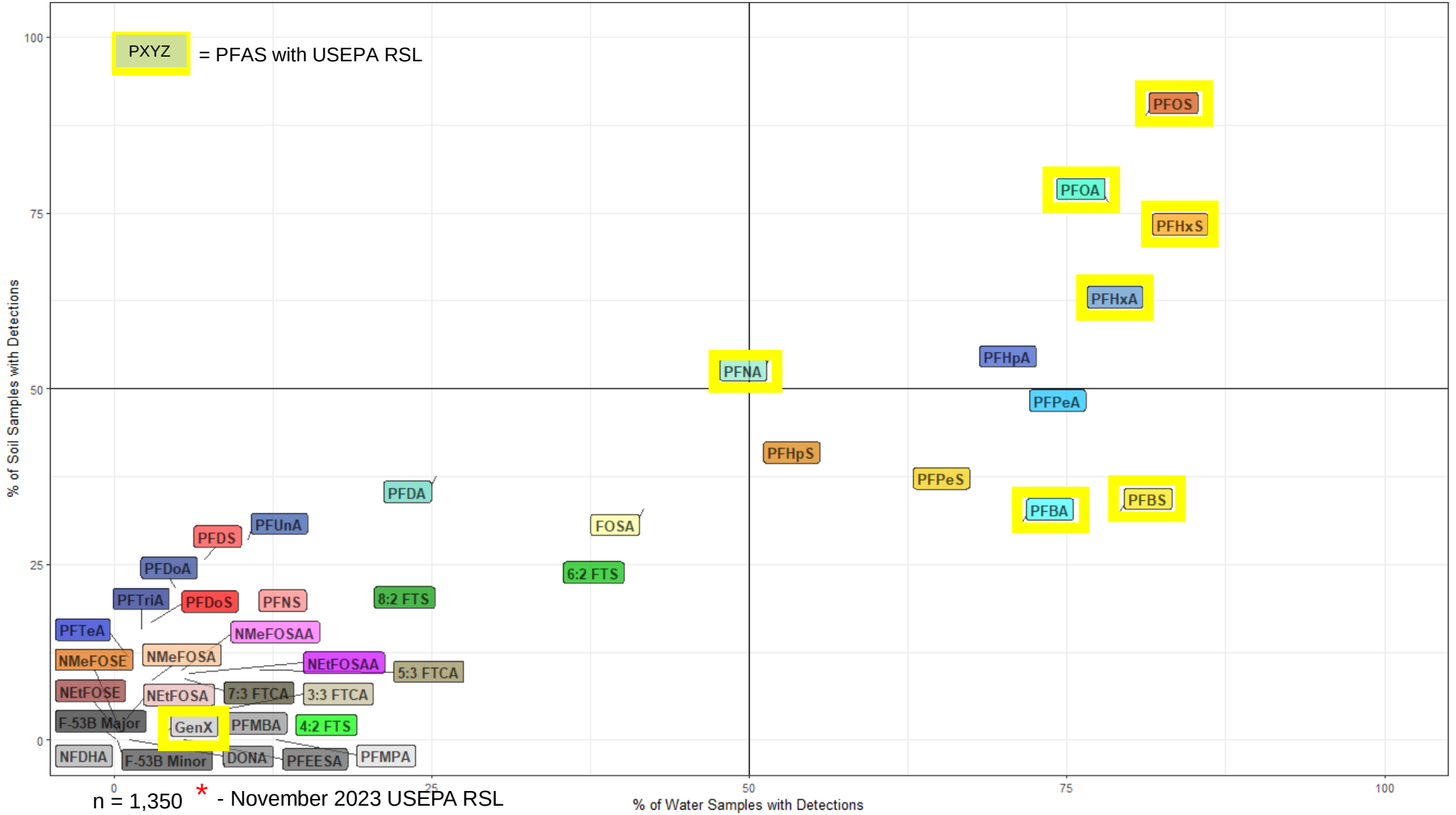
Evaluated basic chemical trends that may help inform remedial responses

**AECOM's DoD PFAS Sites in the US**



# Leveraging Existing Data for Confident Remedial Decisions

## Frequency of Detection in Soil and Groundwater




n = 1,350 * - November 2023 USEPA RSL

# Big Picture

## Leveraging Existing Data for Confident Remedial Decisions

- ✓ Evolving requirements have created “do-loops” in CERCLA
- ✓ Changing RSLs complicates delineation and risk-based decisions
- ✓ Using interim actions allows progress to be made despite “do-loops”
- ✓ Leveraging existing data sets can help you make confident decisions

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OCTOBER 15-17, 2024

Denver, CO

Brookhaven National Laboratory

U.S. DEPARTMENT OF ENERGY

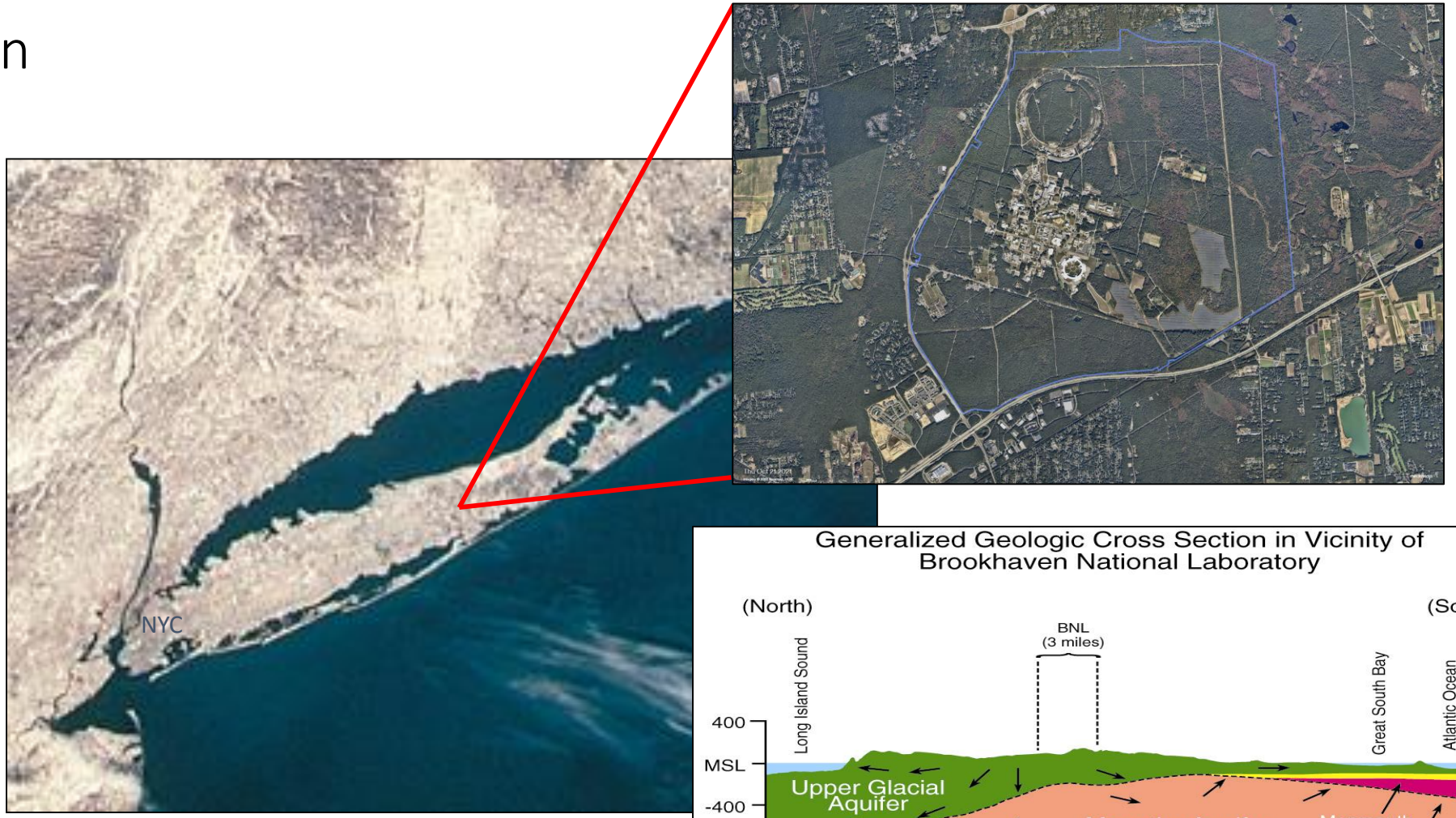
# PFAS Contamination at Brookhaven National Laboratory

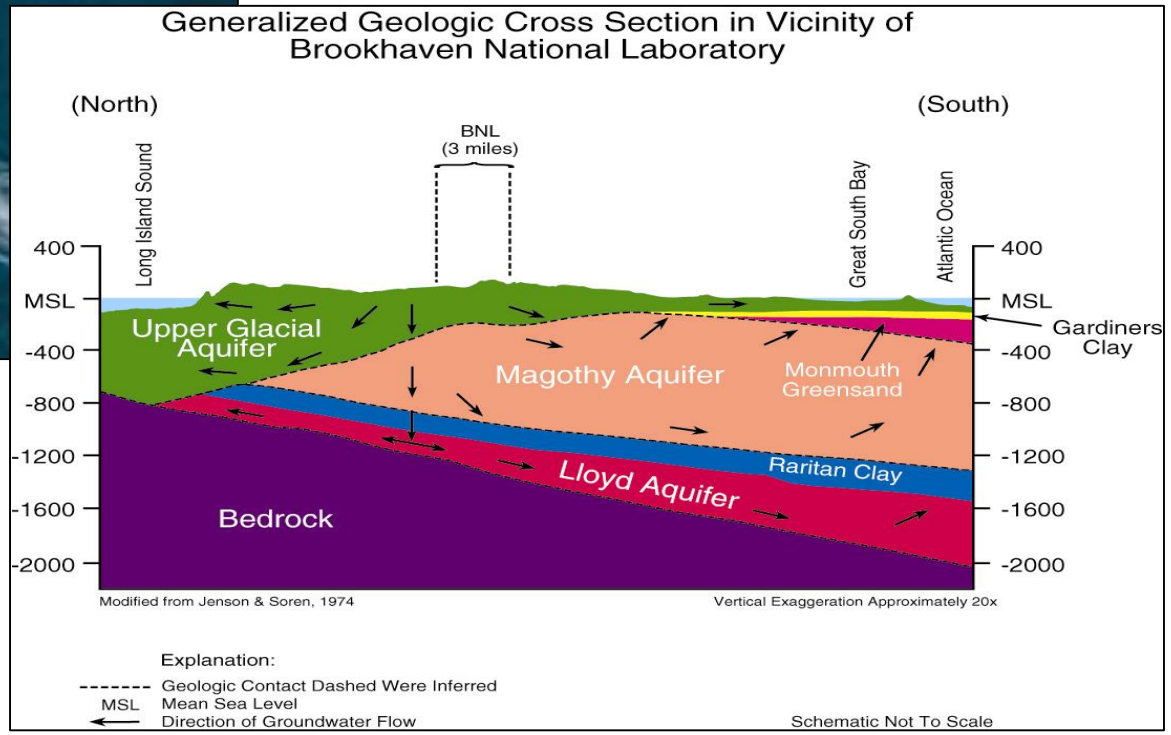
Douglas Paquette, PG

*BNL Groundwater Protection Group*

@BrookhavenLab

# Location




**EPA designated Sole Source Aquifer System on Long Island is highly vulnerable to contamination**

**Aquifers are composed of highly permeable sand and gravel**

**Shallow depth to groundwater (5 – 50 feet)**

# BNL Environmental Timeline

- 1947: Environmental surveillance begins at start of laboratory operations
  - Emphasis on radioactivity, air releases, surface water releases, potable water supply
- 1970's and 80's: More emphasis on groundwater surveillance
  - First detection of volatile organic compounds in groundwater
  - **Long Island Sole Source Aquifer System** designation by USEPA in 1975
- 1980: BNL added to NYS Inactive Hazardous Waste Sites List
- 1985: Operation of first groundwater remediation system for VOCs
- 1989: Listed on Federal National Priorities (Superfund) List
- 1992: Federal Facilities Agreement (DOE, EPA, NYSDEC) provides regulatory framework for cleanup activities
- 1992–Present: Significant progress in remediating VOCs and radionuclides in soils and groundwater
  - Constructed 19 groundwater treatment facilities, remediated source areas, capped two landfills
- **2017: County health department detected PFAS in BNL water supply wells**
  - **Combined PFOS and PFOA concentrations were below the former federal HAL of 70 ng/L**
  - **BNL started to search records and conduct interviews to determine past use of AFFF**
- **2018: Started to sample groundwater at identified/suspected AFFF release areas**
- **2020: NYS established drinking water standards of 10 ng/L for PFOS and PFOA**

# Summary of PFAS Releases at BNL

- Foam Releases (AFFF)

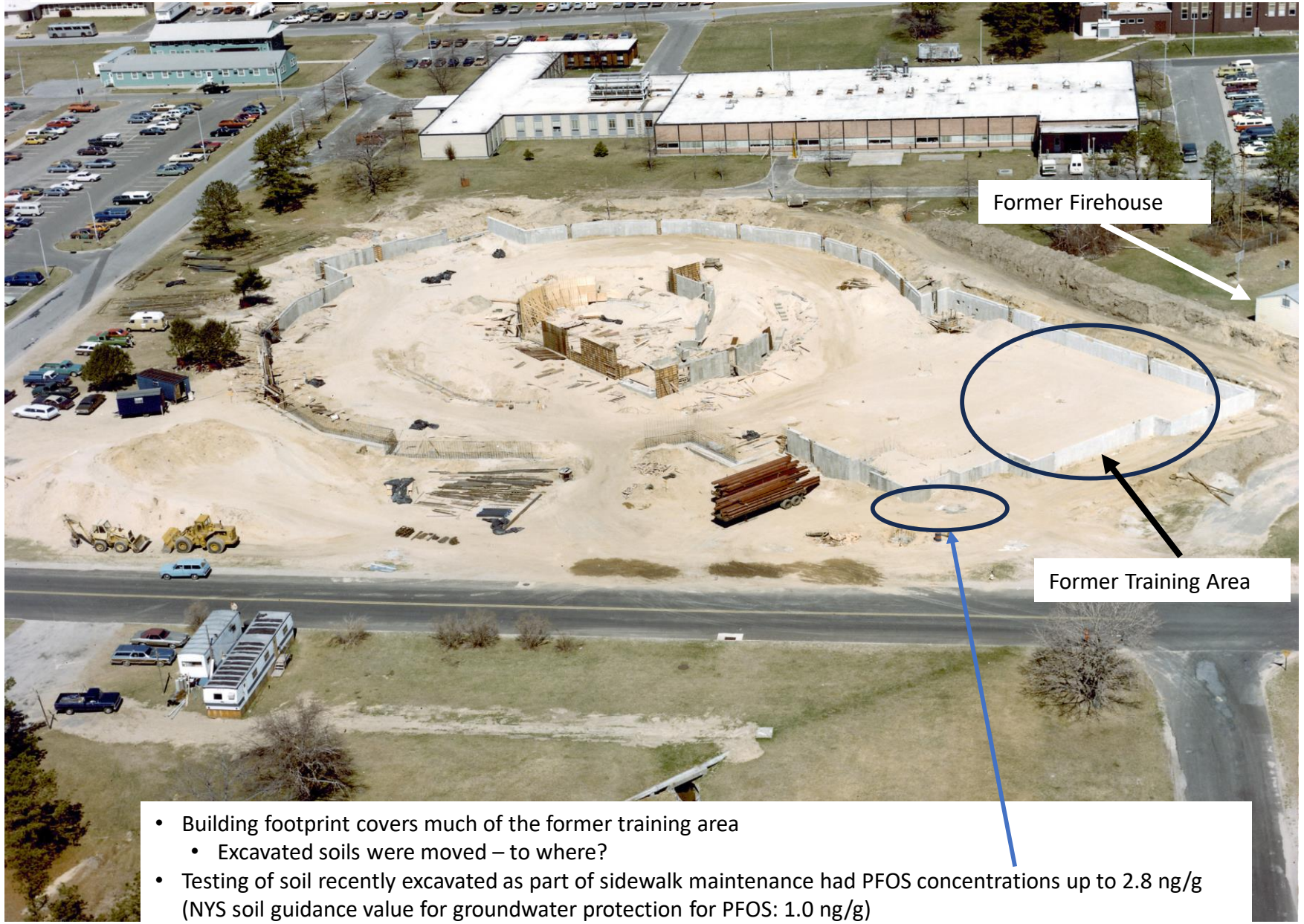
- **Firefighter Training**
  - Firefighters released foam in five areas (that are known)
    - Highest PFAS concentrations in groundwater are associated with three primary firefighter training areas
    - Training with foam was conducted from 1966 - 2008
    - ***PFAS-free foam was purchased in 2019***
- **Fire Suppression Systems**
  - Four suppression systems were located at several research facilities (1970s-1980s)
    - Foam was released to adjacent outdoor areas during periodic system testing
    - The suppression systems were decommissioned in the 1980s

- Other PFAS Releases

- **Landfill Disposal**
  - Low levels of PFAS detected in groundwater at a closed on-site landfill
- **Potable Water**
  - PFAS impacted five of six water supply wells
    - PFAS detected at water treatment facility which removes high levels of natural iron
    - Routine flushing of water lines/fire hydrants may have spread PFAS
    - Potable water used for cooling systems is discharged to recharge basins
    - ***GAC filters are now being used at three supply wells. Two wells permanently shutdown***
- **Discharges to Sanitary System**
  - PFAS impacted potable water was used for sanitary system operations
    - PFAS detected in groundwater at the sanitary treatment plant
    - Possible AFFF releases to firehouse floor drain that is connected to sanitary
    - Possible sanitary line leakage may have spread PFAS

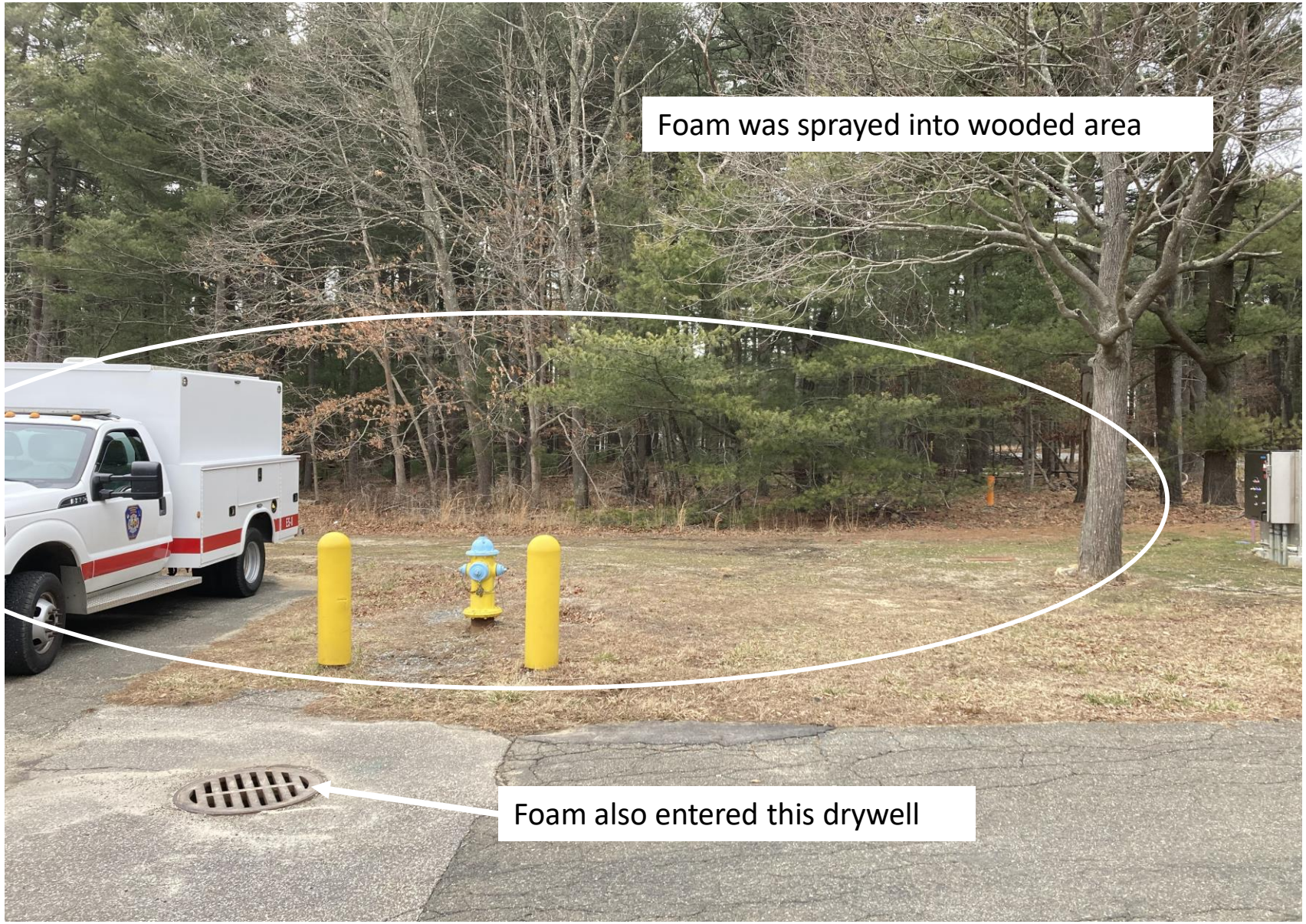
*Foam Training Area: Former Firehouse (Foam Released 1966-1985)*


# 1979 Construction of Science Facility Building Over Former Firehouse Training Area




- Building footprint covers much of the former training area
  - Excavated soils were moved – to where?
- Testing of soil recently excavated as part of sidewalk maintenance had PFOS concentrations up to 2.8 ng/g (NYS soil guidance value for groundwater protection for PFOS: 1.0 ng/g)

*Foam Training Area: Current Firehouse (Foam Released 1986-2008)*



# Fire Suppression System Testing



Foam release area now covered by ~10 feet of soil

# Efforts to Understand Extent of PFAS Contamination
(2017-2024)

- Tested for PFAS at ~800 on-site and off-site locations
  - ~465 on-site and off-site monitoring wells
    - Routine sampling of 120 wells associated with two new PFAS treatment systems
  - ~210 temporary (one-time use) groundwater monitoring wells
    - Collected ~10 samples at each well to determine the vertical distribution of PFAS
  - On-site and off-site groundwater treatment systems
    - Individual extraction wells
    - Treatment system influent and effluent (including 2023 NYS request for testing)
  - Sewage treatment facility influent and effluent
  - Rainwater
  - Quarterly testing of BNL's water supply wells
  - Cooperative testing of 82 private wells with county health department
    - PFAS detections in private wells are related to off-site sources (e.g., local fire department, airport)
  - On-site sentinel wells for a nearby municipal supply well field
    - Source water contributing area extends onto the BNL site
    - Low levels (<5 ng/L) of PFAS are detected in several of the wells
  - Limited testing of soils

# Testing for PFAS in Groundwater

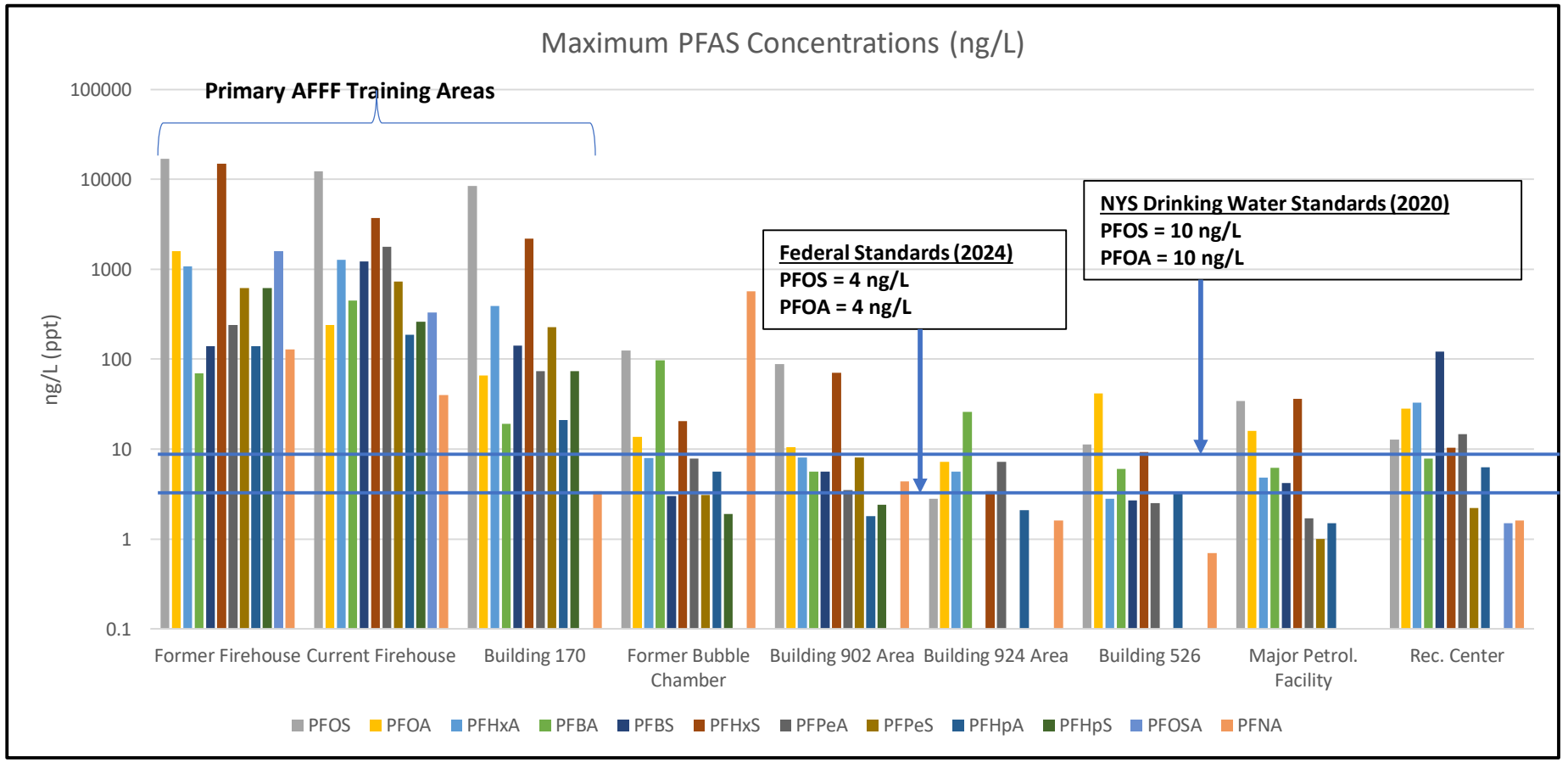

Sampling a permanent monitoring well


Sampling a temporary “GP” well

- BNL has an extensive network of ~1,200 on-site and off-site groundwater monitoring wells
- Temporary groundwater monitoring wells used to:
  - Fill in data gaps in monitoring network
  - Conduct initial characterization of plumes
- Precautions are taken to prevent/limit cross contamination during sampling (e.g., PTFE)

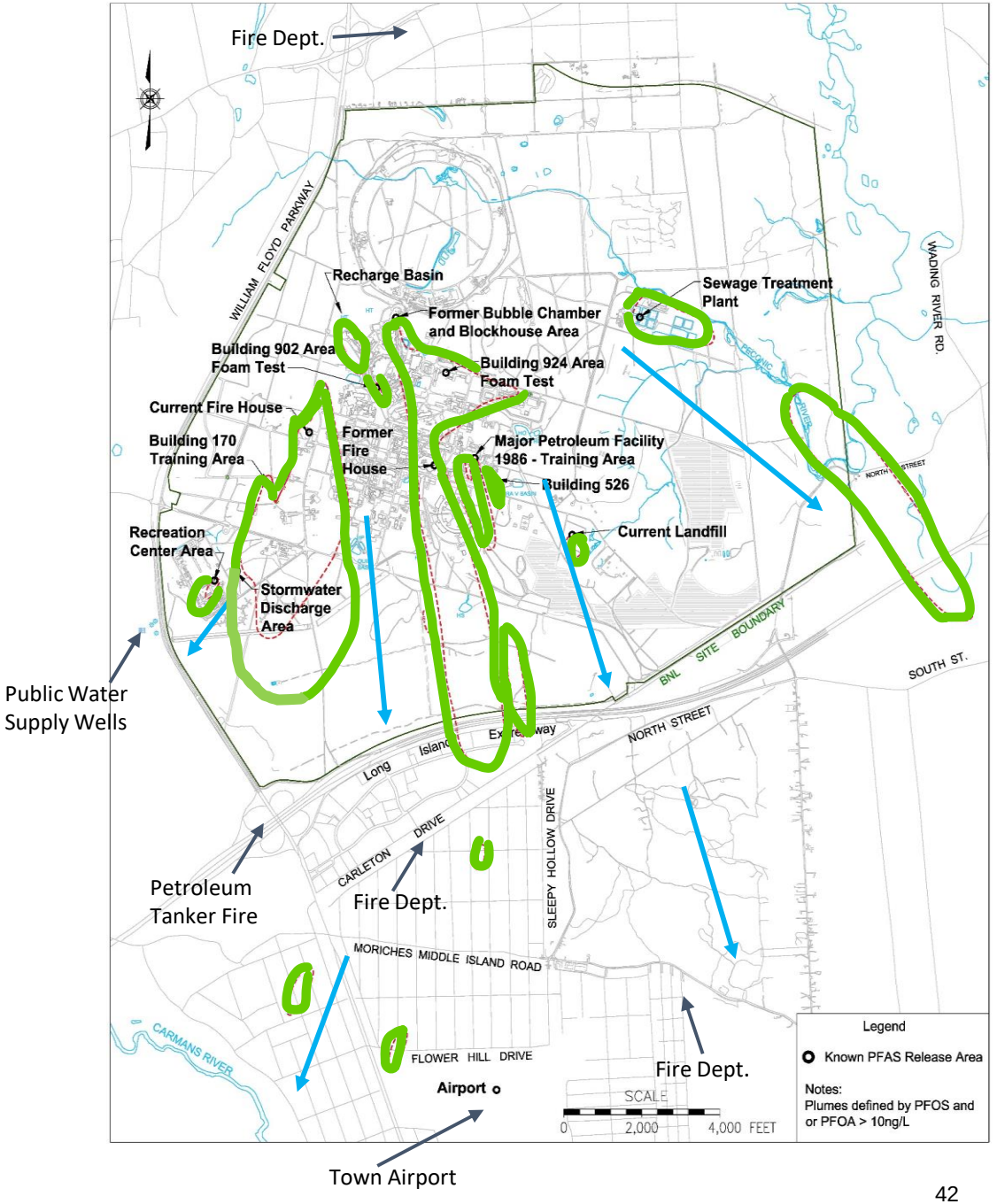
# PFAS in Groundwater at AFFF Release Areas

- 2018-2022 samples were tested using Method 537.1 for 23 PFAS
- Currently using Method 1644 for 40 PFAS
  - ~15 different PFAS are routinely detected in groundwater samples
  - Highest concentrations are usually PFOS, PFOA, PFHxS, PFHxA, PFHpA, PFHpS



# Known Extent of PFAS in Groundwater

- BNL PFAS plumes extend off-site in several areas
  - Additional characterization is required
- Known/potential off-site sources:
  - Town Airport
    - Now a NYS Superfund site due to PFAS contamination
  - Local fire departments
    - FD substation adjacent to the airport is now a NYS Superfund site due to PFAS contamination
  - Response to vehicle fires along local roadways?



# CERCLA Response for PFAS (and 1,4-Dioxane*)

- Investigations and remedial responses are being conducted under the Interagency Agreement (IAG) between DOE, USEPA and New York State
- During 2021:
  - Five-Year Review
    - Described characterization efforts to identify PFAS source areas and downgradient extent of PFAS contamination
    - Noted that remediation of high concentration PFAS plumes associated with the Current and Former Firehouse source areas would be conducted as a Time Critical Removal Action (TCRA)
      - Follow-up actions would include start of operations for the two groundwater treatment systems
    - Noted that final remedy for PFAS and 1,4-dioxane would be documented in a ROD
  - CERCLA Operable Unit (OU 10) was established
    - Address PFOS, PFOA and 1,4-Dioxane contamination (likely to expand to include other PFAS)
    - Remedial Investigation/Feasibility Study (RI/FS) will be required to fully characterize the plumes and determine whether additional remedial responses are required
      - A draft RI/FS Work Plan has been reviewed by the regulatory agencies. BNL is seeking funding to conduct the RI/FS

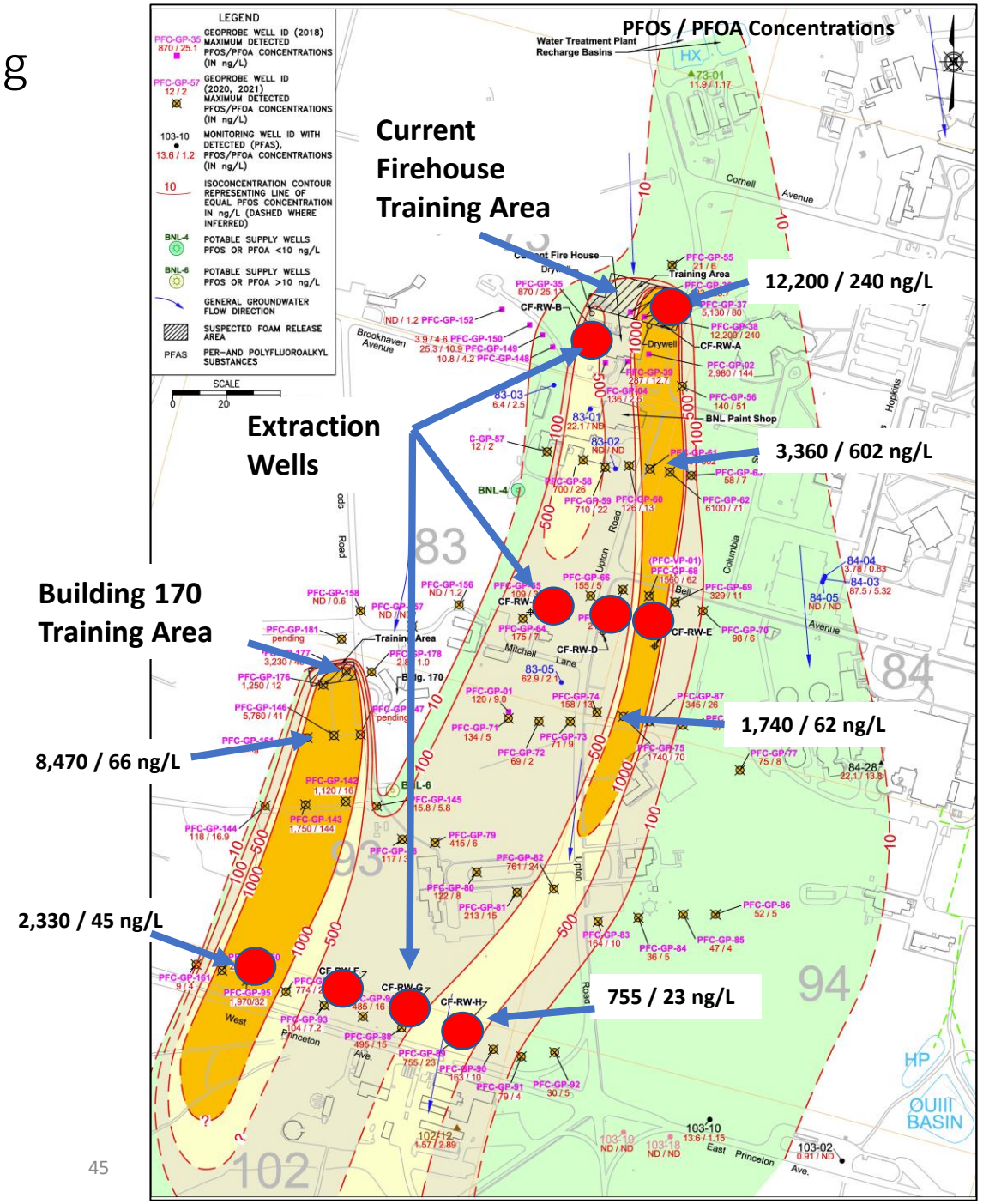
*BNL is also investigating the extent of 1,4-dioxane, which was used as a chemical stabilizer for the solvent 1,1,1-Trichloroethane (TCA). TCA has impacted groundwater quality in several on-site and off-site areas. The treatment systems used for VOCs such as TCA are not effective for 1,4-dioxane.

# Time Critical Removal Action

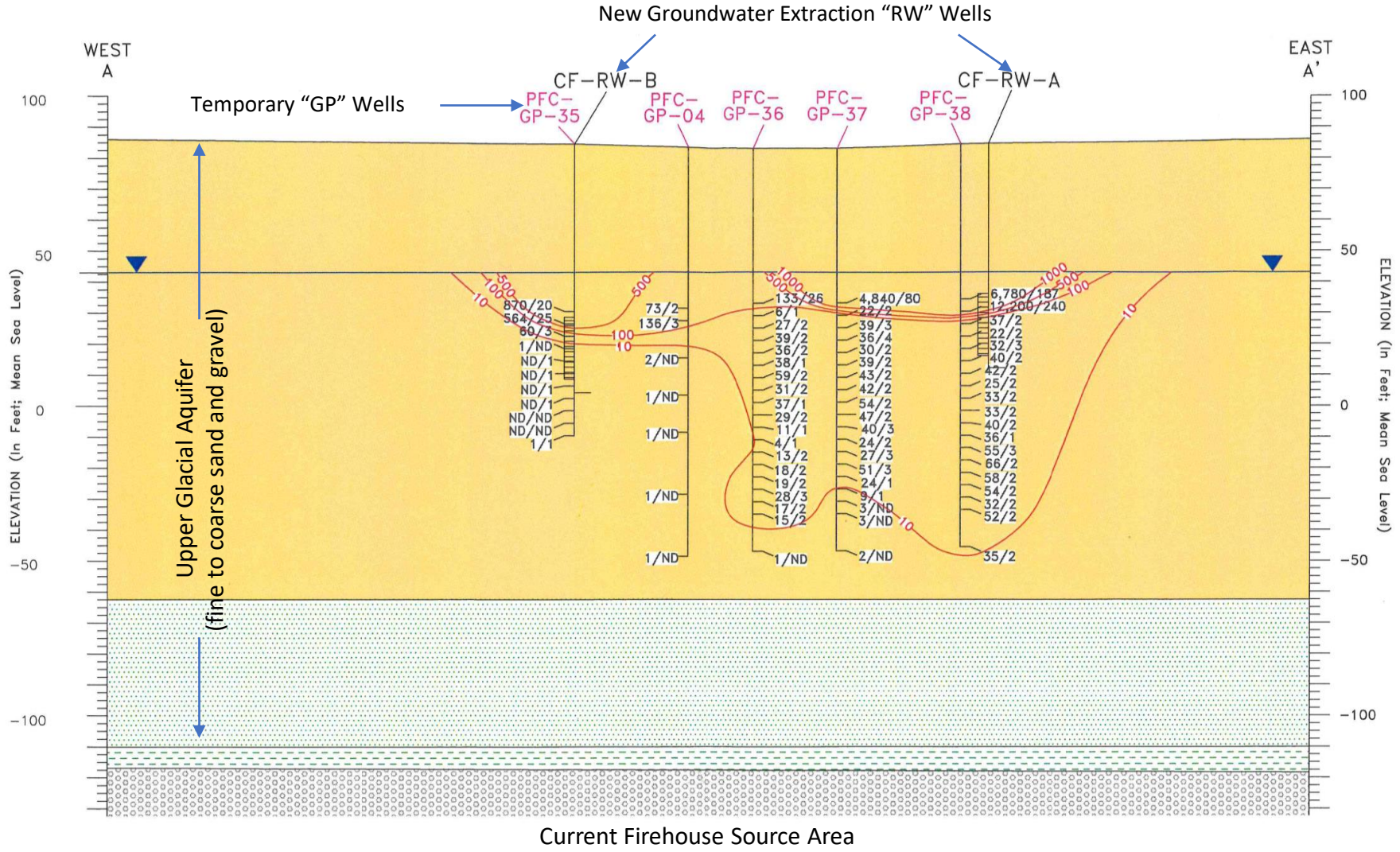
- BNL constructed two treatment systems to remediate groundwater with highest PFAS concentrations
  - Current Firehouse/Building 170 treatment system operations started in October 2022
  - Former Firehouse treatment system operations started in January 2023
- Combined, the two systems can treat ~750 gpm
  - Water is treated using Granular Activated Carbon (GAC) filters
  - Treated water is returned to the aquifer using recharge basins
  - The systems are meeting recently established NYS Effluent Limits for PFOS and PFOA that are lower than the 10 ng/L NYS drinking water standards, and the new 4 ng/L federal standard for PFOS
    - PFOS: 2.7 ng/L
    - PFOA: 6.7 ng/L

# Current Firehouse Plume and Building 170 Plume Remediation

- Installed 87 temporary vertical profile wells to characterize plumes
  - Each well had ~10 sample intervals
- Installed 66 monitoring wells for long-term surveillance
- Treatment System
  - Nine extraction wells
    - Pump ~500 gpm
  - Goal is to remediate groundwater with PFOS or PFOA concentrations >100 ng/L

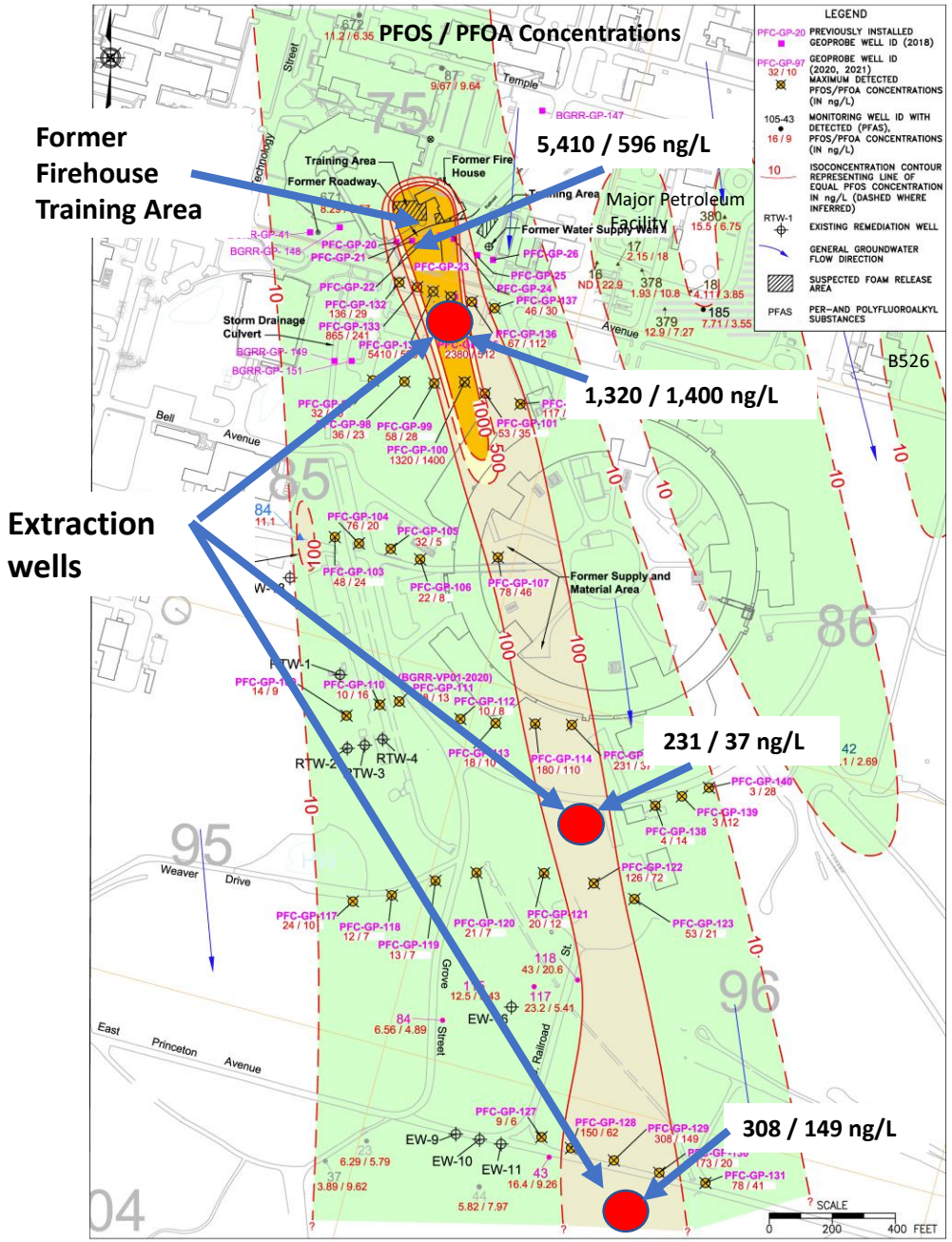


# Temporary wells used to profile vertical distribution of PFAS in groundwater



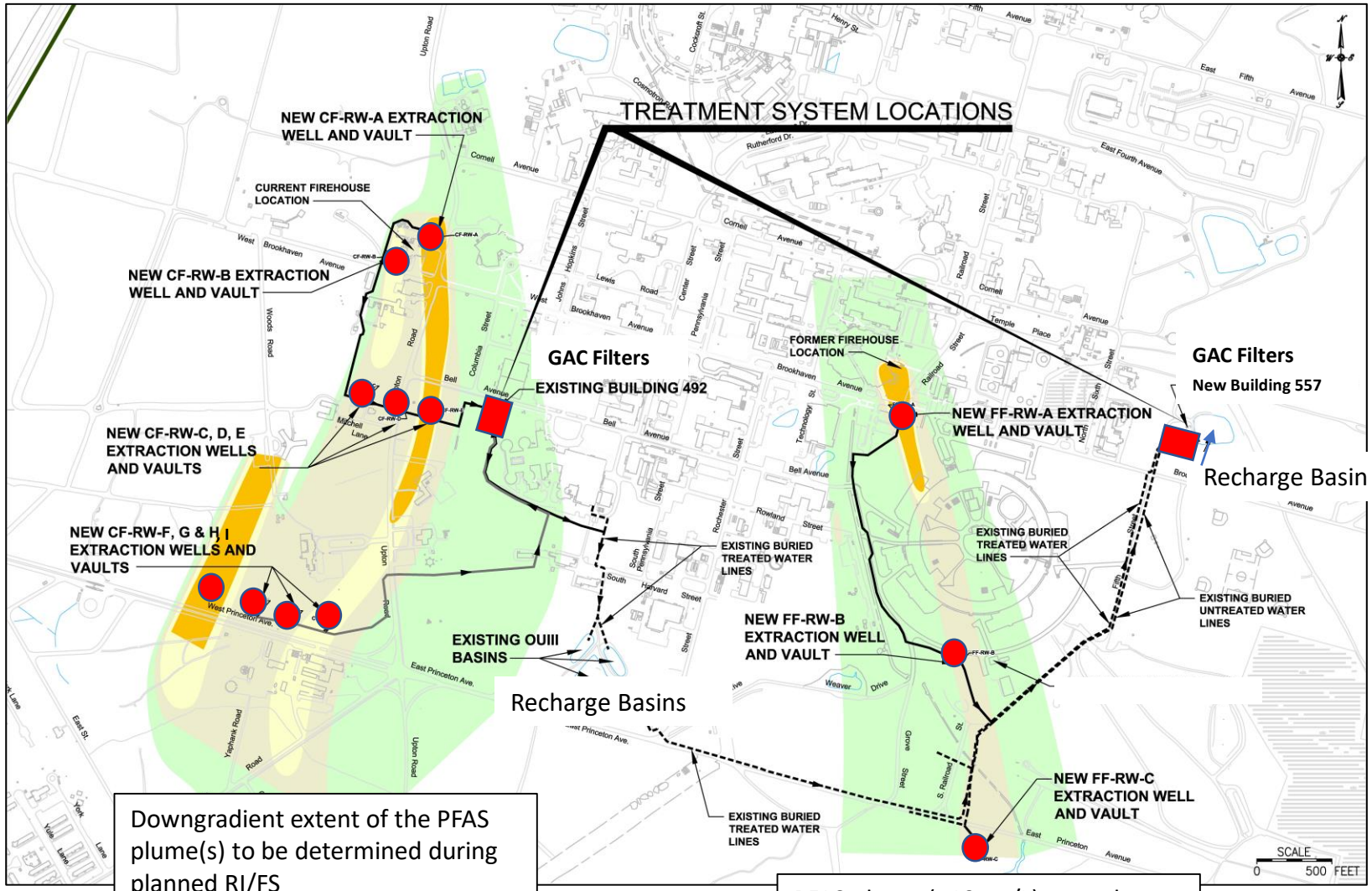
# Former Firehouse Plume Remediation

- Installed 51 temporary vertical profile wells to characterize plumes
  - Each well had ~10 sample intervals
- Installed 29 monitoring wells for long-term surveillance
- Treatment System
  - Three extraction wells
    - Pump ~250 gpm
  - Goal is to remediate groundwater with PFOS or PFOA concentrations >100 ng/L




PFAS plume extends south beyond site boundary

# PFAS Treatment Systems



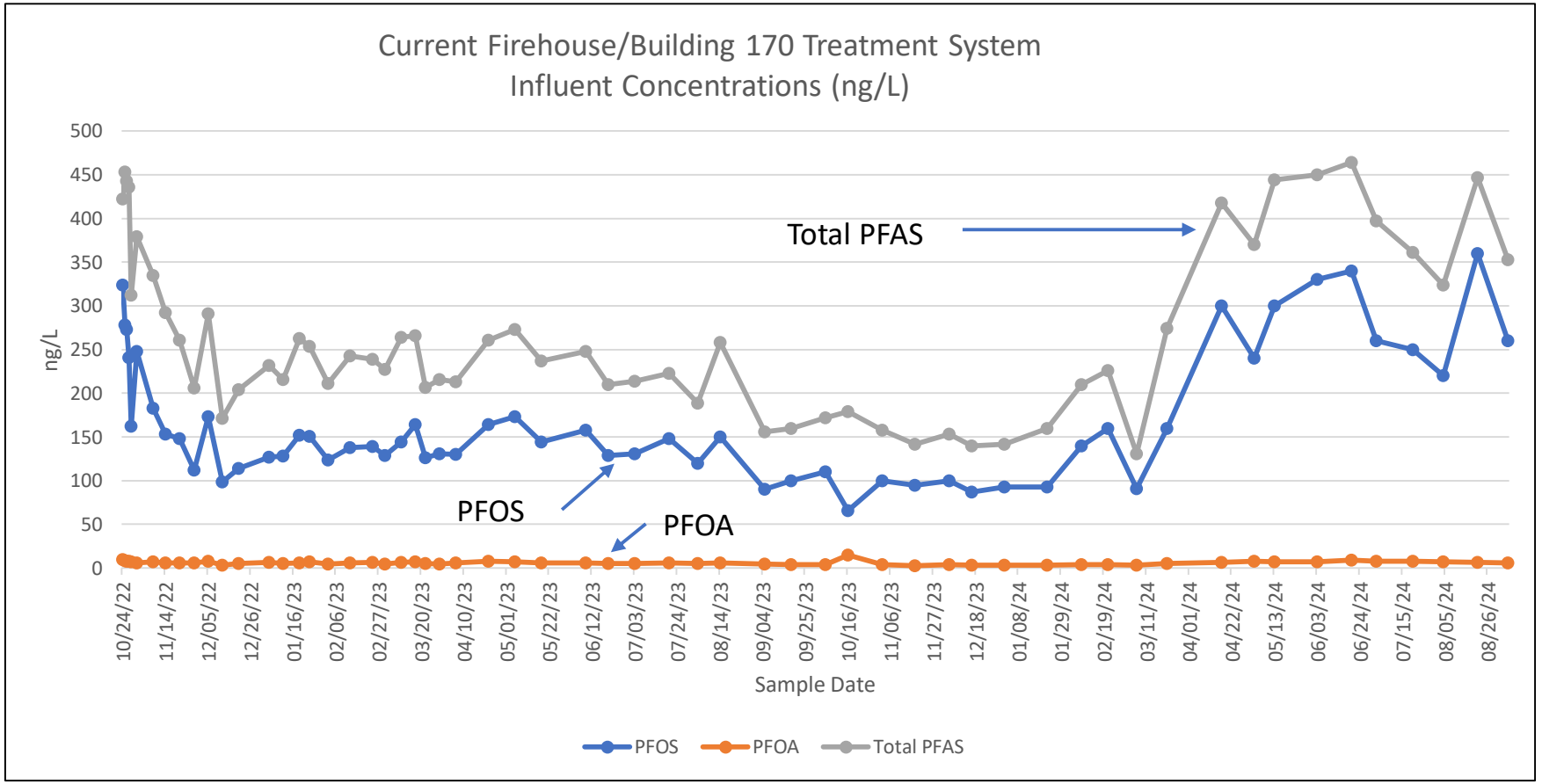

Downgradient extent of the PFAS plume(s) to be determined during planned RI/FS

PFAS plume (>10 ng/L) extends south beyond site boundary

# Treatment System for Former Firehouse PFAS Plume

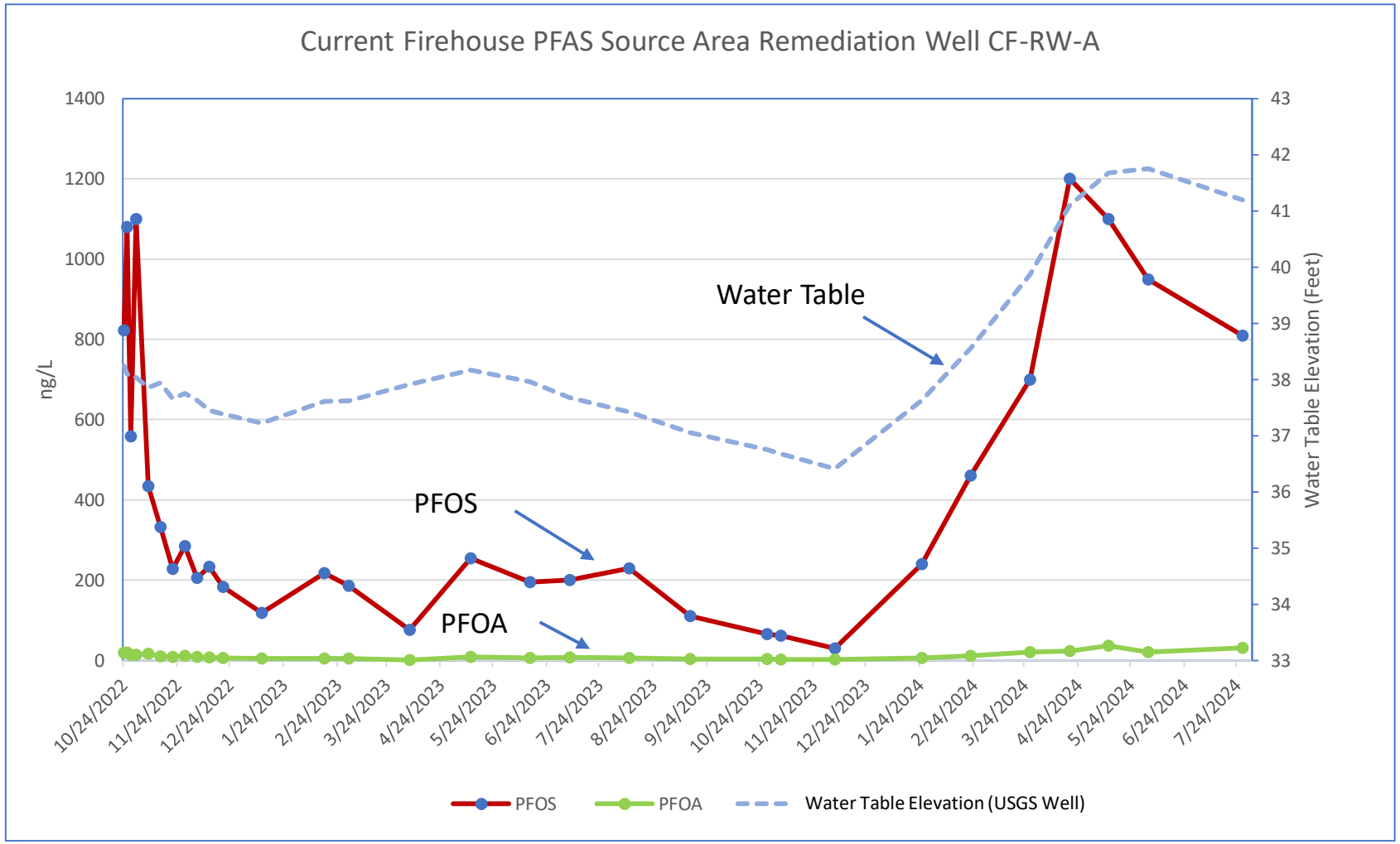
*Granular Activated Carbon Filters*

# GAC Treatment Systems are Effective

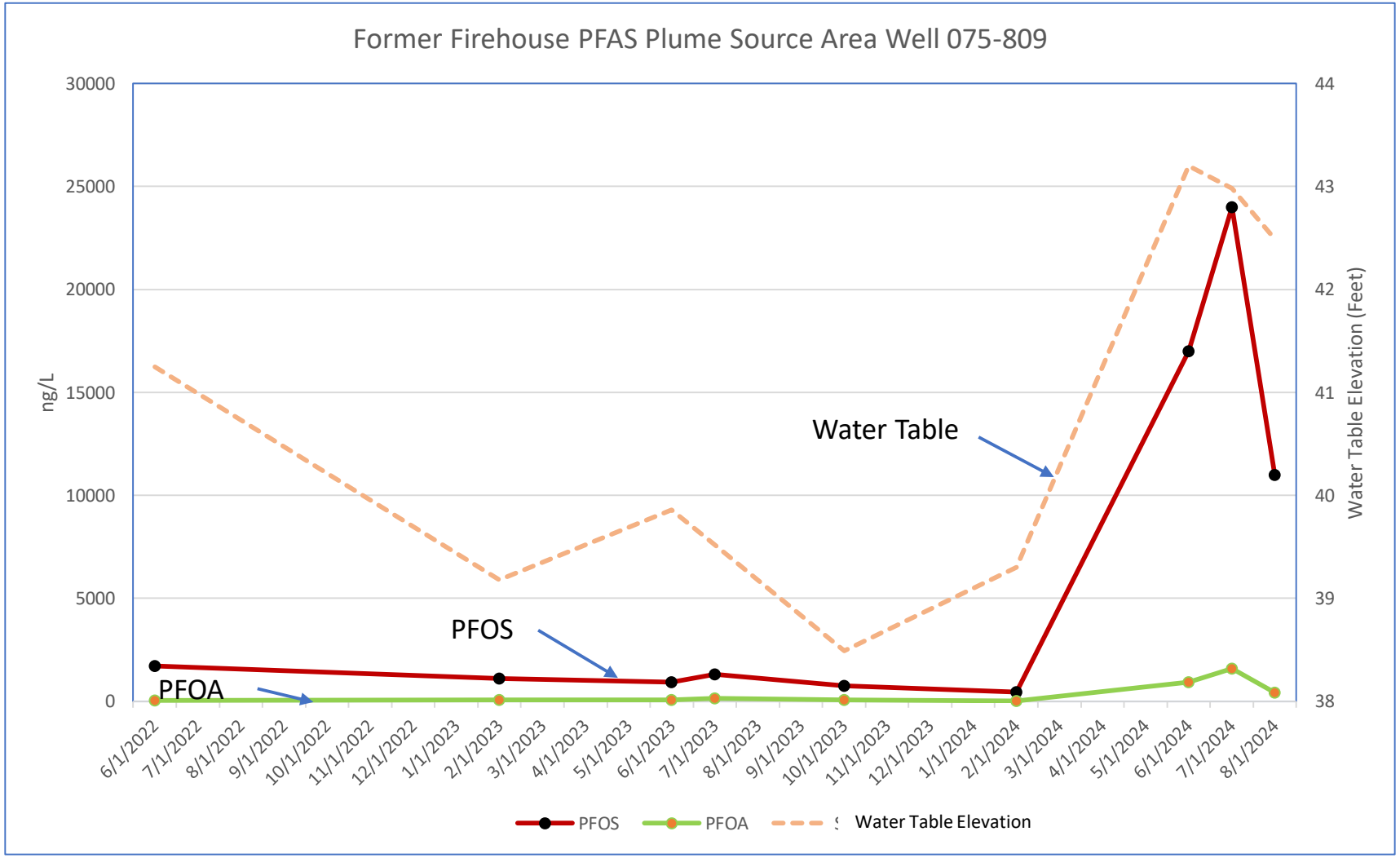



- **Most PFAS are not detected in the treatment system effluent**
  - **PFBA (C-4) is detected in effluent up to 12 ng/L**
  - **Low levels of 1,4-dioxane in effluent (<0.35 µg/L NYS effluent limit)**
- **To date, the two systems have treated ~400M gallons of groundwater and removed ~0.7 lbs. total PFAS**

# *Changes in PFOS and PFOA Concentrations In Current Firehouse Source Area Extraction Well Relative to Changes in Water Table Elevation*



# *Changes in PFOS and PFOA Concentrations In Former Firehouse Source Area Monitoring Well Relative to Changes in Water Table Elevation*



# Determining Distribution of PFAS in Vadose Zone

*Current Firehouse Source Area*

- Continuous samples from ground surface to the water table (~39.5 feet bgs)
- Samples analyzed by Method 1633

*Soil*

- 0 - 2.5 ft
- 2.5 - 5.0 ft
- 5.0 - 7.5 ft
- 7.5 - 10 ft
- 10 - 15 ft
- 15 - 20 ft
- 20 - 25 ft
- 25 - 30 ft
- 30 - 35 ft
- 35 - 37.5 ft
- 37.5 - 40 ft

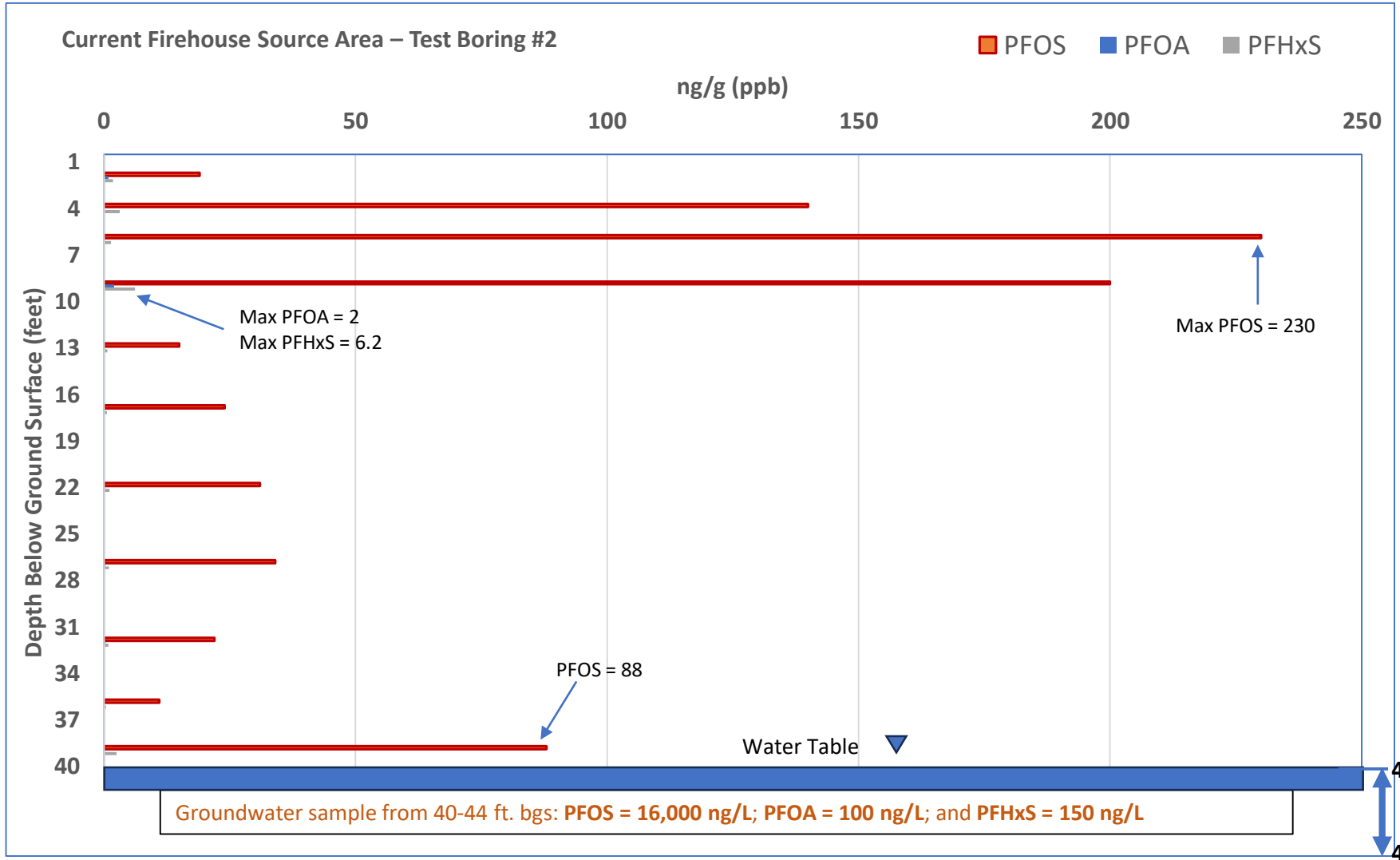
*Groundwater*

- 40 – 44 ft

0 to 5 ft. Core

# Distribution of PFAS in Vadose Zone – Example 1

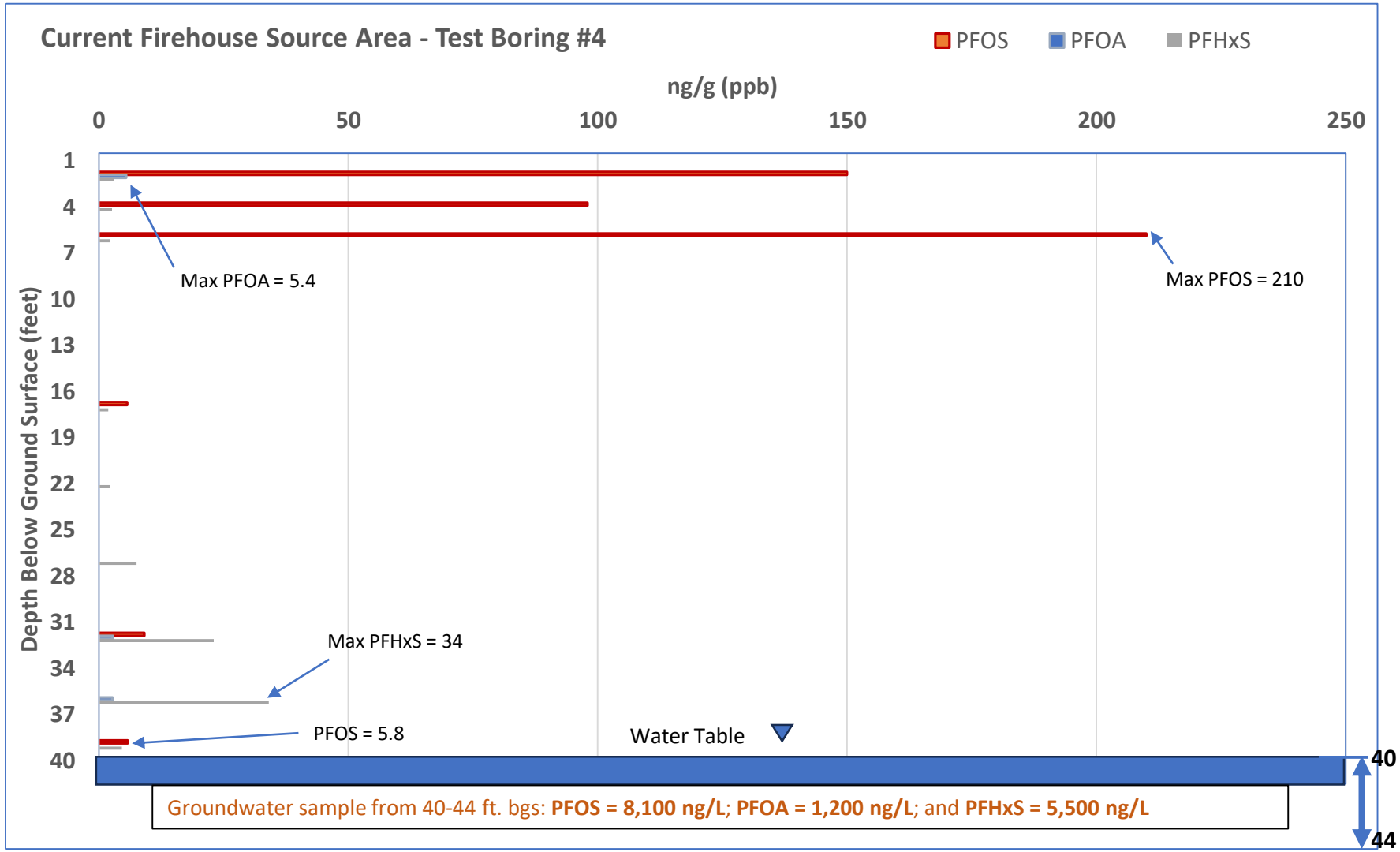
- Vadose zone is predominantly fine- to coarse-grained quartz sand
- Total Organic Carbon in 0-2.5 ft. bgs sample was 7,200 mg/kg; not detected in deeper samples (<4,000 mg/kg)




New York State Soil Guidelines for Groundwater Protection: PFOS = 1.0 ppb
PFOA = 0.8 ppb

# Distribution of PFAS in Vadose Zone – Example 2

- Vadose zone is predominantly fine- to coarse-grained quartz sand
- Total Organic Carbon in 0-2.5 ft. bgs sample was 10,000 mg/kg; not detected in deeper samples (<4,000 mg/kg)




New York State Soil Guidelines for Groundwater Protection: PFOS = 1.0 ppb
PFOA = 0.8 ppb

# Next Phase: Conduct RI/FS

- The RI/FS Work Plan builds upon the extensive characterization work conducted to date

  Groundwater

  - Better define extent of PFAS and 1,4-Dioxane plumes. Sampling will be performed at:
    - ~500 existing on-site and off-site wells
    - ~100 additional temporary (one-time use) vertical profile wells (to max. depths of ~250 feet)
    - ~100 new wells for long-term monitoring (screened based on temporary well data)
    - 17 on-site and off-site groundwater treatment systems
      - Influent and effluent
      - 81 extraction wells

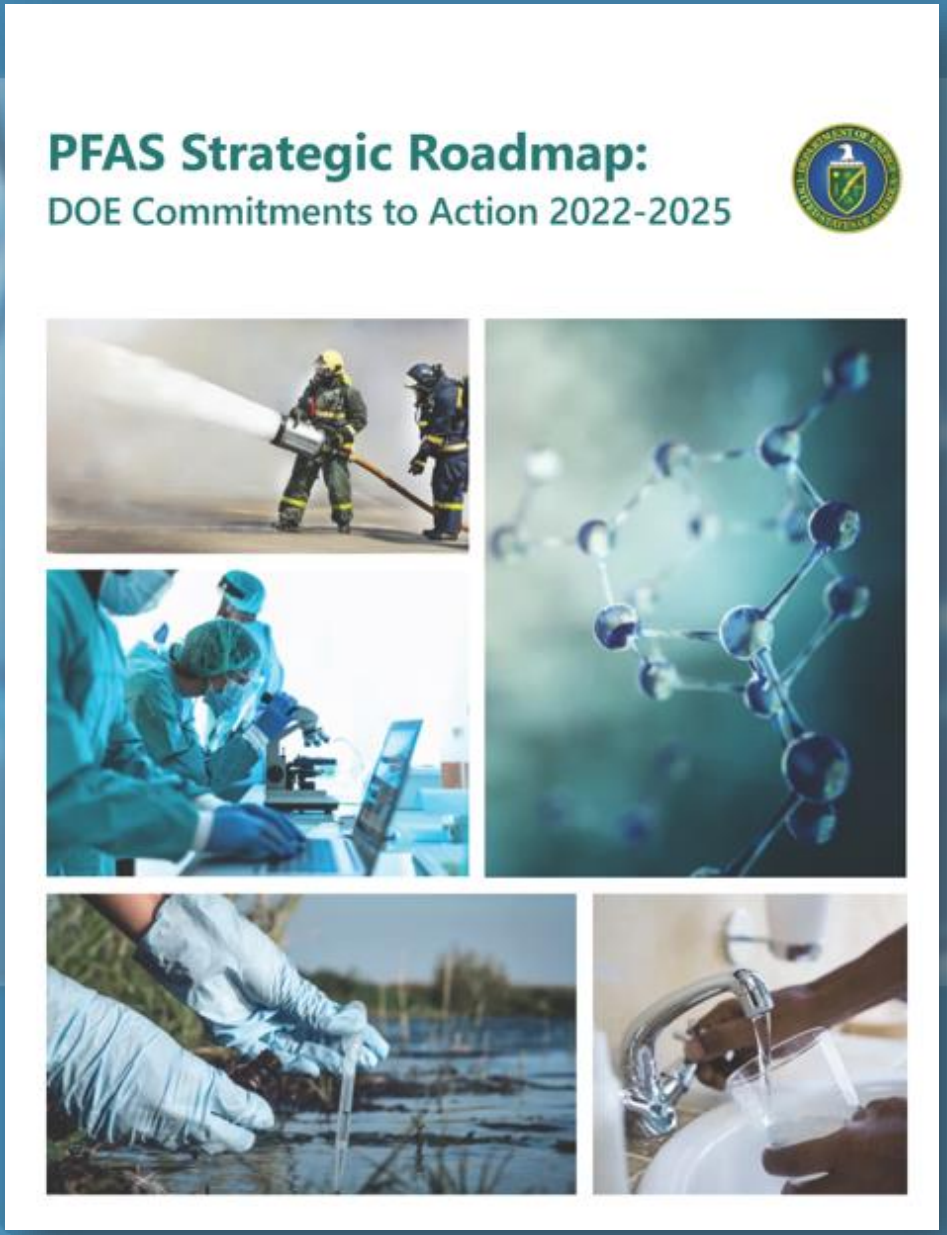
  Soil and sediments

  - ~680 soil samples in AFFF release areas
  - ~5 sediment samples from an on-site stream that received treated sanitary wastewater
- Until the RI/FS is funded, BNL is continuing to evaluate:
  - Downgradient extent of high concentration PFAS plumes
  - Distribution of PFAS in source area soils

# Challenges Going Forward

- **Forever -** After 50+ years, even one-time releases of AFFF are still impacting groundwater quality at the release areas
- Extent of PFAS
  - Groundwater – we've learned a lot, but there are still many data gaps
    - Where is non-detect?
  - Source area soil – needs extensive characterization
    - Some source area soils are not readily accessible for sampling or treatment
- Without adequate source controls, groundwater treatment systems alone cannot meet expected/reasonable remediation timeframes
  - Soil removal vs. in-place treatment/controls?
    - Treat impacted soil to depths of ~50 feet?
- While use of GAC for groundwater remediation is effective, it requires frequent changeouts and off-site thermal treatment or disposal
  - Breakthrough of short-chained PFAS (e.g., PFBA)
  - Alternative methods would need to treat large volumes of groundwater (individual systems up to ~1,000 gpm)
- Expect more PFAS to be regulated

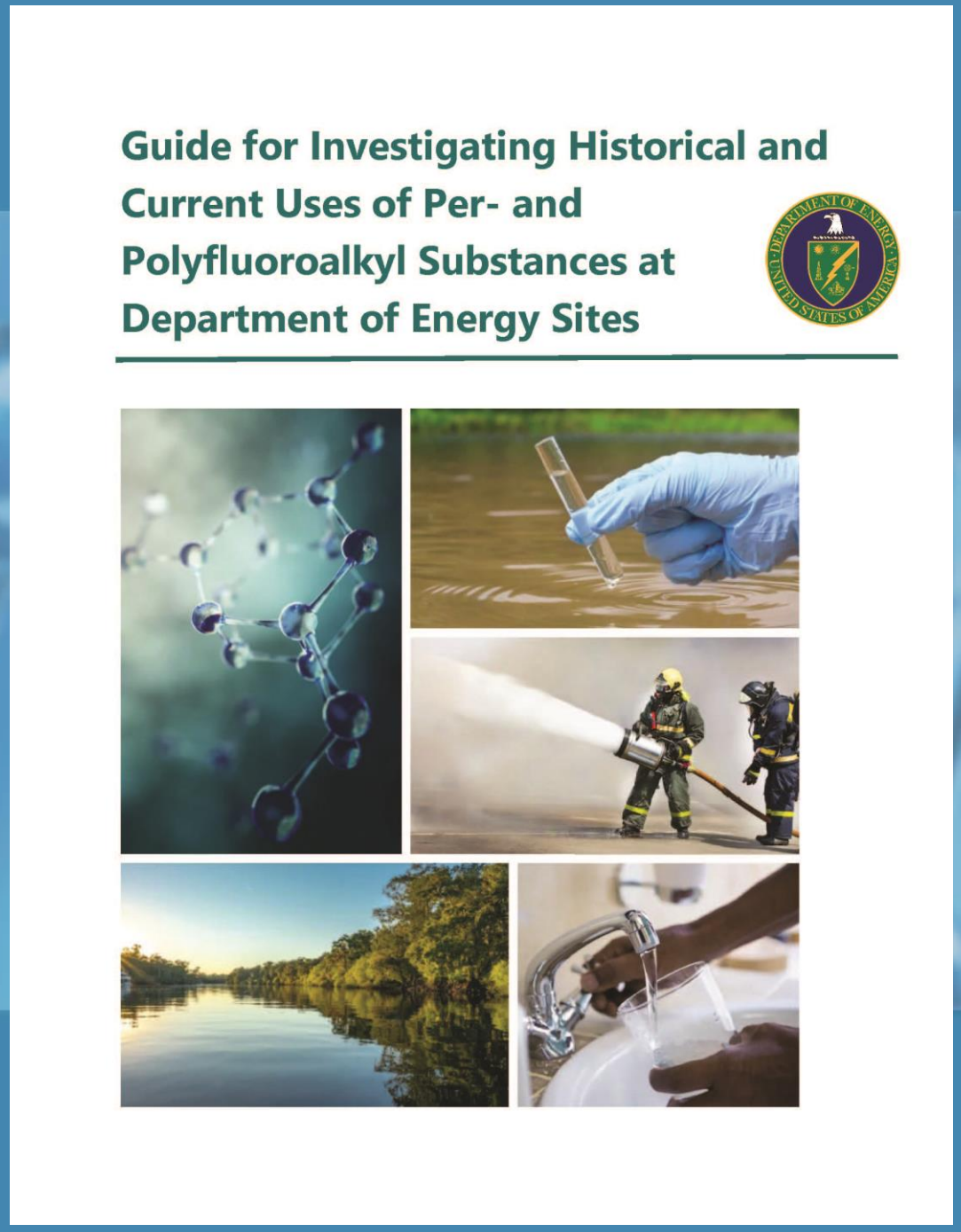
# DOE PFAS Strategic Roadmap




| UNDERSTAND | MANAGE & PROTECT | ADVANCE SOLUTIONS | COMMUNICATE & COLLABORATE |
|---|---|---|---|
| **GOAL:** Develop information concerning PFAS uses and environmental releases to characterize and assess the Department's potential liabilities and risks | **GOAL:** Safeguard the health and well-being of our employees, the public, and the environment by minimizing exposure to PFAS and addressing PFAS releases | **GOAL:** Leverage expertise at DOE's National Laboratories and collaborate with research partners to enhance PFAS knowledge and develop technological solutions | **GOAL:** Engage with regulators, tribal nations, local communities, and stakeholders to ensure transparency on DOE's PFAS progress and develop effective PFAS strategies |
| **OBJECTIVES** | **OBJECTIVES** | **OBJECTIVES** | **OBJECTIVES** |
| **ACTIONS** | **ACTIONS** | **ACTIONS** | **ACTIONS** |

# DOE Actions: Historical and Current Use Guide (February 16, 2023)

Outlines framework for investigating historical and current use of PFAS at DOE facilities.  Identify the most common sources of PFAS



# Nicole Goers, PE

- EPA Region 5 Superfund & Emergency Management Division (SEMD) PFAS Coordinator
- Serves as EPA Region 5's Remedial Program Manager for:
  - Crab Orchard National Wildlife Refuge (Marion, IL) – PCB OU
  - FMC Corp. (Fridley, MN)
  - Naval Industrial Reserve Ordnance Plant (Fridley, MN)
  - North Shore Gas North Plant (Waukegan, IL)
  - North Shore Gas South Plant (Waukegan, IL)
  - Savanna Army Depot Activity (Savanna, IL)
  - Wright-Patterson Air Force Base (Dayton, OH)
- 16 years of engineering consulting experience on EPA contracts
- Bachelor of Science in Mining and Minerals Engineering; Environmental PE

# Region 5 PFAS Sites

| State | Superfund Sites with Potential PFAS | Total Sites Sampled | Sites with PFAS Detections | Sites with PFAS above EPA Regional Screening Level (RSL)/State Screening Level |
|---|---|---|---|---|
| Illinois | 15 | 6 | 6 | 4 |
| Indiana | 10 | 3 | 3 | 2 |
| Michigan | 45 | 31 | 28 | 23 |
| Minnesota | 13 | 13 | 12 | 11 |
| Ohio | 17 | 9 | 9 | 7 |
| Wisconsin | 20 | 9 | 8 | 7 |
| **Total** | **120** | **71** | **66** | **54** |

# Region 5 Five Year Reviews (FYRs)

| Year | Total Number of FYRs | PFAS Issues and Recommendations |
|---|---|---|
| 2022 | 49 | 8 (16%) |
| 2023 | 36 | 15 (41%) |
| 2024 | 49 | 32 (65%) |

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# Demystifying PFAS in Remedial Regulatory Processes:

## Litigation as a Potential Regulatory Disrupter


Donald Sobelman

Farella Braun + Martel LLP


October 16, 2024 RemTech & Emerging Contaminants Conference

**Donald Sobelman, J.D. (1996)**

- Partner & Chair of Environmental Practice
  Farella Braun + Martel LLP
  - 24 years practicing environmental law
  - CERCLA / RCRA / CWA litigation
  - Environmental common law (tort) litigation
  - EPA & California agency enforcement defense
  - CERCLA / RCRA / California agency site cleanups
  - Brownfields redevelopment and permitting

# Two Types of Litigation Risk

**#1**

**Legal challenge to regulatory agency remedial process**

**(by responsible party, environmental/public health group, community)**

**#2**

**Lawsuit against potentially responsible/liable parties for cleanup of drinking water supply impacted by site subject to agency action**

**(by public water system)**

# Legal Challenge to Regulatory Agency Remedial Process

**Key stakeholders – responsible parties, community members, environmental/public health advocates – have (potentially contradictory) interests and positions on key issues:**

- Adequacy of remedial investigation
- Need for emergency or interim removal/remedial action
- Applicable or relevant and appropriate requirements (ARARs)
- Protectiveness of remedial goals/objectives (human health & environment)
- Adequacy of range of remedial options analyzed
- Cost / effectiveness / speed of selected remedial action
- Adequacy of agency responses to stakeholder comments/recommendations

# Legal Challenge to Regulatory Agency Remedial Process

**Mitigating risk of legal challenge to agency action:**

- Focus on stakeholder communications
  - Meaningful meetings and requests for input
  - Robust responses to comments
  - Clear factual/scientific basis supporting positions
- Robust record of decision (ROD) / administrative record
- Consistent application of regulatory requirements and guidance
- Equal emphasis on the roads not taken, as on the one selected

# Lawsuit to Clean Up Drinking Water Supply

**Public water systems (water districts; municipalities) are facing:**

- Vast costs associated with federal Maximum Contaminant Level (MCL) compliance by 2029 (per EPA's April 10, 2024 final rule):
  - PFOA, PFOS: **4 parts per trillion (ppt) (compare PCE: 5 ppb)**
  - PFHxS, PFNA, and HFPO-DA (GenX): **10 parts per trillion**
- State requirements/guidance potentially more stringent than MCLs
  - Minnesota guidance value for PFOA: **0.0079 parts per trillion**
  - California public health goal for PFOS: **1 part per trillion**
- MCL Goals (MCLGs) that are simply unachievable
    - Federal MCLG for PFOA and PFOS is **zero**.
- Significant community scrutiny and concerns about health risk

# Lawsuit to Clean Up Drinking Water Supply

**Legal claims previously available under common law (tort) theories:**

- Nuisance, trespass, negligence, and (for manufacturers) strict products liability

**EPA's designation of PFOA and PFOS as CERCLA hazardous substances (April 19, 2024) opens door to much broader litigation:**

- Easier liability standard (strict liability for all PRPs)
- Broader range of defendants (including owners and operators of facilities)
- Easier statute of limitations (3 years from removal action completion, 6 years from remedial action initiation)

# Lawsuit to Clean Up Drinking Water Supply

**Public water systems (and their attorneys) will use litigation in ways that could impact regulatory action at cleanup sites:**

- Seek remedy covering (much) broader geographic area
- Seek implementation of interim remedy
- Seek to fund final remedy different from or conflicting with remedy at regulated site
- Seek to impose remedial goals/objectives more stringent than at regulated site

**If successful, may:**

- Impose financial burdens on responsible parties at site, leading to insolvency or other ability-to-pay issues at site
- Impose significant burdens and costs on site regulator
- Provide fodder for legal challenge to agency action at site

# Questions?

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**PFAS Regulatory and Litigation Developments Webpage:**

https://www.fbm.com/per-and-polyfluoroalkyl-substances-pfas/regulatory-and-litigation-developments/