



# PFAS Update

Community Advisory Council Meeting  
April 13, 2023

Doug Paquette  
Groundwater Protection Group  
Environmental Protection Division




# Agenda

- Background
  - What are Per- and Polyfluoroalkyl Substances (PFAS)?
  - Sources of PFAS Contamination
  - Response to PFAS and 1,4-Dioxane under the CERCLA\* Program
- PFAS Groundwater Treatment Systems
  - Start of treatment system operations
- BNL Water Supply Wells
  - Status
  - Proposed additional NYS drinking water standards for PFAS
  - Proposed EPA national drinking water standards
- Next Steps

\*Comprehensive Environmental Response, Compensation, and Liability Act, also known as Superfund

# What are PFAS?

- PFAS are a diverse group of chemicals that are resistant to heat, water, oil and grease
  - Estimated ~9,000 PFAS have been created since the 1940s
  - Do not breakdown in the environment (commonly referred to as “Forever Chemicals”)
  - Persistent – impact the environment for many years
  - Bioaccumulate (widespread detections in many species)
  - Numerous potential health effects
  - Focus has been on PFAS chemicals PFOS and PFOA, but now other PFAS are being evaluated and regulated
    - August 2020, NYS established drinking water standards of 10 ng/L (part per trillion) for PFOS and PFOA
- Used in many industrial applications and consumer products
  - Firefighting foam (Aqueous Film Forming Foam or AFFF)
    - Used for extinguishing Class B fires; including flammable liquids such as gasoline, oil, and aviation fuel
  - Teflon-coated cookware
  - Stain-resistant carpets
  - Water-resistant textiles
  - Fast-food wrappers and other paper products



Perfluorooctane sulfonic acid (PFOS)  
Perfluorooctanoic acid (PFOA)

# PFAS Detected in LI Groundwater

*Some Examples – The List is Growing*

- Firefighting foam release areas
  - Local Firehouses
  - Yaphank Fire Training Facility
  - Former Grumman Site - Calverton
  - Air National Guard Base at Gabreski Airport
  - East Hampton Airport
  - Islip MacArthur Airport
  - Brookhaven Calabro Airport
  - Brookhaven National Laboratory
- Landfills
  - East Quogue
  - Riverhead
  - Brookhaven

# Efforts to Understand the Source and Extent of PFAS in groundwater at BNL

2017: PFAS were detected in samples from three BNL potable water supply wells

- Combined PFOS and PFOA concentrations were below the former 70 ng/L (parts per trillion) Health Advisory Level that EPA established in 2016

2018-2021: Identified 12 areas impacted by PFAS

- 9 areas where firefighting foam had been released (1966-2008)
- 3 areas impacted by releases to sanitary system, landfill disposal, and water supply treatment operations

2018-2022: Testing for PFAS

- Tested for PFAS at ~750 on-site and off-site locations
  - ~465 on-site and off-site monitoring wells
    - Including 95 new wells installed for the PFAS treatment systems
  - ~180 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
  - BNL's sewage treatment facility influent and effluent
  - Routine testing of BNL's water supply wells
  - BNL/SCDHS cooperative testing of 82 private wells



# Firefighter Training

Example: Former Firehouse Training Area (September 1966)



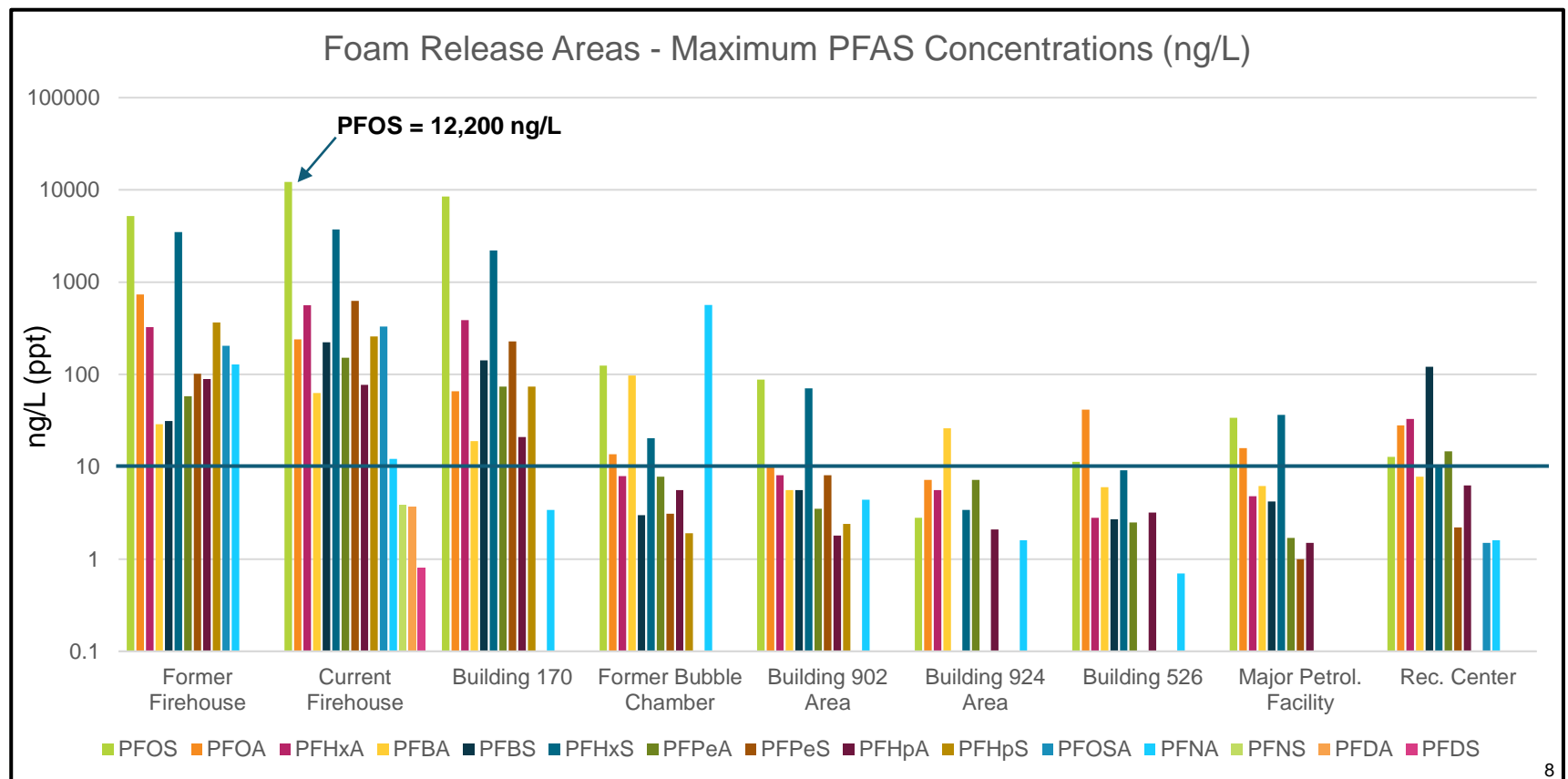
# Building Fire Suppression System Testing

Example: Former Bubble Chamber Area East of Building 902 (September 1970)



# Analyzing water samples for PFAS

- Drinking water samples in 2017 were tested for 6 PFAS
- Monitoring wells samples during 2018-2022 were tested for 23 PFAS
- Current analytical methods test for 40 to 47 PFAS
  - To date, ~20 different PFAS have been detected in groundwater samples
  - Highest concentrations are usually PFOS, PFOA, PFHxS, PFHxA
  - Detection limits for most PFAS are ~2 ng/L





# CERCLA Response: PFAS and 1,4-Dioxane\*

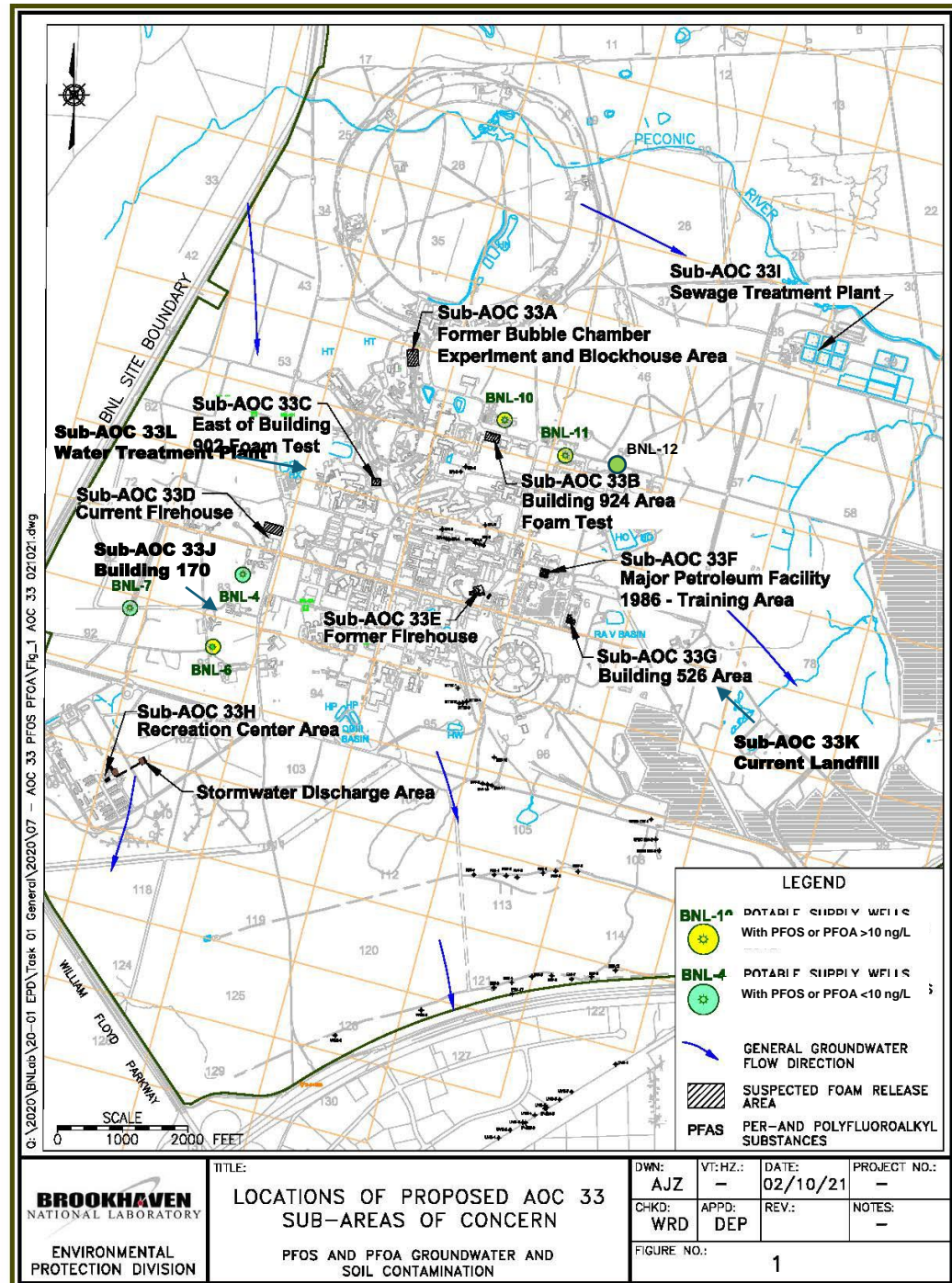
- Investigations and remedial responses are conducted under the Interagency Agreement (IAG) between DOE, EPA and New York State
- Operable Unit X was established in 2021
  - Current scope is to address PFOS, PFOA and 1,4-Dioxane
    - Likely to cover additional PFAS as they become regulated
  - Remediation of three high concentration PFAS plumes is being conducted as a Time Critical Removal Action (TCRA)
  - Full Remedial Investigation/Feasibility Study (RI/FS) will be required

\*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.

# Operable Unit X

## Areas of Concern (AOCs)

- Area of Concern 33
  - PFOS and PFOA
  - Includes 12 Sub-Areas of Concern (33A through 33L)
- Area of Concern 34
  - 1,4-Dioxane

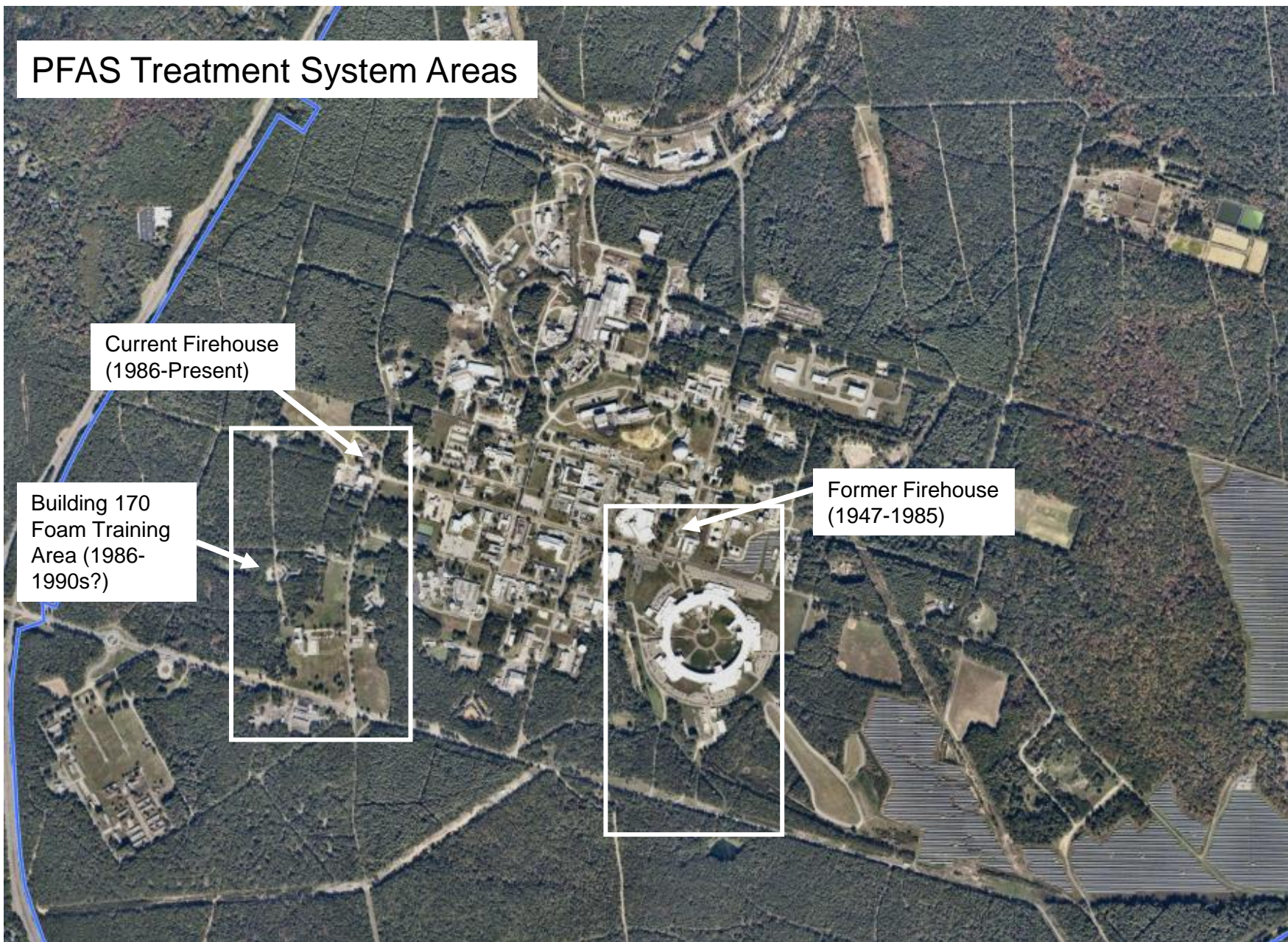


# PFAS Treatment Systems

- BNL completed construction of two treatment systems to remediate groundwater with highest PFAS concentrations
  - Conducted as a CERCLA Time Critical Removal Action (TCRA)
  - Current Firehouse/Building 170 treatment system operations started in October 2022
  - Former Firehouse treatment system operations started in January 2023
- Combined, the two systems are treating ~750 gpm of PFAS contaminated groundwater
  - Monitoring results indicate that the Granular Activated Carbon (GAC) filters are highly effective
    - **PFAS are not detected in the treated water**
    - Treated water is returned to the aquifer using recharge basins
    - NYS Effluent Limits\* applied to the treatment systems for PFOS and PFOA are lower than the 10 ng/L drinking water standards:
      - PFOS: 2.7 ng/L
      - PFOA: 6.7 ng/L
  - (1,4-Dioxane in system effluent must be below 0.35 µg/L, which is lower than the 1.0 µg/L drinking water standard)



# PFAS Treatment System Areas



Current Firehouse  
(1986-Present)

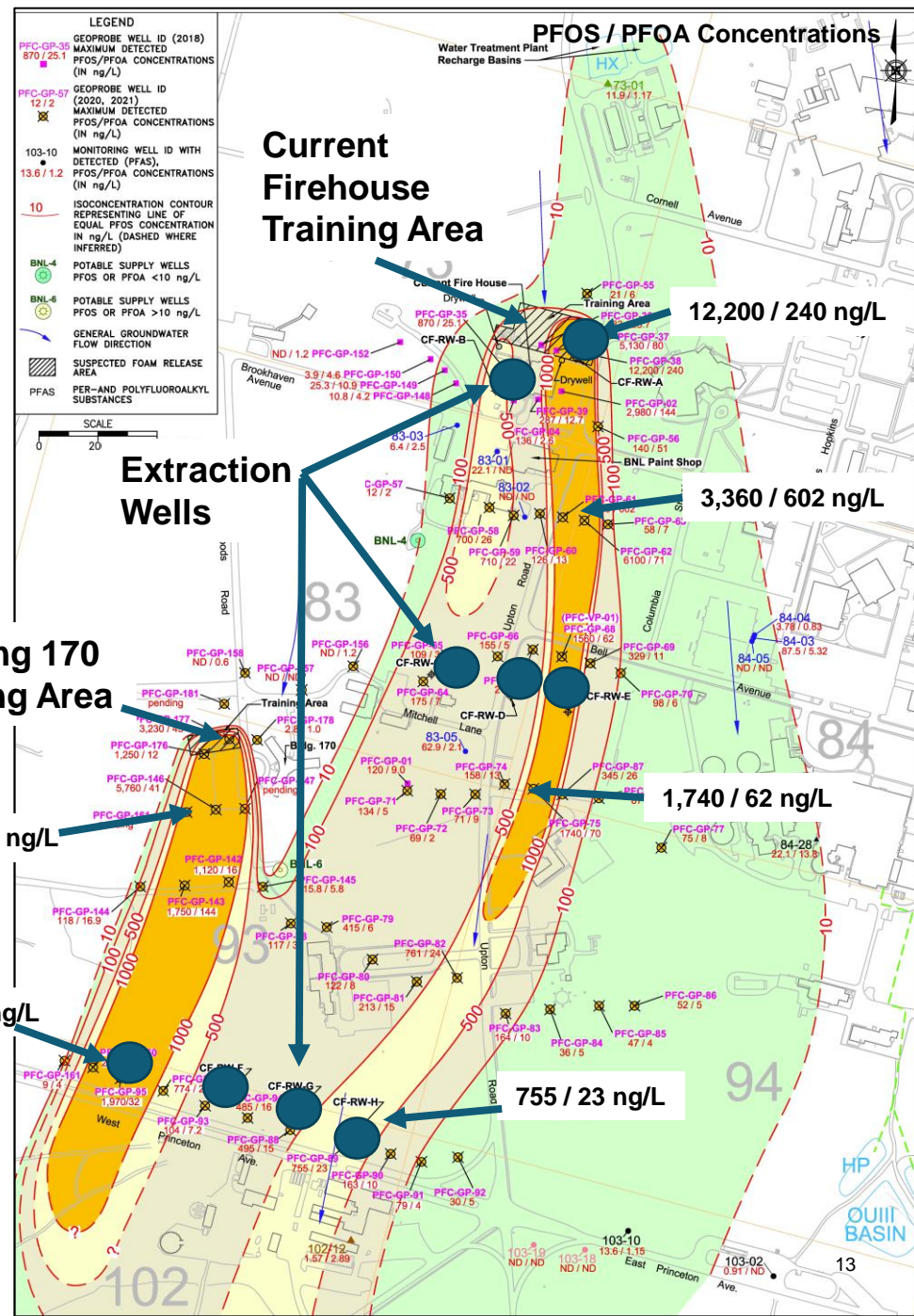
Building 170  
Foam Training  
Area (1986-  
1990s?)

Former Firehouse  
(1947-1985)



# Current Firehouse Plume and Building 170 Plume Remediation

- Treatment System
  - Nine extraction wells
    - Pump ~500 gpm
  - Goal is to remediate groundwater with PFOS or PFOA concentrations >100 ng/L
  - New carbon filters installed in an inactive groundwater treatment system building
- Monitoring
  - Installed 66 additional monitoring wells for long-term surveillance



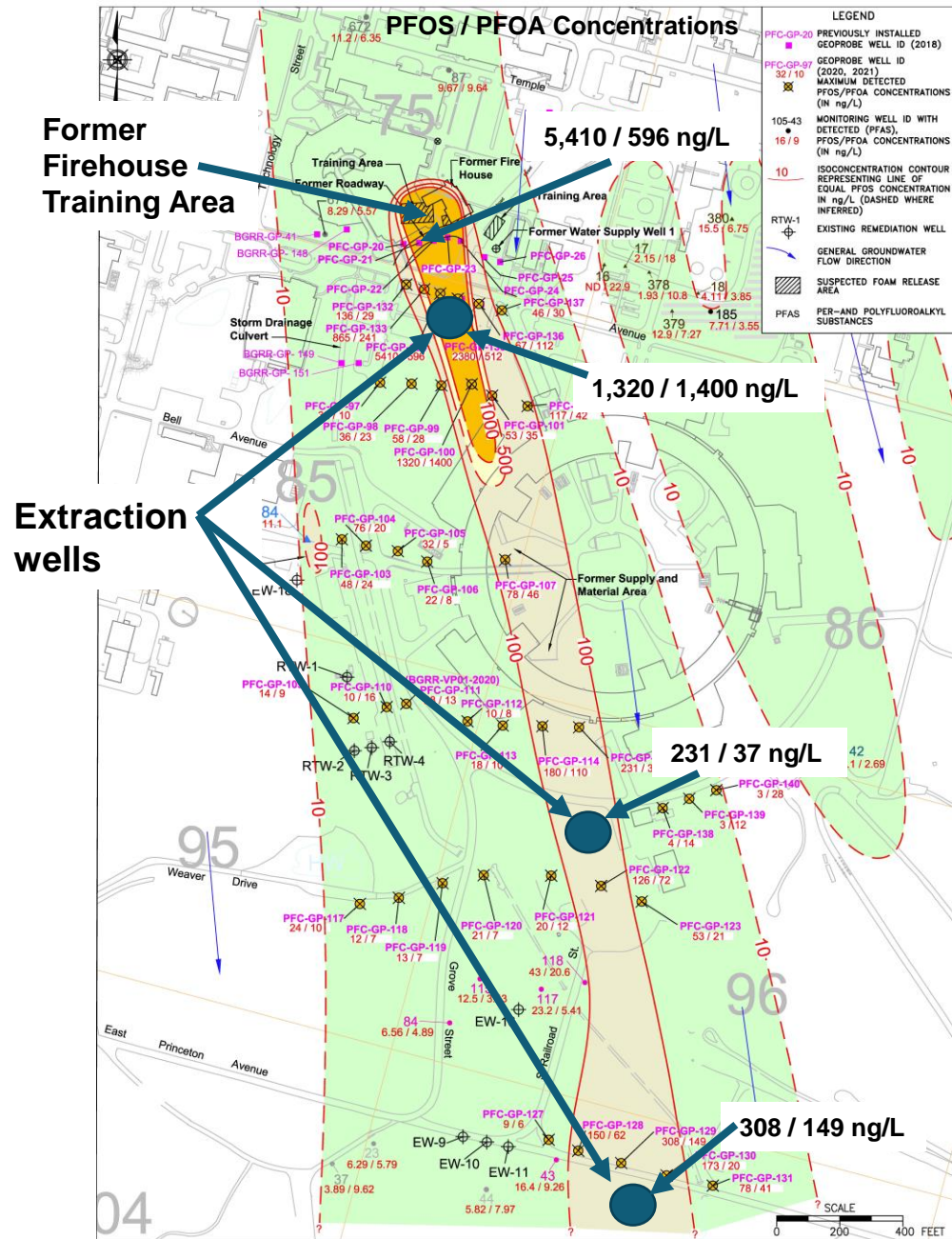
# Former Firehouse Plume Remediation

- **Treatment System**

- Three extraction wells
  - Pump ~250 gpm
- Goal is to remediate groundwater with PFOS or PFOA concentrations >100 ng/L
- Reuse carbon filters previously installed for another project

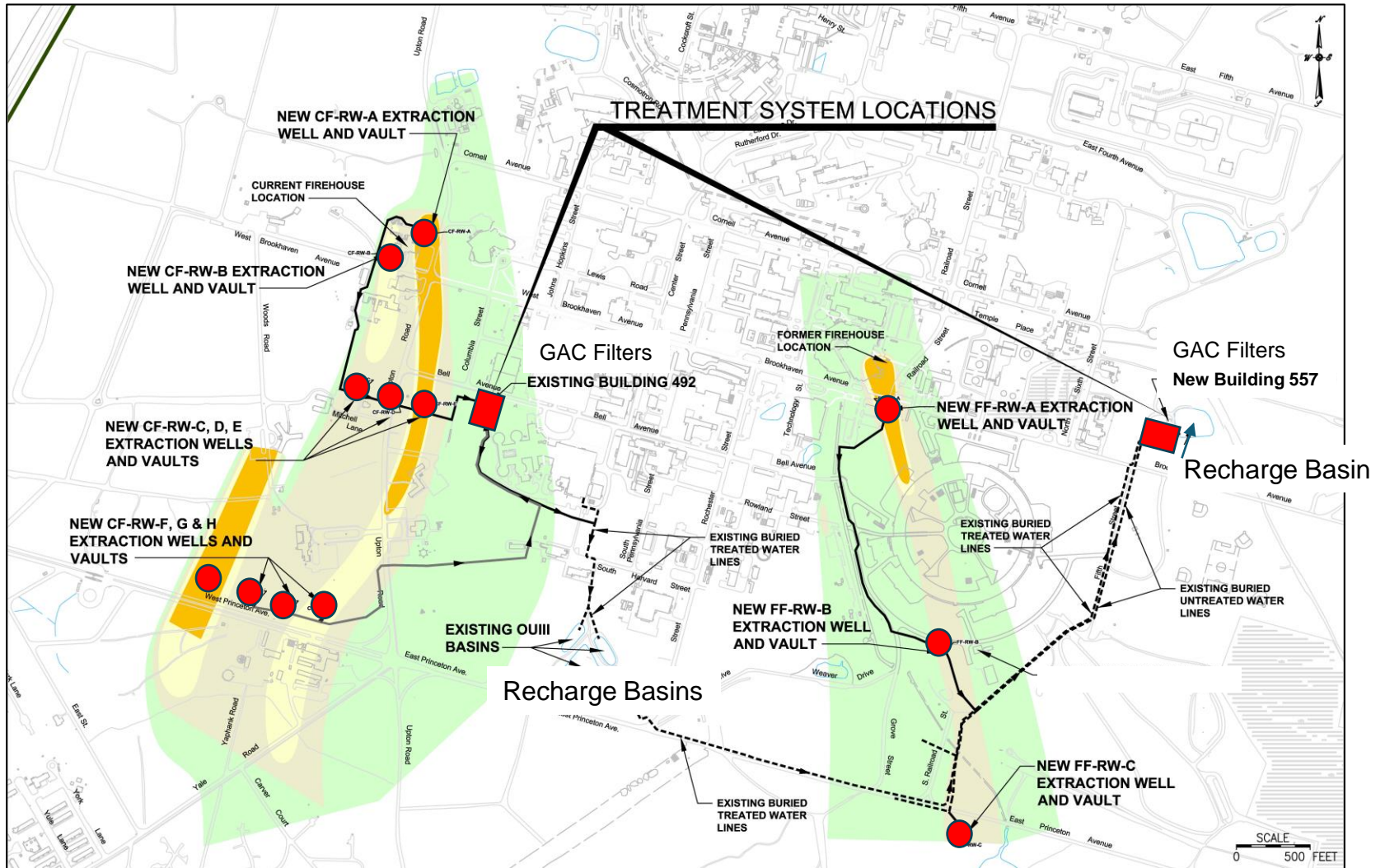
- **Monitoring**

- Installed 29 additional groundwater monitoring wells for long-term surveillance





# PFAS Treatment Systems



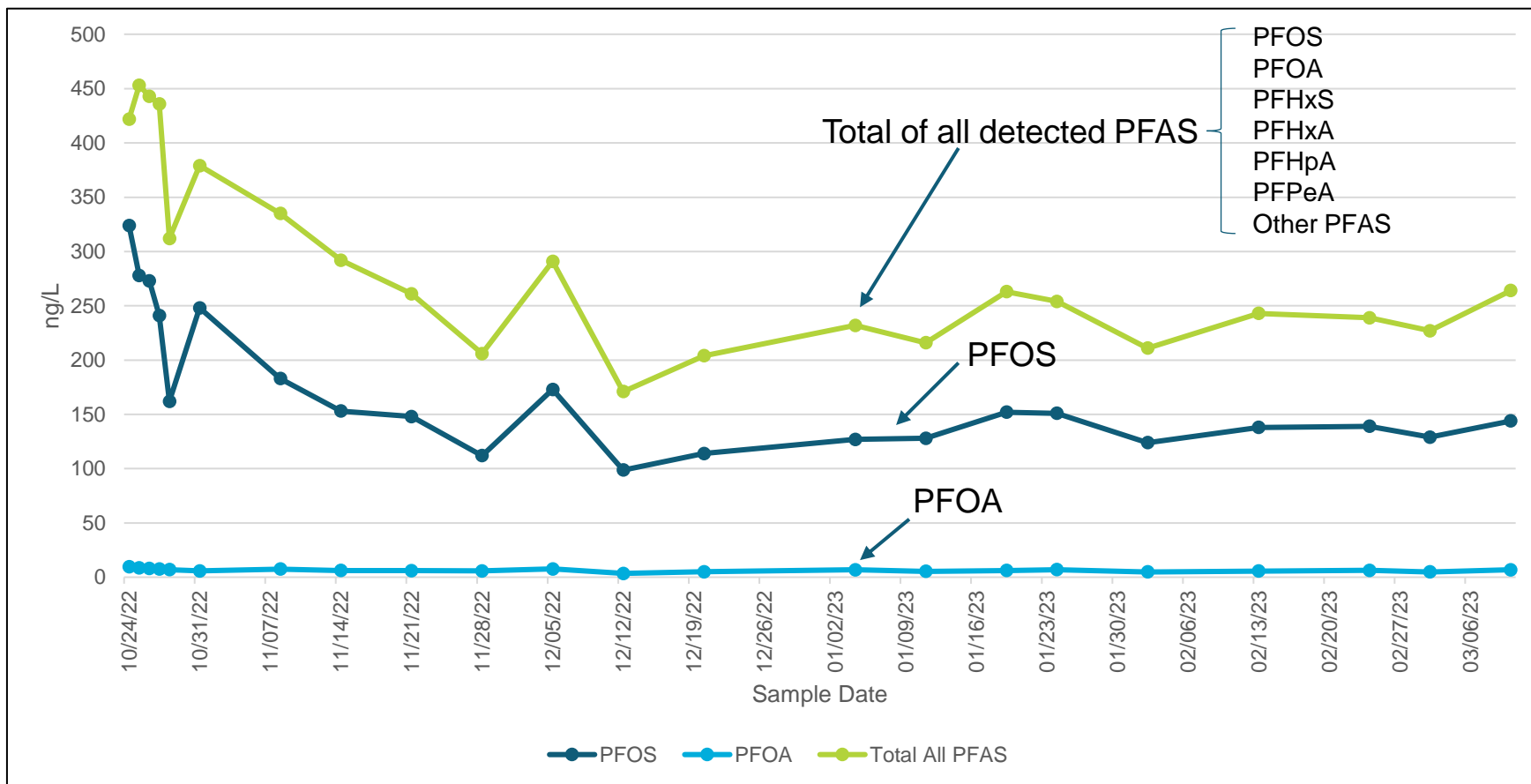
# Treatment System for Former Firehouse PFAS Plume

## Granular Activated Carbon Filters



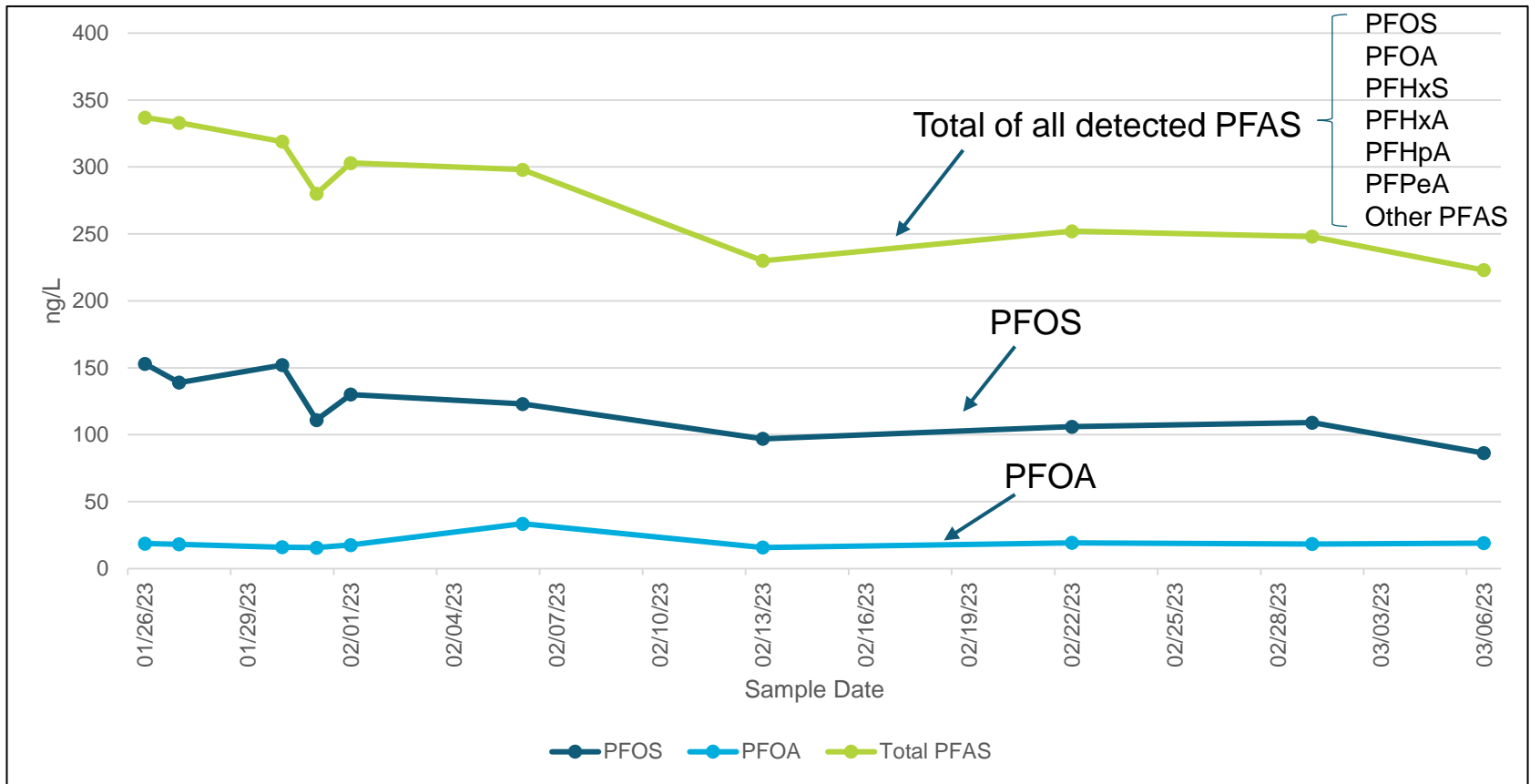


# Current Firehouse/Building 170 Treatment System Influent Concentrations (combined water from 9 extraction wells)



**PFAS are not detected in the system effluent (treated water) samples**

# Former Firehouse Treatment System Influent Concentrations (combined water from 3 extraction wells)



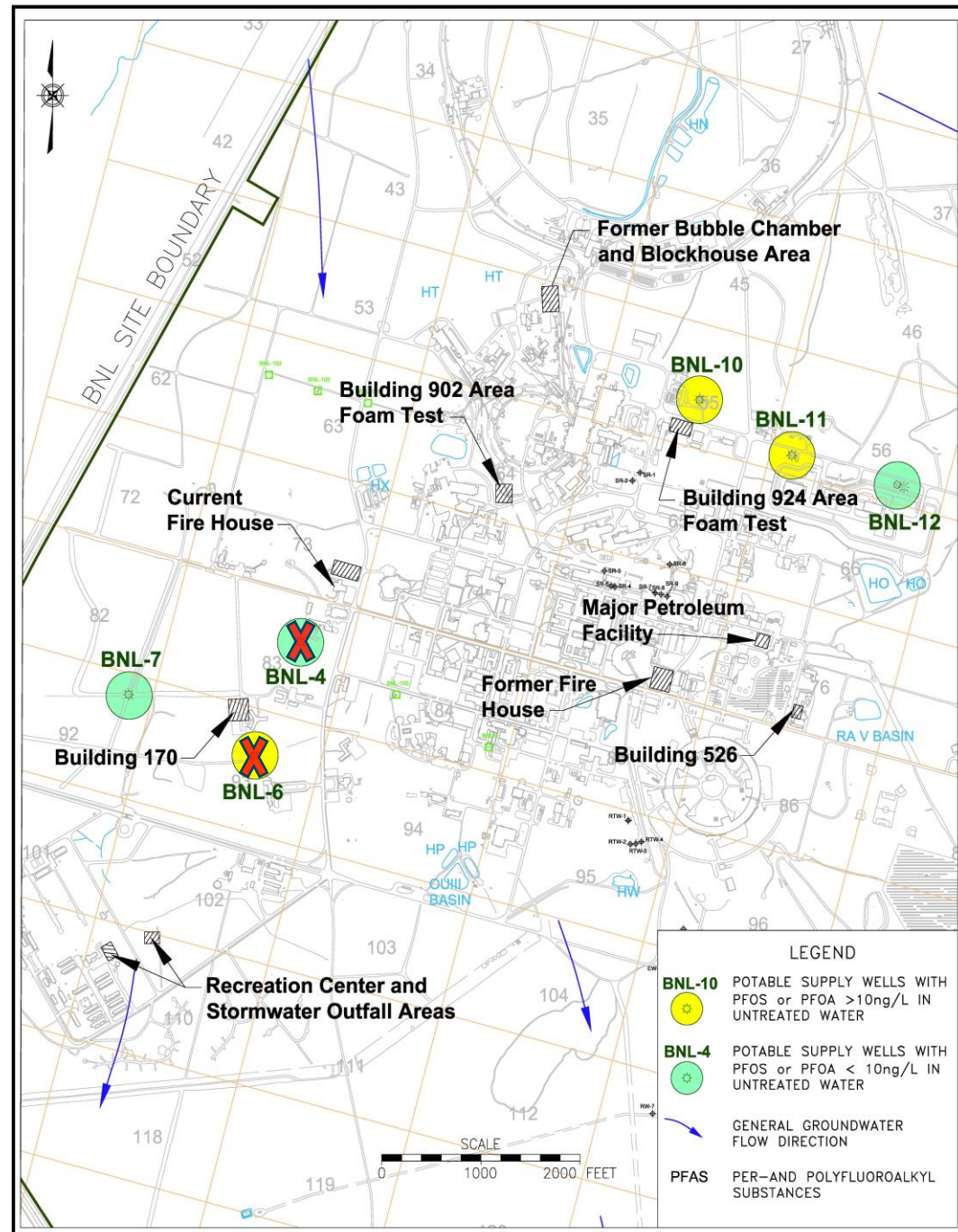
**PFAS are not detected in the system effluent (treated water) samples**

# Operable Unit X RI/FS Work Plan

- Draft RI/FS Work Plan was submitted to the regulatory agencies on March 30<sup>th</sup>
  - Anticipate two-month review period
- The Work Plan builds upon the extensive groundwater characterization work conducted during 2018-2022
  - Groundwater
    - Better define downgradient extent of previously identified PFAS and 1,4-Dioxane plumes
      - Sample extensive network of existing on-site and off-site wells
      - Install temporary (one-time use) wells to fill in data gaps
        - Based upon temporary well data, install new wells for long-term monitoring
      - Sample on-site and off-site groundwater treatment systems
  - Soil and sediments
    - Test soils and asphalt in areas impacted by PFAS releases
    - Test surface water and sediment in on-site portion of the Peconic River

# BNL Water Supply Wells Impacted by PFAS

- In August 2020, New York established drinking water standards of 10 ng/L for PFOS and PFOA
  - PFOS concentrations in untreated water from three supply wells were >10 ng/L
- BNL returned to service GAC filters at BNL-10, BNL-11 and BNL-12
  - Filters were installed in the 1990s to address VOC contamination
    - Filters were taken out of service by ~2010
  - Filters are effectively removing PFOS and PFOA to non-detectable levels
    - However, starting to see breakthrough of several short-chained PFAS (e.g., PFBA)
- BNL-4 and BNL-6 have been taken out of service permanently
  - These wells are not equipped with GAC filters





# Proposed New York Drinking Water Standards

Maximum Contaminant Levels (MCLs) and Notification Levels (NLs)

Contaminants	MCLs
PFOS	10 ng/L (adopted in 2020)
PFOA	10 ng/L (adopted in 2020)
PFNA	<b>10 ng/L</b>
PFHxS	<b>10 ng/L</b>
PFDA	<b>10 ng/L</b>
PFHpA	<b>10 ng/L</b>
Combined concentrations of: PFOS, PFOA, PFNA, PFHxS, PFDA and PFHpA (Referred to as the “PFAS6”)	<b>30 ng/L</b>
Contaminants	NLs
Combined concentrations of: PFHpS, PFUnA, PFDaA, HFPO-DA (GenX)*, 9CI-PF3ONS, 11CI-PF3OUdS	<b>30 ng/L</b> <small>* GenX would have a separate notification level of 10 ng/L</small>
Combined concentrations of: PFBA, PFBS, PFPeA, PFPeS, PFHxA, ADONA, 4:2 FTS, 6:2 FTS, 8:2 FTS, NFDHA, PFEESA, PFMBA, PFMPA	<b>100 ng/L</b>
Contaminant	MCL
1,4-Dioxane	1 µg/L (adopted in 2020)

- Proposed standards were published in the NYS Register on October 5, 2022
- NYSDOH is working on “Responses to Comments”
- Recently proposed National Standards may impact final rule making

# EPA's Proposed National Drinking Water Standards

Maximum Contaminant Levels Goals (MCLGs) and Maximum Contaminant Levels (MCLs)

Contaminants	MCLG	MCL
PFOS	Non-Detect	4 ng/L
PFOA	Non-Detect	4 ng/L
HFPO-DA (GenX), PFBS, PFNA and PFHxS	Hazard Index of 1.0*	Hazard Index of 1.0*

\*Hazard Index :  $(\text{GenX} / \underline{10 \text{ ng/L}}) + (\text{PFBS} / \underline{2,000 \text{ ng/L}}) + (\text{PFNA} / \underline{10 \text{ ng/L}}) + (\text{PFHxS} / \underline{9 \text{ ng/L}})$   
Calculation

Divide Measured Concentrations by the EPA Health Based Water Concentrations (HBWCs)

- Proposed standards were published in the Federal Register on March 29<sup>th</sup>
  - 60-day public comment period (ends May 30<sup>th</sup>)
  - EPA expects to finalize the new standards by the end of 2023
  - Initial monitoring of water systems must be completed within the 3 years between rule promulgation date and rule effective date (anticipated to be by end of 2026)
  - When finalized, the national drinking water standards will supersede the current NYS standards
    - Will the NYS standards be adjusted before proposed federal standards are enforceable?
- **With the effectiveness of the GAC filters, BNL's drinking water is already in compliance with the proposed standards**

# Next Steps

- Continue operation of the PFAS treatment systems
  - Conduct groundwater and treatment system monitoring to verify effectiveness of the systems
- Finalize the RI/FS Work Plan following regulatory agency review
  - Respond to agency comments
  - Establish a public comment period
    - Provide an overview of Work Plan
      - Possibly during a CAC Meeting
    - Respond to public comments
  - Establish a schedule for conducting the RI/FS





BNL PFAS Team

Questions?

L. Singh, V. Racaniello, R. Lagattolla, B. Howe, J. Milligan, J. Remien, AJ Scheff, B. Gordon (DOE), B. Dorsch, D. Paquette, E. Kramer, M. Yost, J. Ferraiuolo, N. Shemet

Not pictured: A. Engel and K. Green (DOE)