Update
Per- and Polyfluoroalkyl Substances (PFAS)

Community Advisory Council
June 13, 2019

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BNL Groundwater Protection Group

PFAS

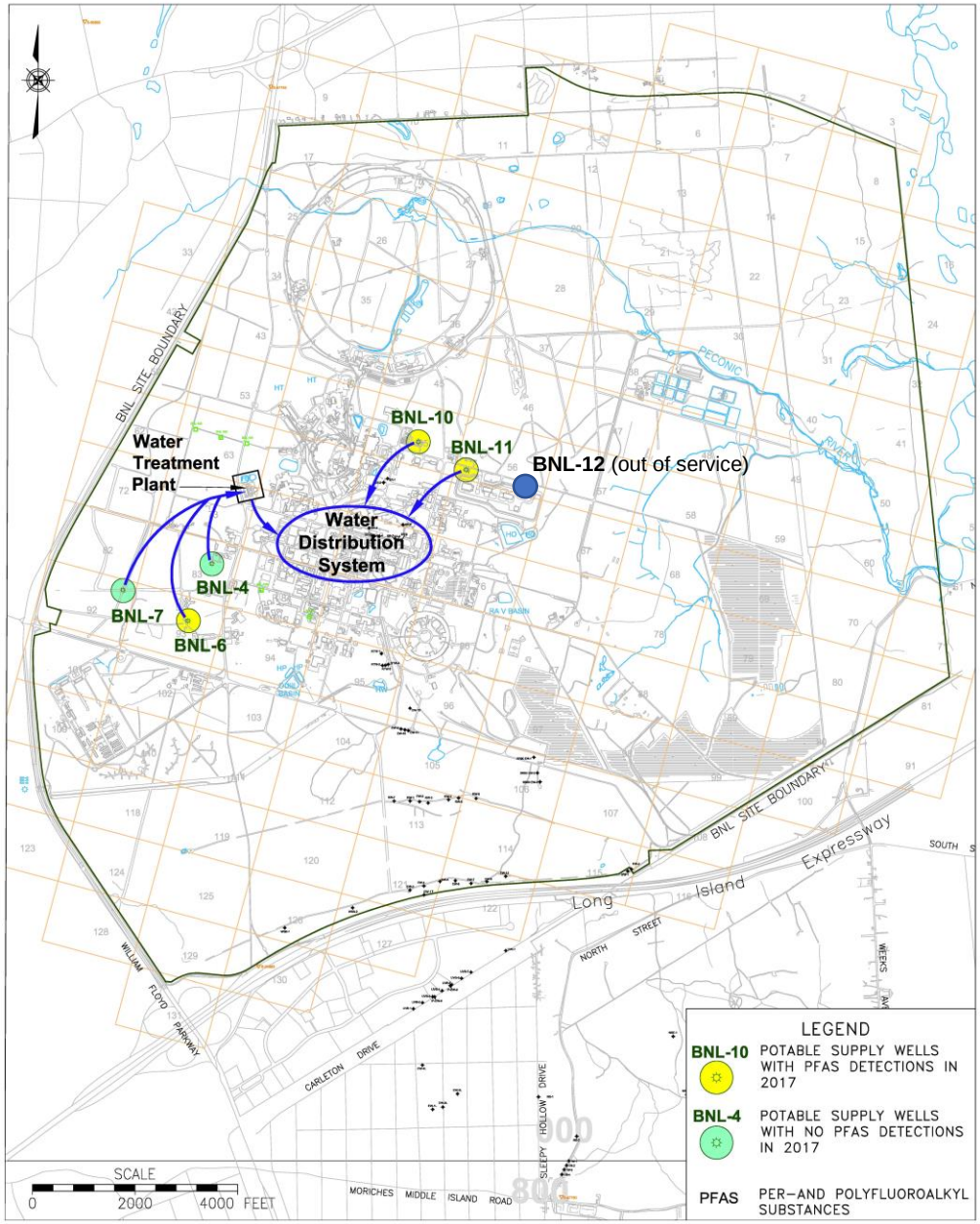
- PFAS contamination is an emerging issue internationally
  - There have been ~4,700 PFAS compounds developed
  - Products can contain mixtures of these compounds (including firefighting foam)
  - Persist in soils and groundwater for long periods of time
  - Potential health effects, classified as a possible carcinogen
  - 2013-2015 the EPA conducted a nationwide effort to test public water supply systems serving >10,000 people for six PFAS compounds
- In 2016, EPA established a Lifetime Health Advisory Level of 70 ng/L* for combined concentrations of two compounds:
  - PFOS = Perfluorooctane sulfonate
  - PFOA = Perfluorooctanoic acid

***NYS Drinking Water Standards of 10 ng/L Were Recently Recommended for PFOS and PFOA**

- PFOS/PFOA production in the US was phased out starting in the early 2000s due to environmental and health concerns
- Water can be effectively treated by using standard granular activated carbon filters and ion exchange resins

2017 - First Testing for PFAS in Groundwater at BNL

- Suffolk County tested water samples from BNL's potable water wells for PFAS
  - Tested for six PFAS compounds
  - Results were compared with the 70 ng/L Lifetime Health Advisory Level (HAL) for PFOS+PFOA
- PFAS were detected in three of BNL's five active water supply wells
  - Confirmed by analyzing multiple samples during 2017 and 2018
  - PFOS+PFOA concentrations
    - Wells 10 and 11: up to 33 ng/L
    - Well 6: up to 70.4 ng/L*
      - All other samples were <70 ng/L
      - Most recent = 2.4 ng/L
      - Use of this well is now limited
    - Water Treatment Facility <3 ng/L
- Routine testing for PFAS was added to potable water monitoring program in 2018
  - Samples are now tested quarterly
  - Results have been consistently <70 ng/L



*There were QA concerns with analysis of the June 2018 sample

Source of PFAS = Firefighting Foam

Based upon review of available records and interviews with current long-term firefighters and retirees, identified eight locations where foam was stored or released:

A. **Trailer near Building 924** (1970)

B. **Area near Building 902** (1970)

C. **Former Bubble Chamber Experiment and Blockhouse Area** (1973 [2 times], 1980)

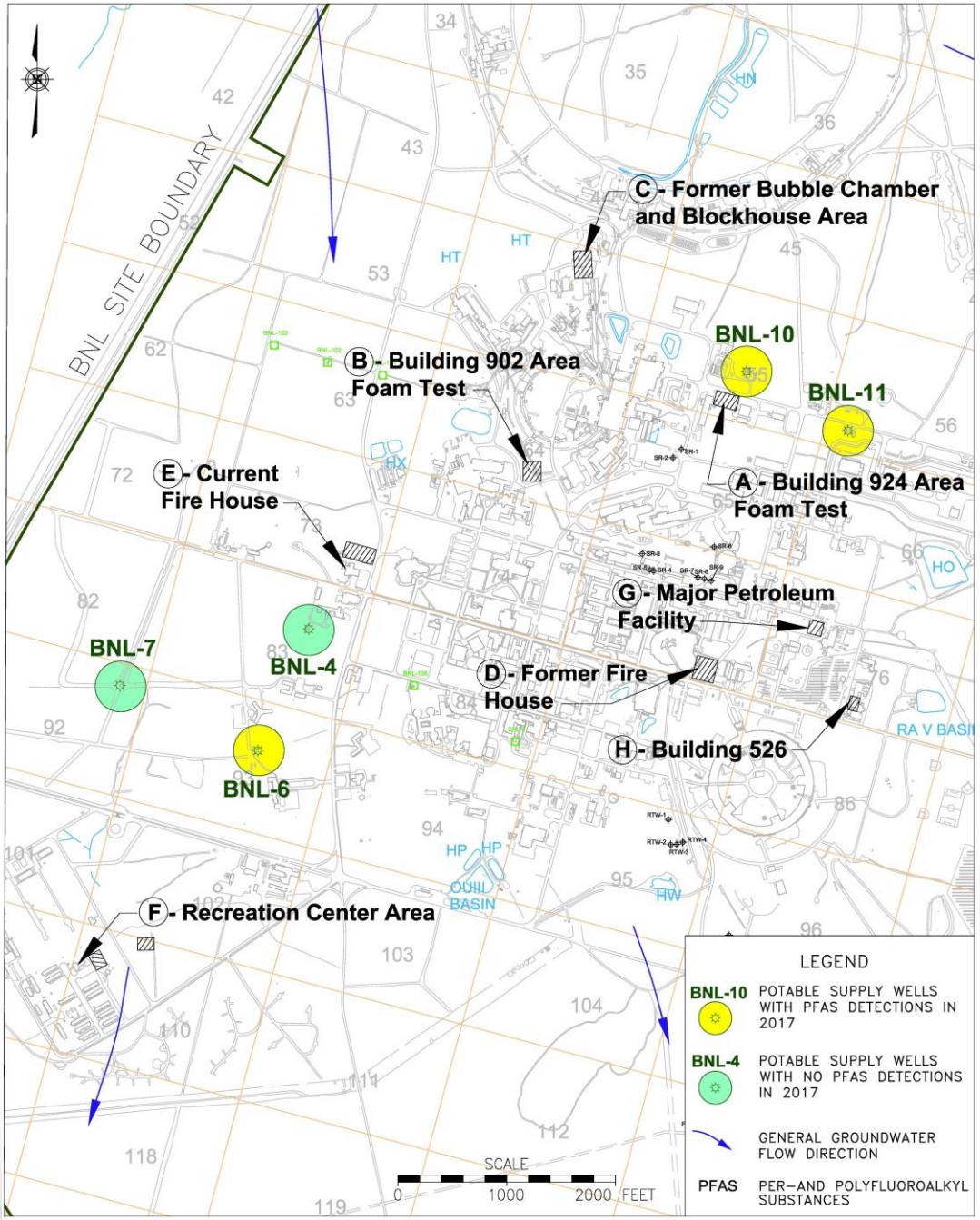
D. **Former Firehouse** (1966-1985)

E. **Current Firehouse** (1986-2008)

F. **Recreation Center Area** (1978, 1980)

G. **Major Petroleum Facility** (1986)

H. **Building 526** (no documented releases)



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Groundwater Characterization

Phased effort to determine the impacts from PFAS:

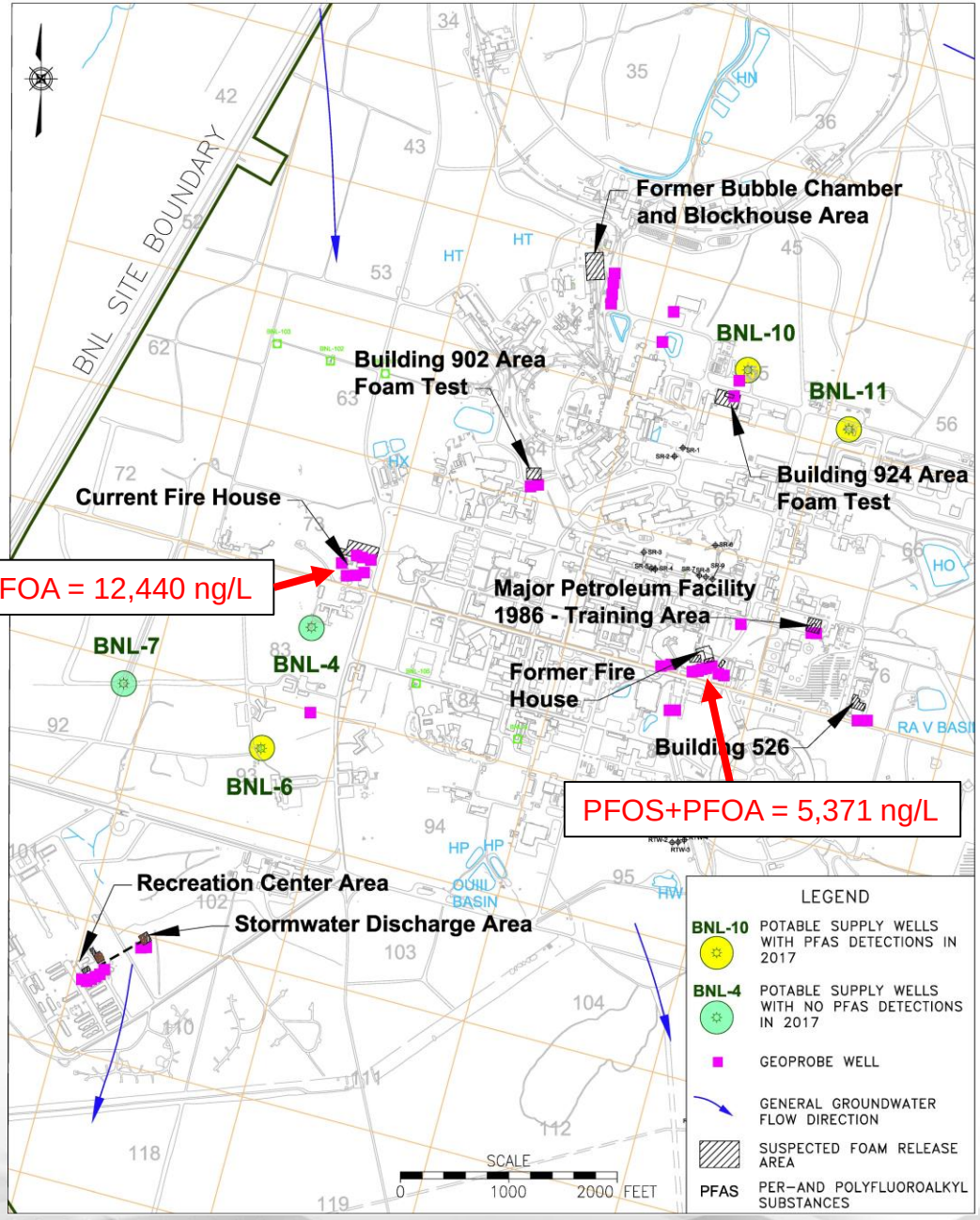
- Phase 1- Source water contributing areas for the supply wells
- Phase 2- Eight foam release areas
- Phase 3- Groundwater treatment wells/systems, landfill areas, Sewage Treatment Plant effluent and groundwater, southern boundary monitoring wells

Collected approximately 500 samples:

- 53 temporary monitoring wells
- 45 permanent monitoring wells
- 43 groundwater treatment system extraction wells
- 6 groundwater treatment systems influent/effluent
- Sewage Treatment Plant (STP) effluent

PFAS Characterization – Source Areas

- Tested groundwater samples for 21 PFAS compounds
- Results: PFAS were detected in groundwater at all eight known foam use areas
- Highest PFOS and PFOA concentrations detected at:
  - Former firehouse area
  - Current firehouse
- High levels of other PFAS chemicals were also detected (e.g., PFHxA, PFHxS, PFBS)



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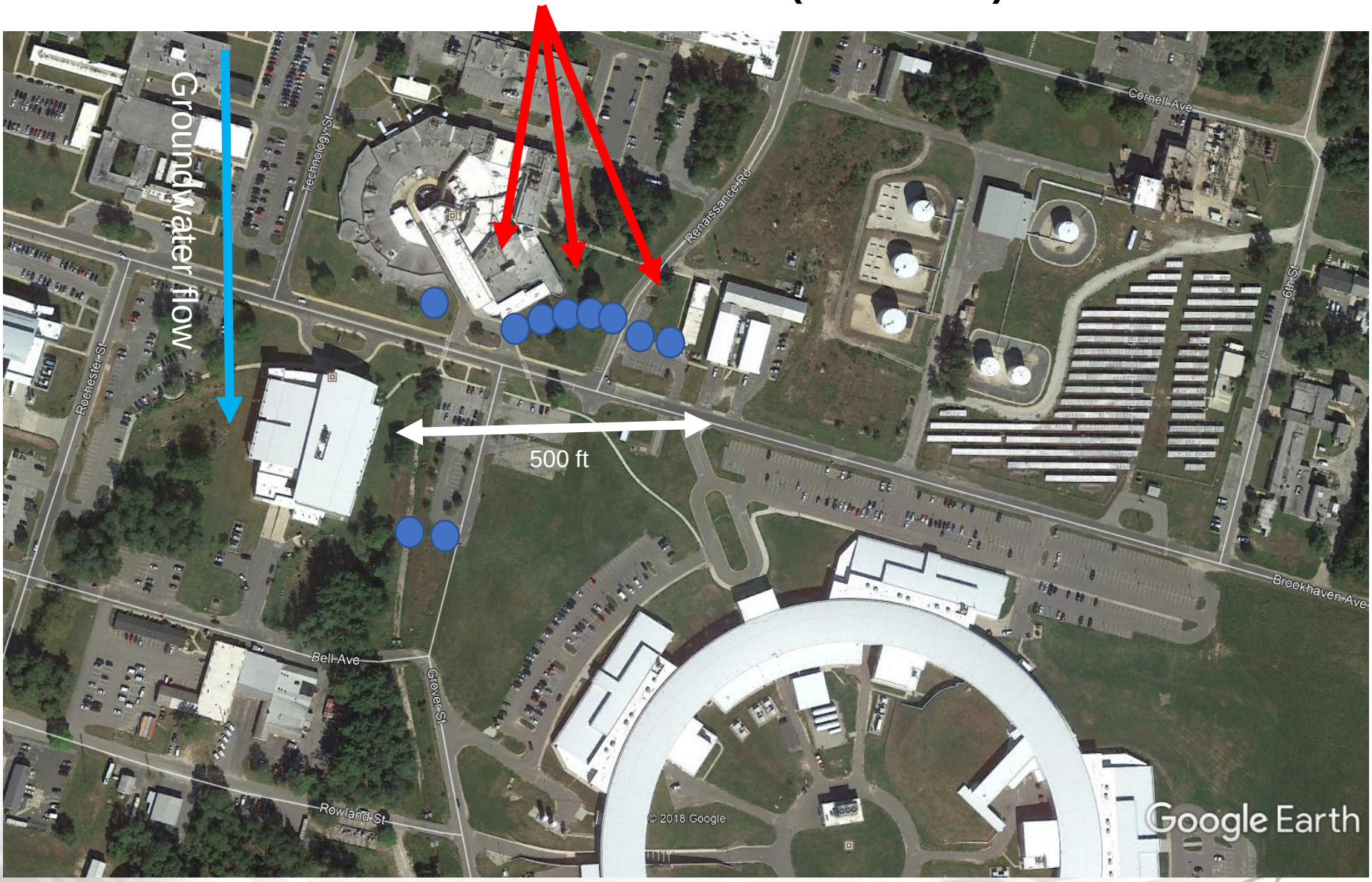
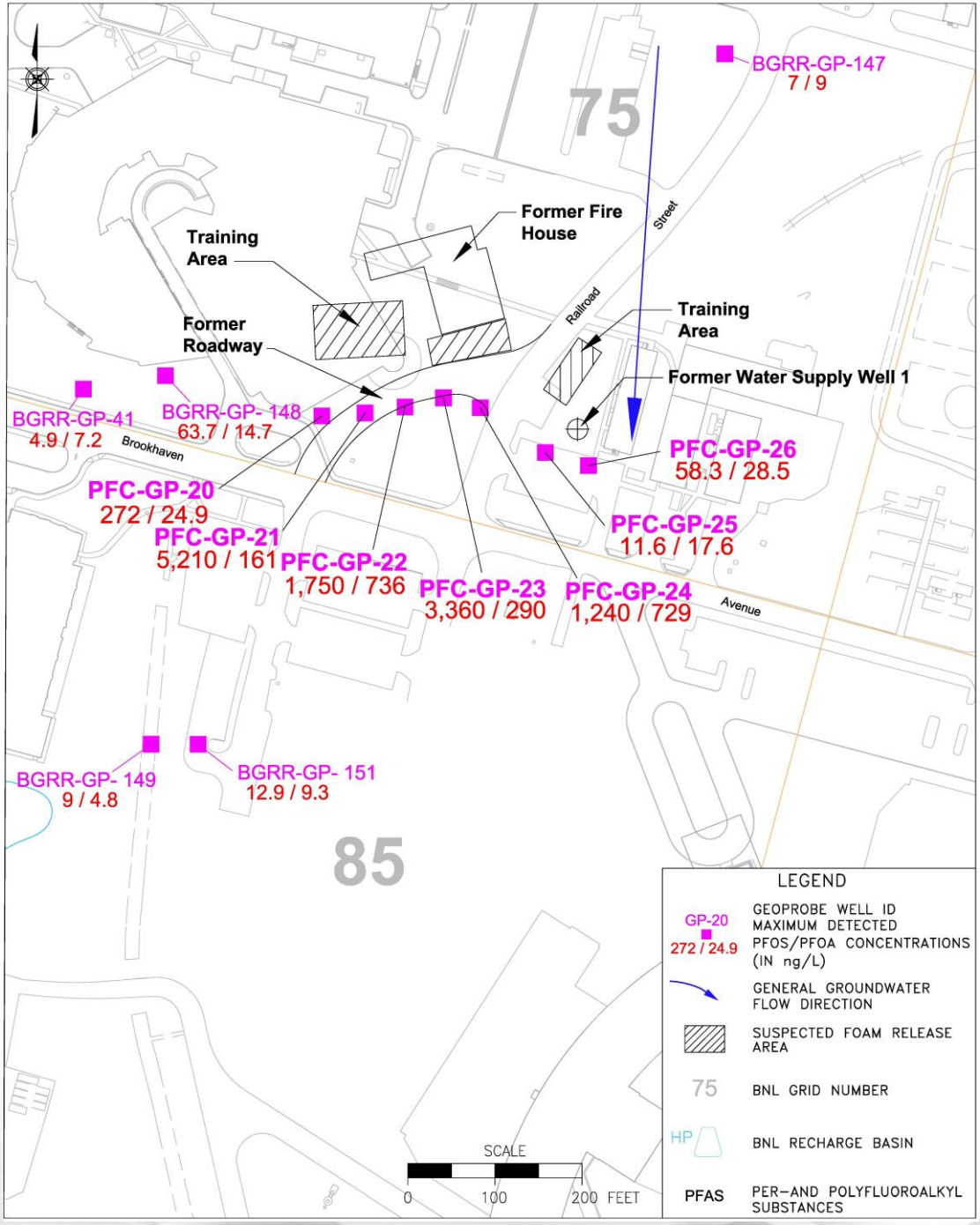
Former Firehouse Foam Release Areas (1966-1985)



Former Firehouse

- 12 temporary wells installed
- Highest PFAS concentrations
  - PFOS = 5,210 ng/L
  - PFOA = 736 ng/L
- Building 725 currently occupies part of the former training area



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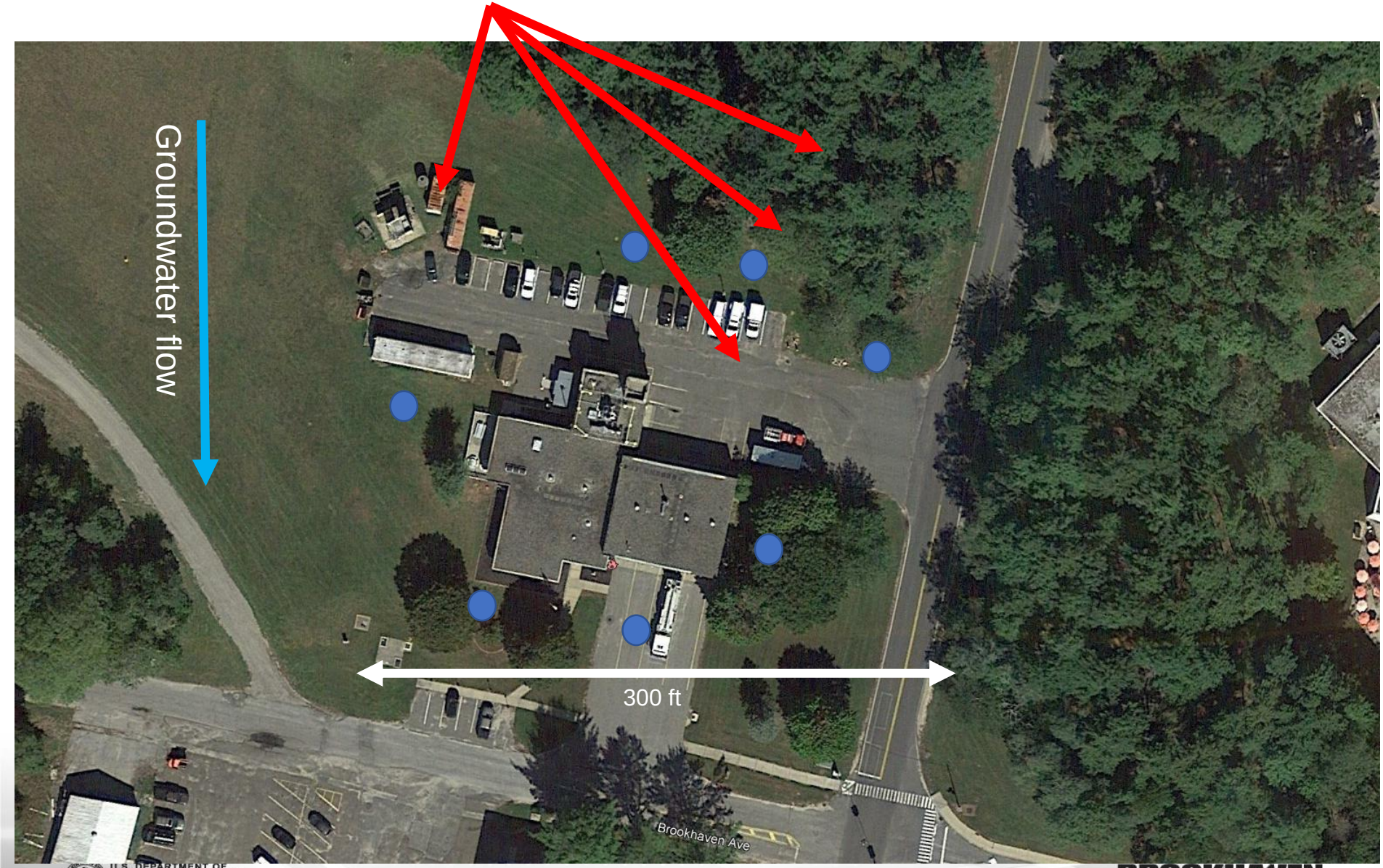
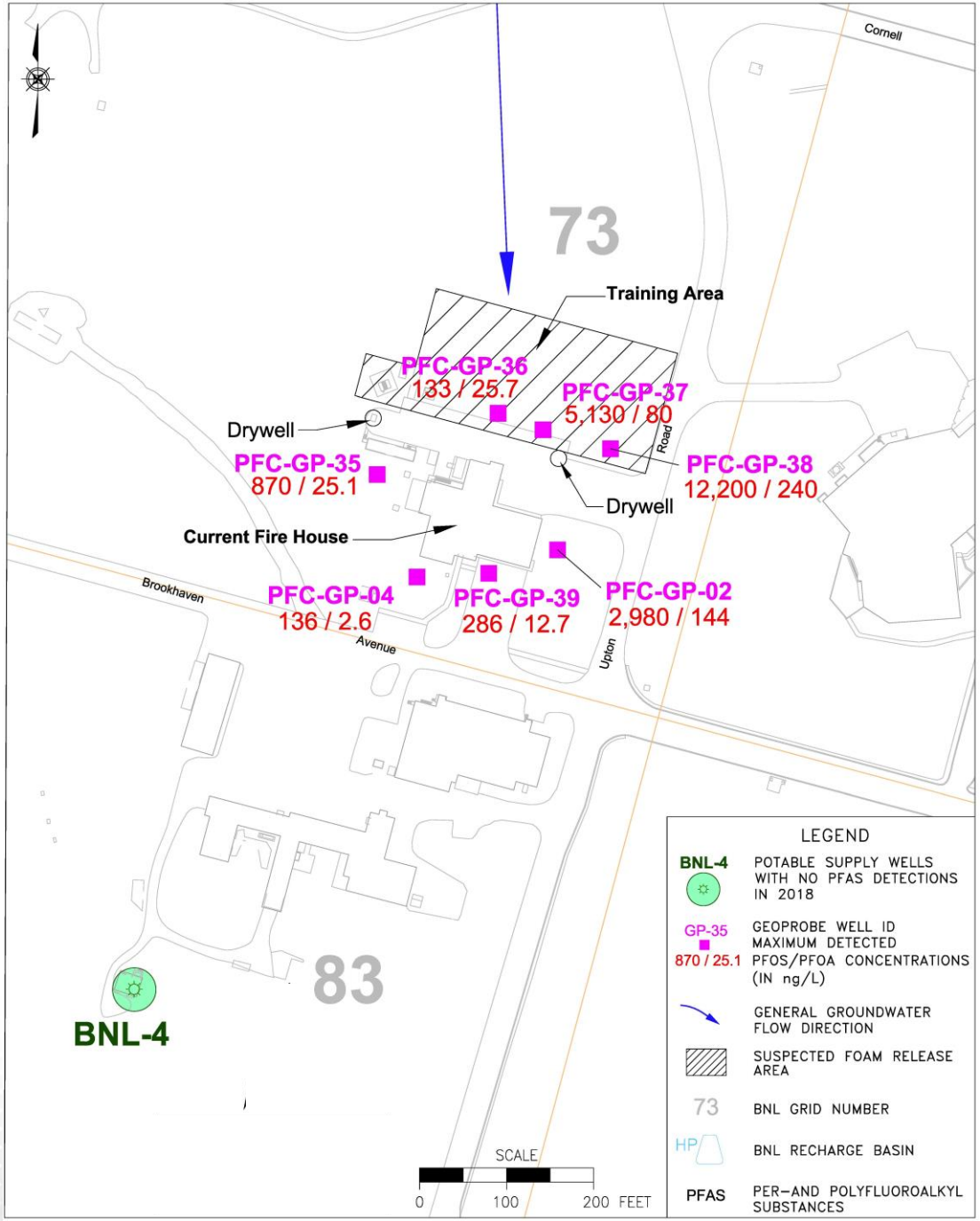
Current Firehouse Foam Release Areas



Current Firehouse

- 7 temporary wells installed
- Highest concentrations
  - PFOS = 12,200 ng/L
  - PFOA = 240 ng/L
- The Current Firehouse area is the likely source of PFAS that is impacting supply Well 6
- Supply Well 4 is located close to the firehouse. Due to age/condition and presence of PFAS, this well will not be used again



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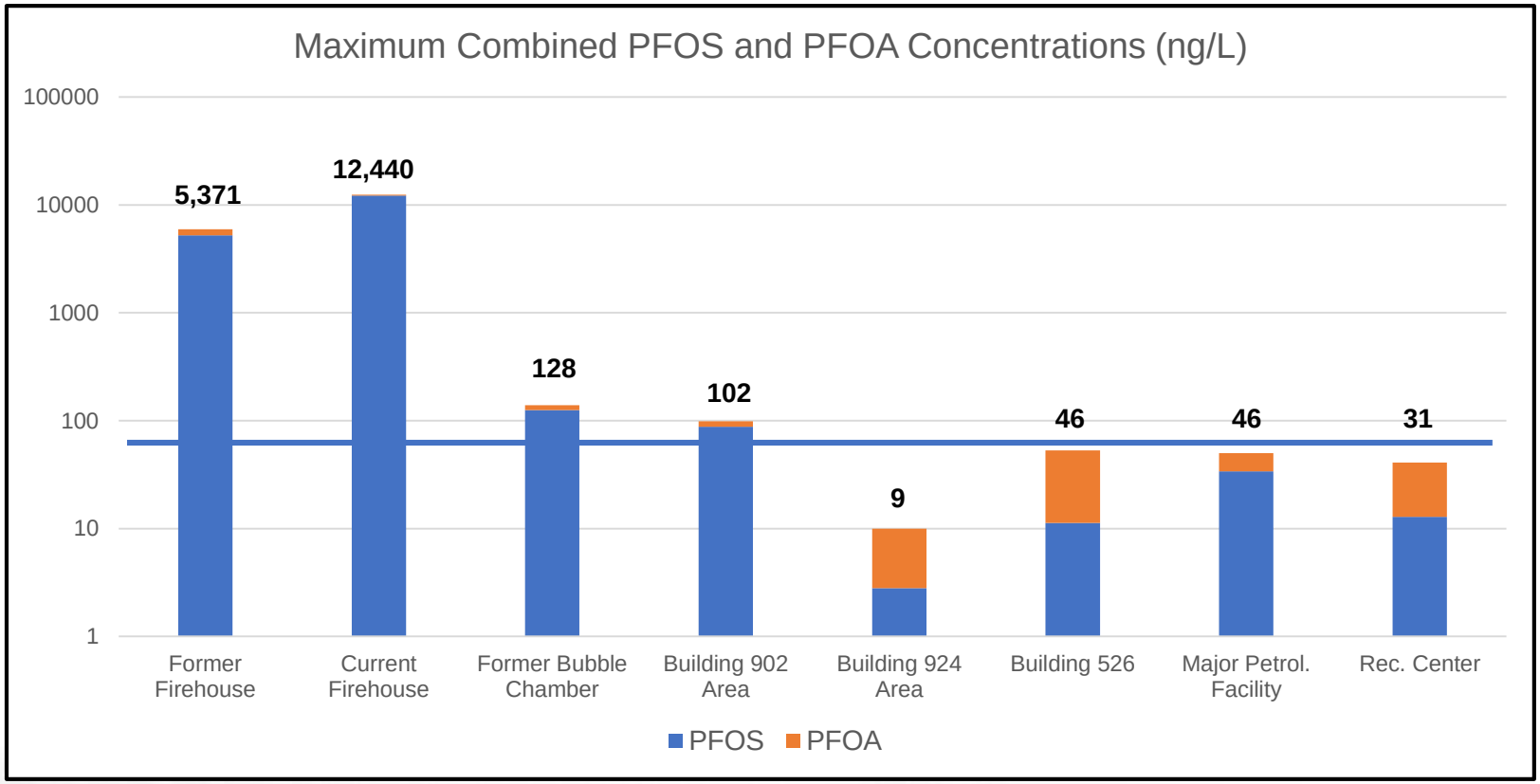
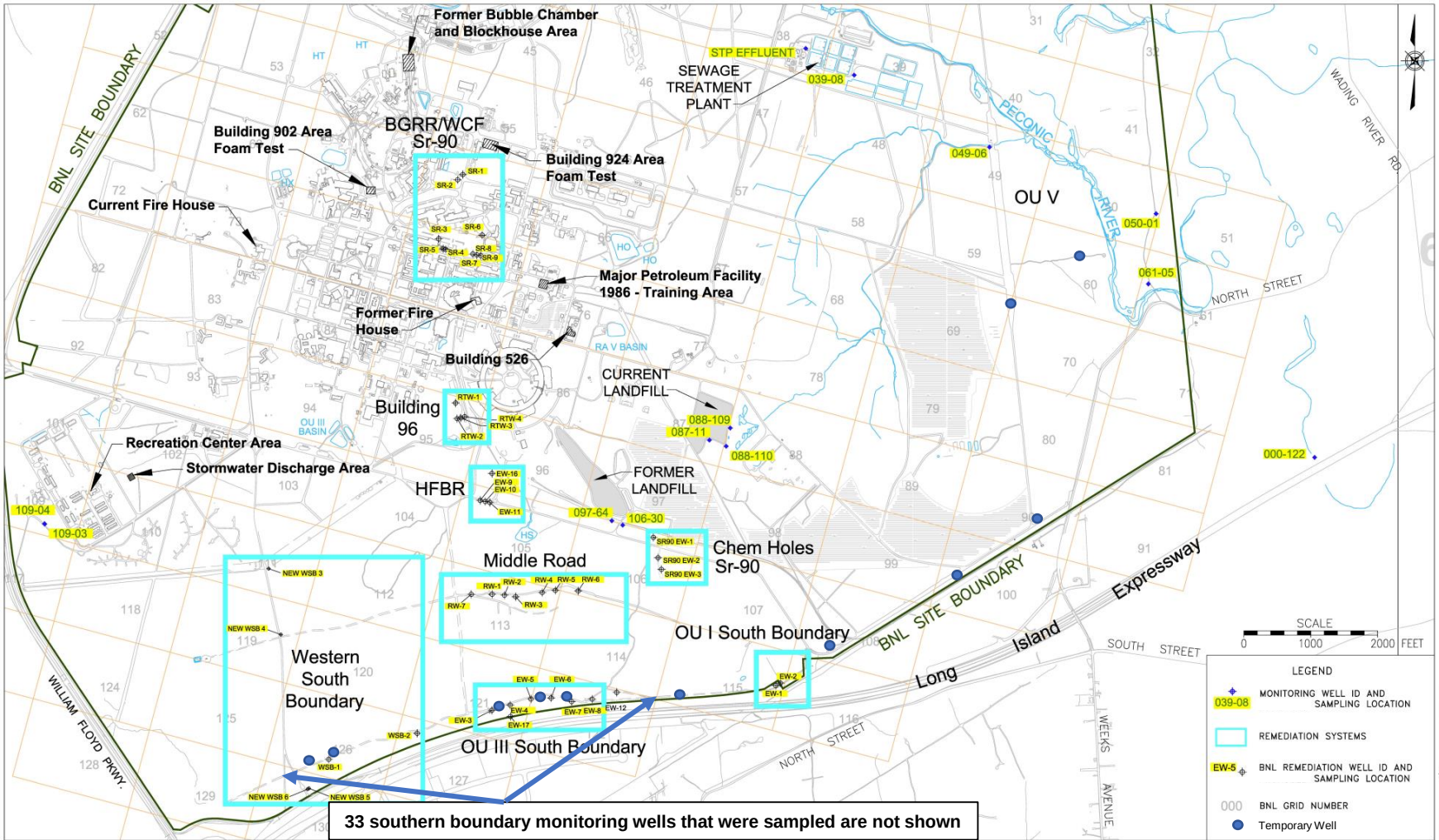
Combined PFOS and PFOA Concentrations

Compared to the current 70 ng/L EPA Health Advisory Level



Tracking PFAS in other areas of the site

- 43 on-site groundwater extraction wells and 6 treatment systems
- Monitoring wells
  - 45 permanent wells: landfill area wells, STP/OU V wells, and wells along the southern boundary
  - 11 temporary wells at site boundary
- STP effluent

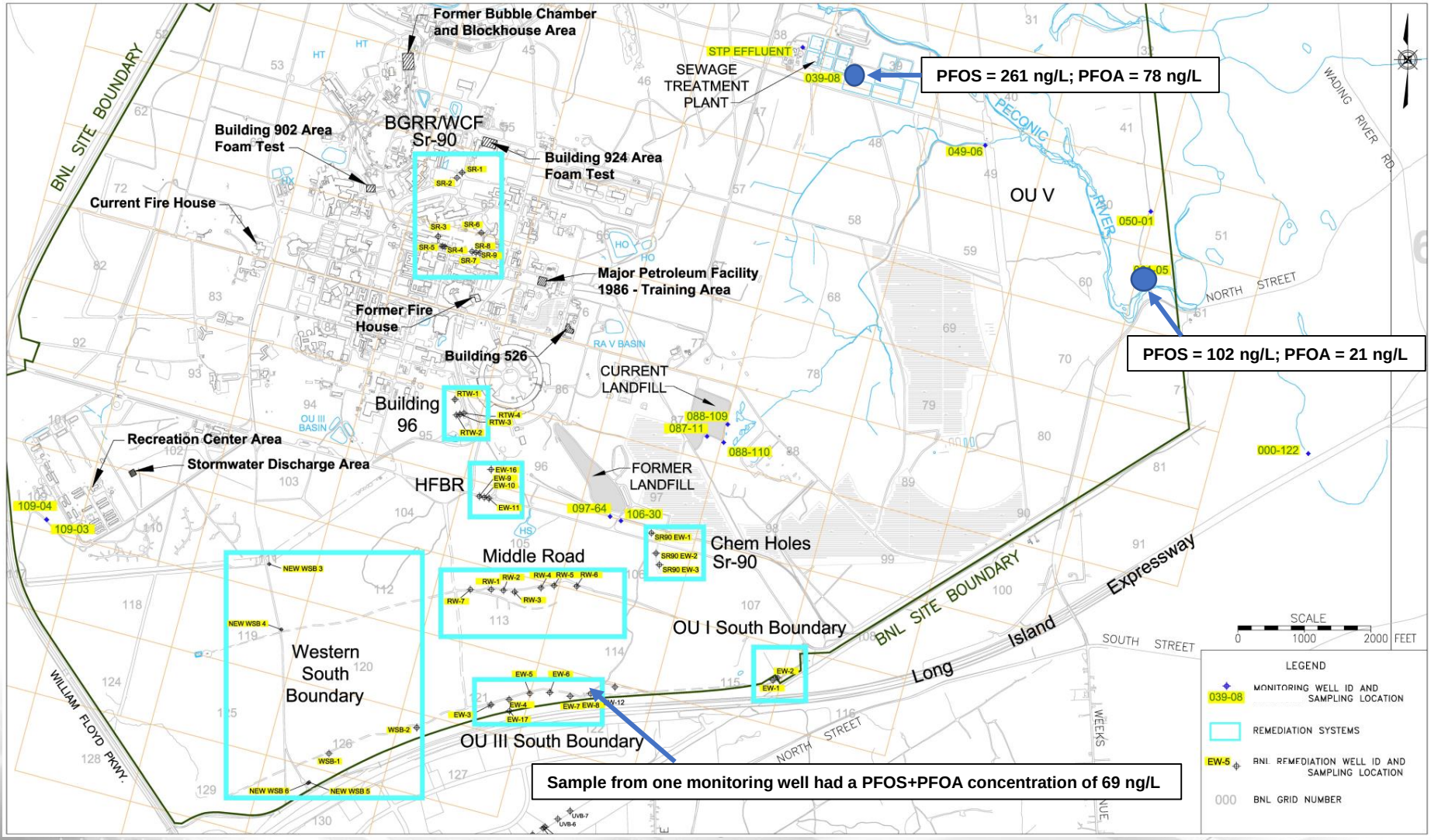


Combined PFOS and PFOA Concentrations > 70 ng/L

Current EPA Health Advisory Level

● = PFOS + PFOA > 70 ng/L (Monitoring Well)

PFOS+PFOA in extraction wells/treatment systems were all <70 ng/L



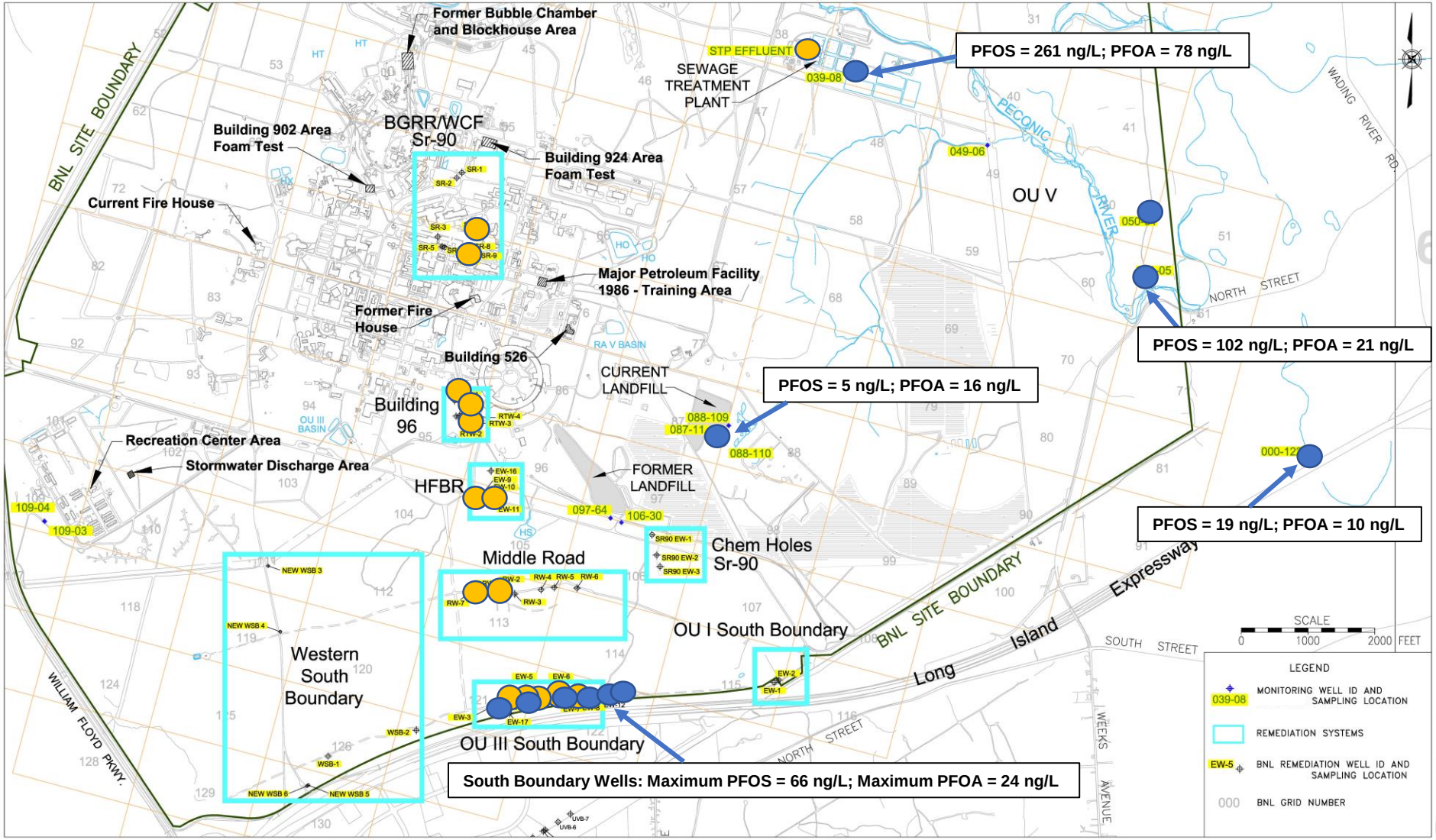
Individual PFOS and PFOA Concentrations >10 ng/L

Recommended NYS Drinking Water Standard (December 2018)

Currently under consideration by NYS Health Commissioner

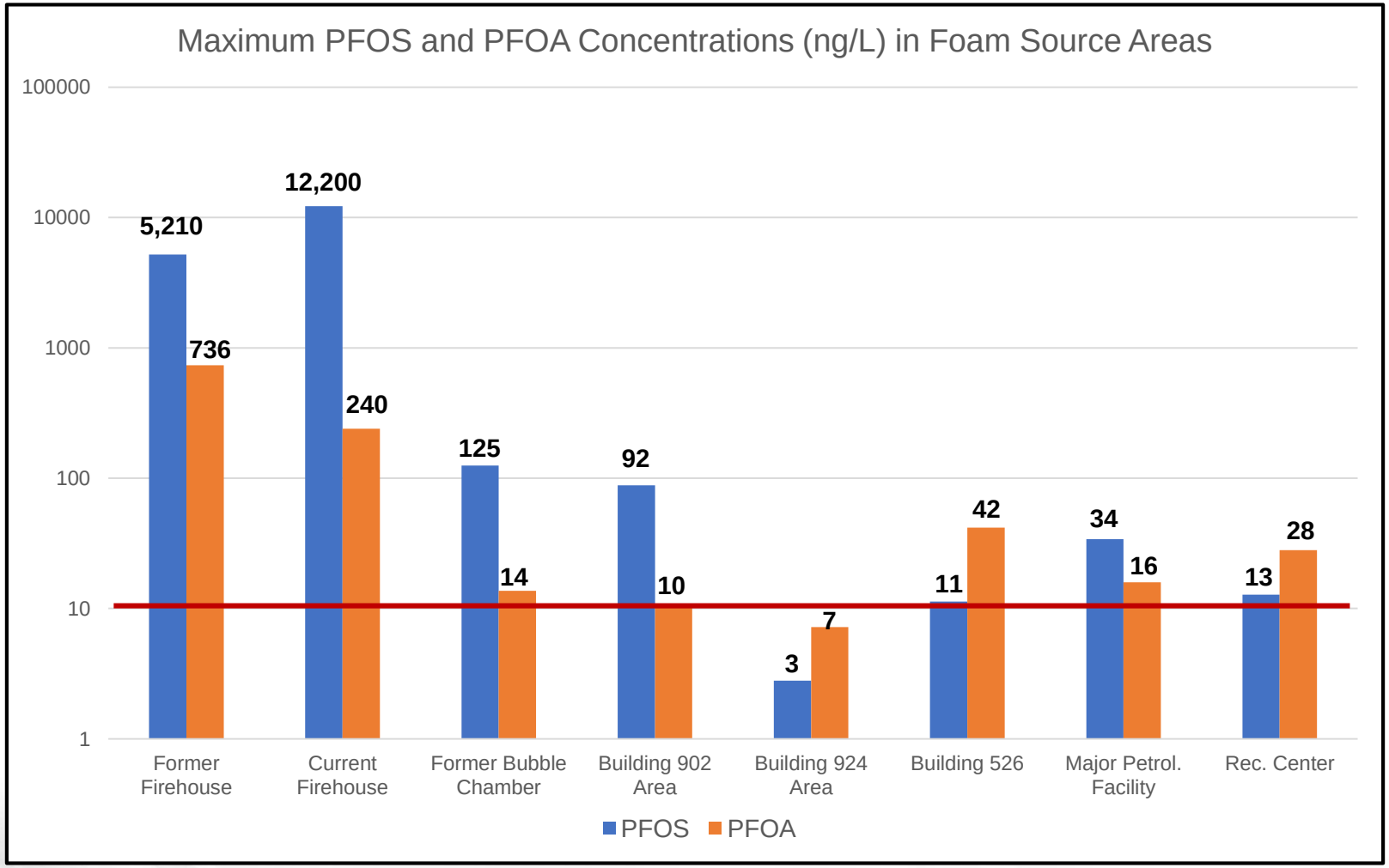
= PFOS/PFOA > 10 ng/L (Monitoring Well)

= PFOS/PFOA > 10 ng/L (Extraction Well/Treatment System)



Individual PFOS and PFOA Concentrations

Compared to the recommended 10 ng/L drinking water standard



Possible Future Actions

- Once NYS drinking water standards for PFOS and PFOA have been approved:
  - Additional characterization will be required to define extent of PFOS/PFOA contamination to those standards
  - New groundwater remediation systems will be required (e.g., current and former firehouse plumes)
  - Need to remediate or establish engineered controls for source area soils
  - As necessary, make modifications to existing groundwater treatment systems (e.g., add carbon filters)

Potable Water Supply Wells – PFAS Treatment

- BNL is planning to reactivate carbon filters that were previously installed at potable supply wells 10, 11 and 12
  - The carbon filters were originally installed in the 1980s in response to volatile organic compound contamination
  - Filters were disconnected in 2008
- Planed sequence:
  1. Reactivate the carbon filters at Well 11
     - Project plan was approved by Suffolk County
     - Materials have been purchased and repair work has started
     - Goal is to return filters to service by Summer 2019
  2. Reactivate the carbon filters at Well 10
  3. Prepare plans and identify funding to rebuild Well 12 and reactivate the carbon filters

Testing of Private Wells

- BNL and Suffolk County established a “Technical Services Agreement” to sample private supply wells that may be present on 97 properties
  - The County identified **two additional** properties with private supply wells
  - **Five** properties that are part of the existing routine monitoring program were sampled in October
  - **Property total 97+2+5 = 104.**
  - Notifications to property owners about the testing program started May 3 (mailed and hand delivered)
  - Suffolk County started sampling private supply wells on May 6
- To date:
  - 46 properties have been sampled (48 wells)
  - 44 properties have not been sampled
    - 1 scheduled to be sampled
    - 37 have not responded to the offer
    - 4 have declined the offer
    - 2 contain unoccupied structures
  - 13 properties were found to be connected to public water
  - 1 property is vacant
- Suffolk County has an established notification process for monitoring results

* Note: Starting June 24, the NYSDEC will be installing temporary groundwater monitoring wells near several potential sources of PFAS in areas south of BNL (e.g., firehouses, airport)

Replacement of Firefighting Foam

- BNL currently has ~100 gallons of Class B foam concentrate that was manufactured in 2010
  - Made with a newer formulation using currently approved shorter-chained PFAS (e.g., C-6 fluorosurfactants)
  - This foam would only be used in case of an emergency
    - No training at BNL with Class B foam since 2008
- BNL will switch to PFAS-free (fluorine-free) Class B foam
  - Fluorine-free foam has been proven to be effective
  - Does not have long-term impacts to the environment
  - Eliminates possible impacts to soil and groundwater from shorter-chained PFAS
    - There are uncertainties about long-term environmental and health impacts from these PFAS
  - Purchase order was placed this week for the replacement foam
  - Current inventory of PFAS containing foam will be properly disposed of at an authorized off-site treatment, storage and disposal facility

Final messages

- PFAS contamination is a national/international problem
- On a regional basis the extent of PFAS contamination is not well understood
  - Many potential sources will require investigation
- BNL has taken important first steps in understanding the extent of PFAS contamination
  - BNL will continue to work on this issue in close coordination with the regulatory agencies
  - Once drinking water standards have been established, any required remedial responses will be conducted under the established CERCLA process
  - BNL is currently taking steps to ensure that its potable water will be able to meet the recommended standards