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U.S. DEPARTMENT of ENERGY

Groundwater Status Briefing:
2025 Groundwater Status Report & 2026 CERCLA Five-Year Review

Brian Barth, Manager, Groundwater Protection Group

October 8, 2026

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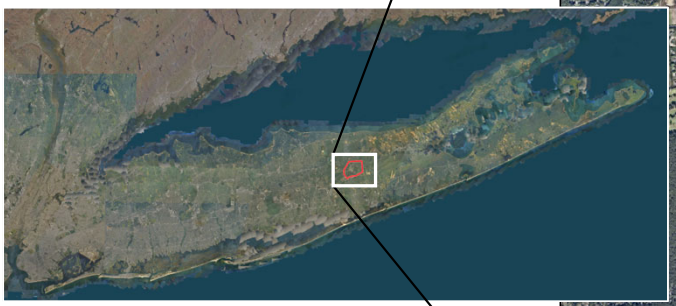
Agenda

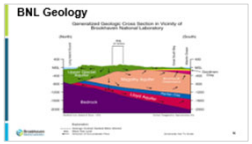
- Program Overview
- Cleanup Progress
  - VOCs
  - Radiological
  - PFAS
- Groundwater Monitoring for PFAS & 1,4-dioxane
  - 1,4-Dioxane
  - Recharge Basins
  - William Floyd Wellfield
- Other Progress
- Next Steps

Groundwater Protection Program Overview

BNL Site and Groundwater Flow

- ~5,300 acres
- Depth to groundwater ranges from ~5’ bls to ~80’ bls
- Groundwater flow direction generally south



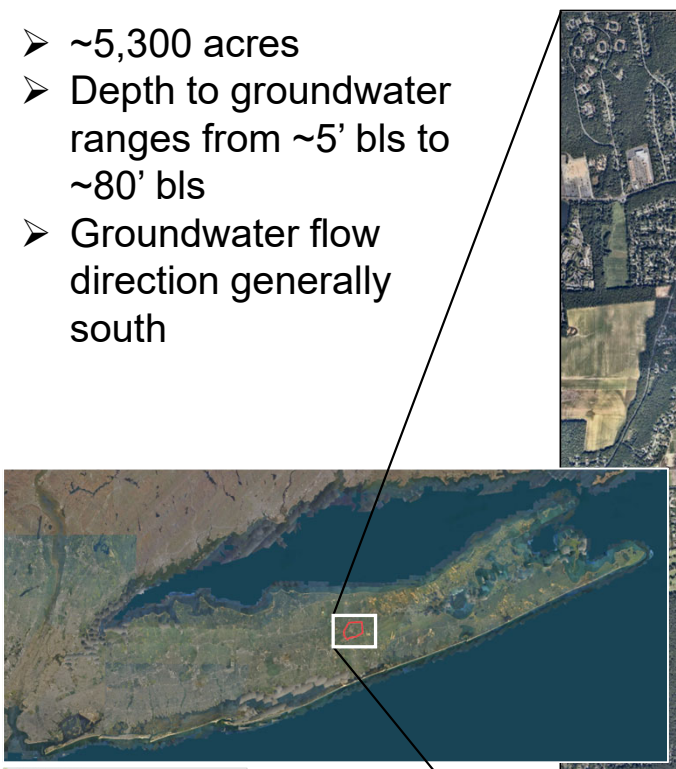


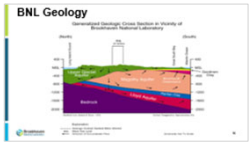


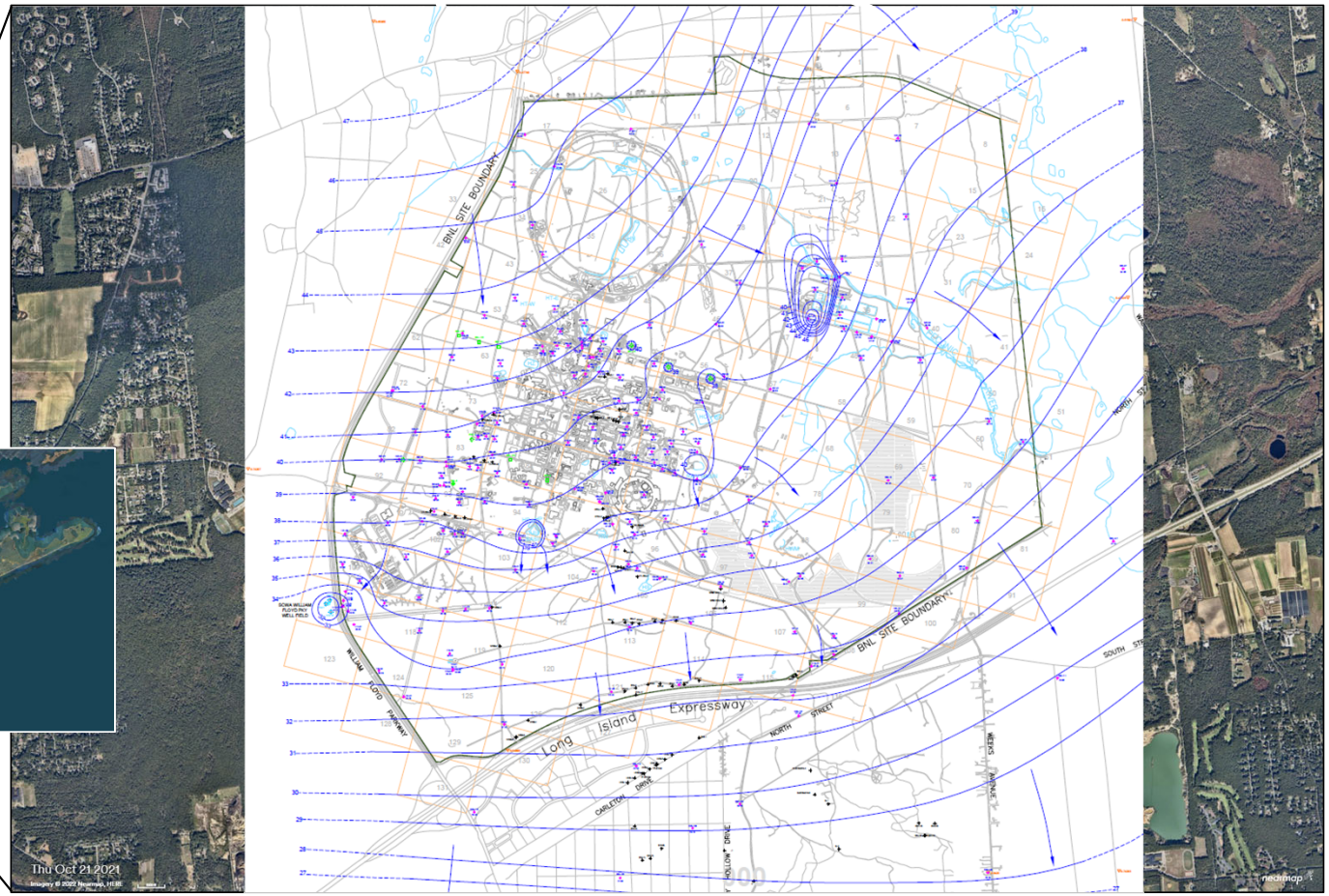
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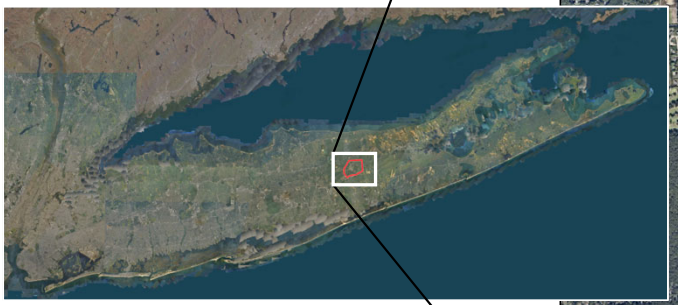


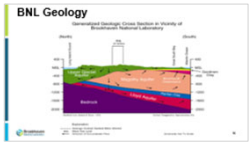


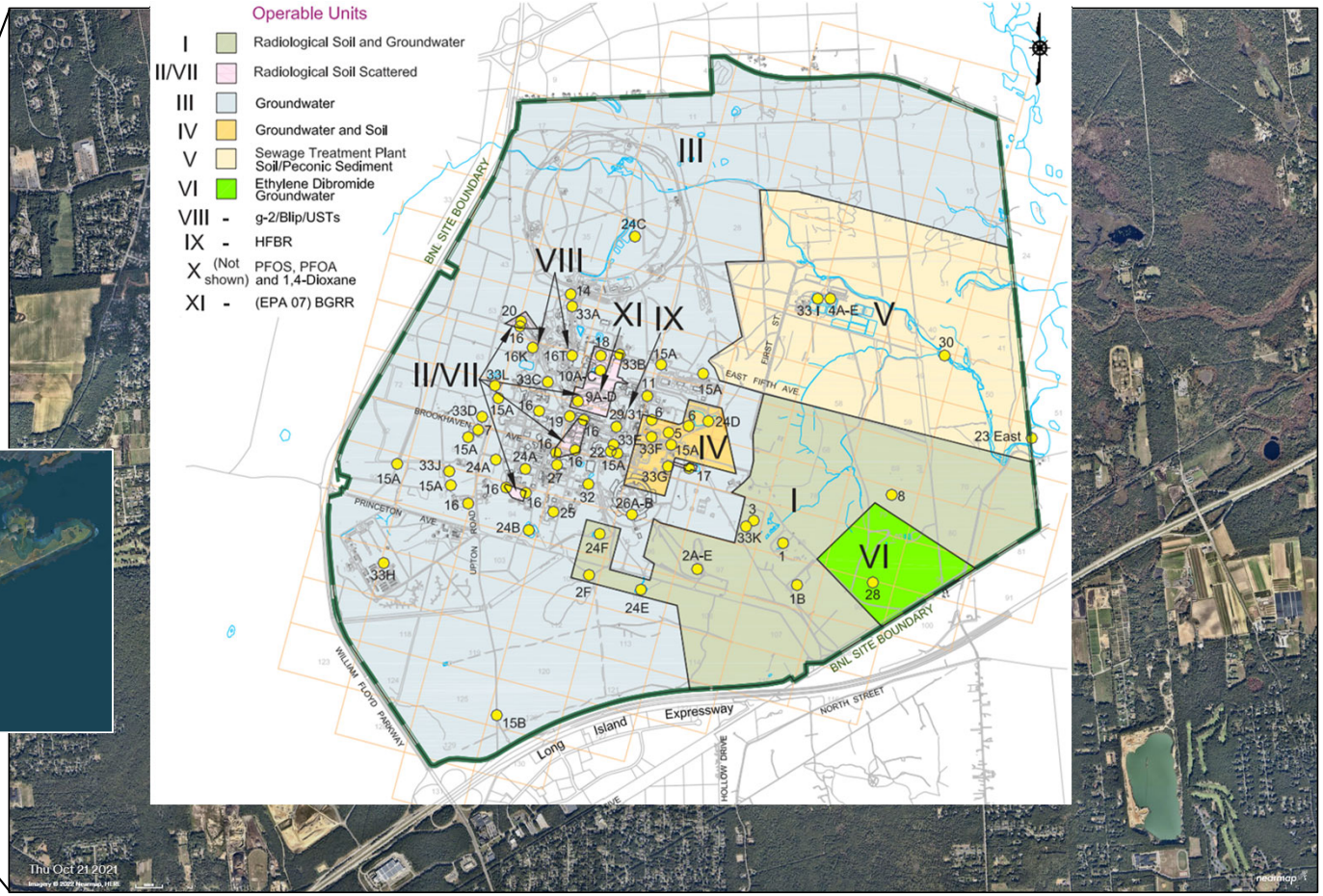
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BNL Site and Groundwater Flow

- 11 Operable Units
- 34 Areas of Concern
- 9 Records of Decision
- Groundwater cleanup extends offsite south of the BNL site







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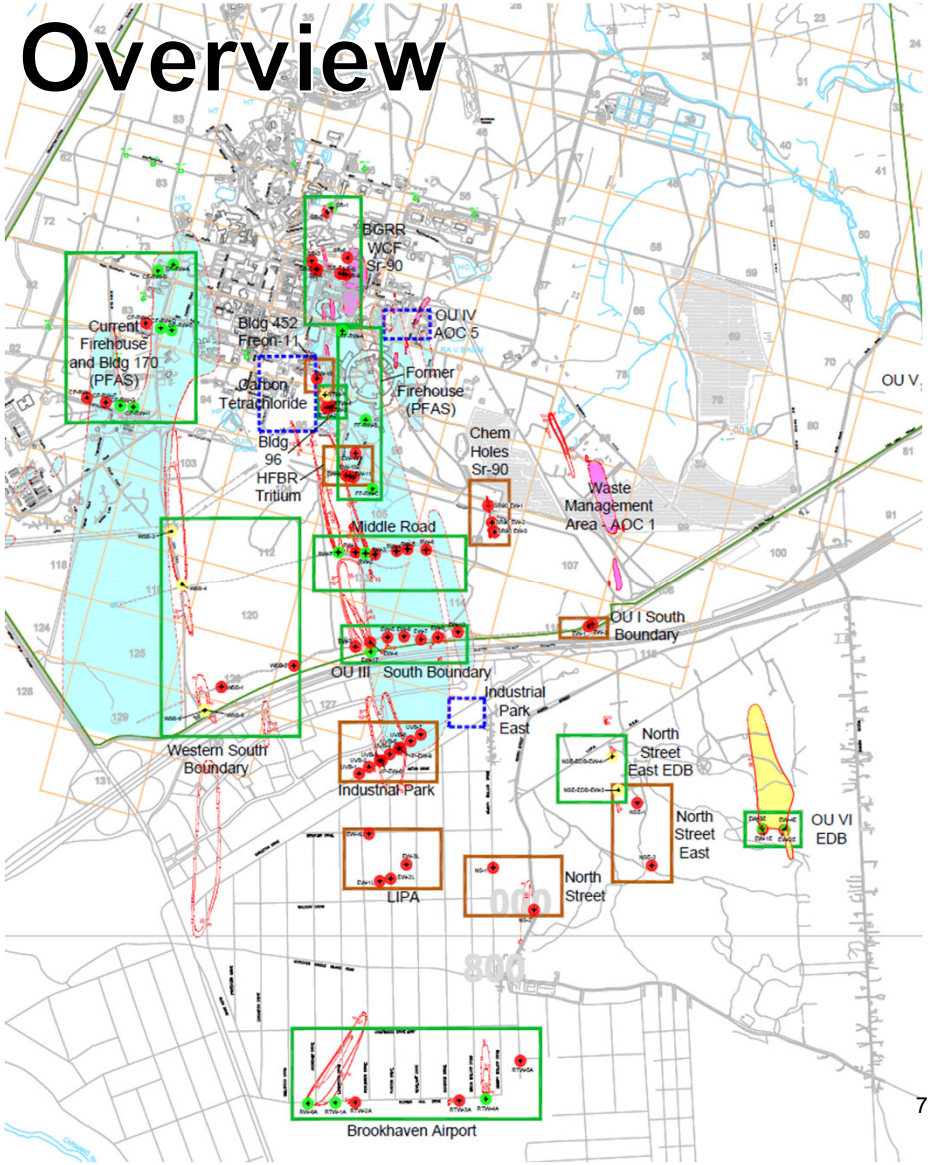
Groundwater Cleanup Progress

Highlights and Milestones Recap

- Fifth CERCLA Five-Year Sitewide Review completed
- Petition for closure approved for the Industrial Park System
- Petition for shutdown approved for the North Street East Ethylene Dibromide (EDB) System
- Characterization of the eastern shift of the Current Firehouse/Building 170 PFAS plume and engineering design underway for additional extraction wells
- Completed engineering design for extraction wells at the Middle Road and South Boundary treatment systems
- Completed the engineering design for two advanced oxidation process (AOP) treatment systems to address 1,4-dioxane in existing groundwater treatment systems

Remediation System Overview

	2024	2025	Totals
(7) VOC	753 MG 41 lbs	746 MG 38 lbs	33 BG 7,952 lbs
(1) Sr-90	6.6 MG 0.1 mCi	4.7 MG 0.1 mCi	301 MG 35 mCi
(2) PFAS	320 MG 0.7 lbs	339 MG 0.3 lbs	1 BG 1.9 lbs
Total Pumpage	1.1 BG	1.1 BG	34 BG
No. Extraction Wells	31 of 83	31 of 83	



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2026 CERCLA Five-Year Review

Protectiveness Determinations by Operable Unit

Operable Unit	Protectiveness Determinations
OU I – Radiologically Contaminated Soil, Radiological and VOC Contaminated Groundwater (FHWMF, Former & Current Landfills)	Protective
OU III – Groundwater On- and Offsite	Short-term Protective
OU IV – Soil and Groundwater Onsite (Central Steam Facility, 650 Sump & Outfall)	Protective
OU V – Sewage Treatment Plant	Protective
OU V – Peconic River	Protective
OU VI – Ethylene Dibromide (EDB) in Groundwater Offsite	Short-term Protective
OU VIII – g-2/BLIP/USTs	Protective
OU IX – HFBR Radiologically Contaminated Structures and Soil	Short-term Protective
OU X – PFAS and 1,4-Dioxane	*TBD*
OU XI – BGRR	Protective

VOC Remediation Systems

Building 96 Changed from Green to Yellow since May 2026

System	Operations	Status	
OU I – South Boundary	1996 – 2019	Closed – Monitoring Ongoing	*Discontinue Post-Closure Monitoring*
OU III – Building 96	2001 –	In Operation	
OU III – Middle Road/South Boundary	1997 –	In Operation	
OU III – Industrial Park & Modification	1999 – 2025	Closed – Monitoring Ongoing	
OU III – Carbon Tetrachloride	*1999 – 2010*	*Closed – Goals Met*	
OU III – Western South Boundary	2002 –	In Operation	*Petition for Shutdown in 2026-2027*
OU III – Industrial Park East	*2004 – 2014*	*Closed – Goals Met*	
OU III – North Street	2004 – 2020	Closed – Monitoring Ongoing	
OU III – North Street East – VOCs	2004 – 2020	Shutdown – Monitoring Ongoing	
OU III – North Street East – EDB	2020 – 2026	Shutdown – Monitoring Ongoing	
OU III – LIPA	2004 – 2025	Closed – Monitoring Ongoing	
OU III – Airport	2004 –	In Operation	
OU III – Freon-11	*2012 – 2019*	*Closed – Goals Met*	
OU IV – ASVE	*1997 – 2003*	*Closed – Goals Met*	
OU V – MNA of VOCs	*NA*	*Closed – Goals Met*	
OU VI – EDB	2004 –	In Operation	

Legend
On Track
Concerns on Attaining Goals
Closed – Goals Met

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Radiological Projects

No change since May 2026

System	Operations	Status
Operable Unit (OU) I – Former Hazardous Waste Management Facility Strontium 90 (Sr-90)	NA	Monitoring Ongoing
OU III – Brookhaven Graphite Research Reactor/Waste Concentration Facility (BGRR/WCF) (Sr-90)	2005 –	In Operation
OU III – Chemical Holes (Sr-90)	2003 – 2018	Shutdown – Monitoring Ongoing
OU III – High Flux Beam Reactor (HFBR) Pump & Recharge (Tritium)	1997 – 2019	Closed – Monitoring Ongoing
OU IV – Building 650 Sump Outfall (Sr-90)	NA	Monitoring Ongoing
OU VIII – g-2 & Brookhaven Linac Isotope Producer (BLIP) (Tritium)	NA	Monitoring Ongoing

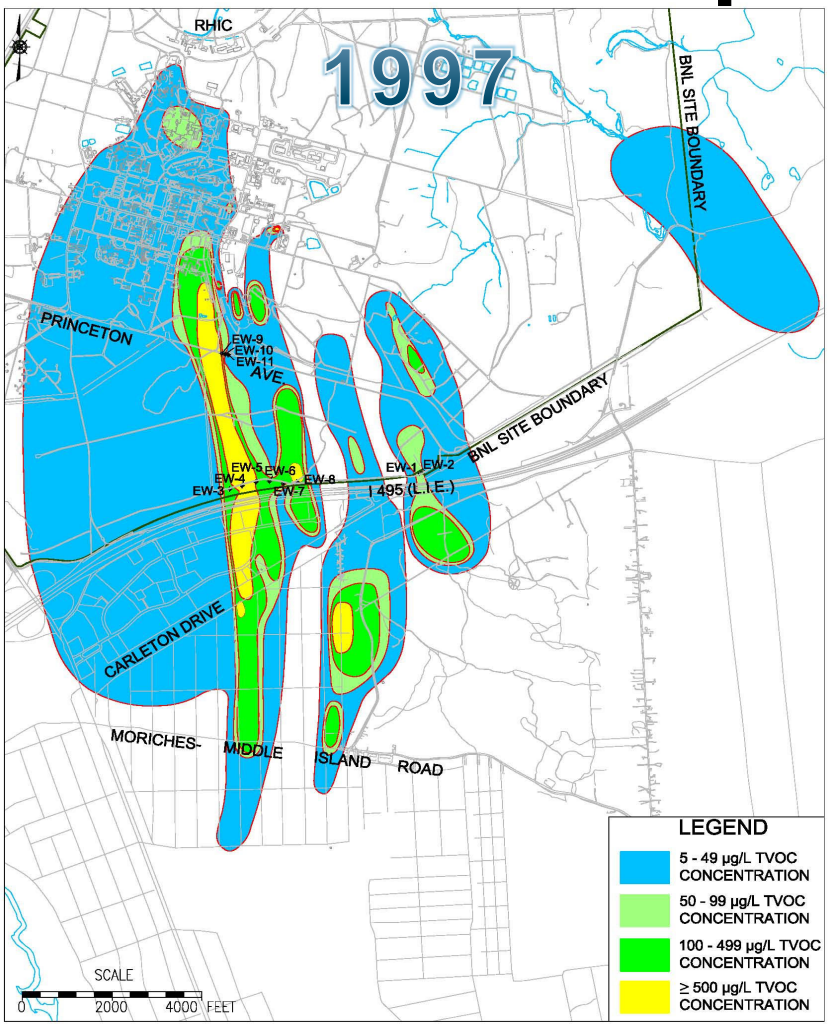
PFAS Remediation Systems

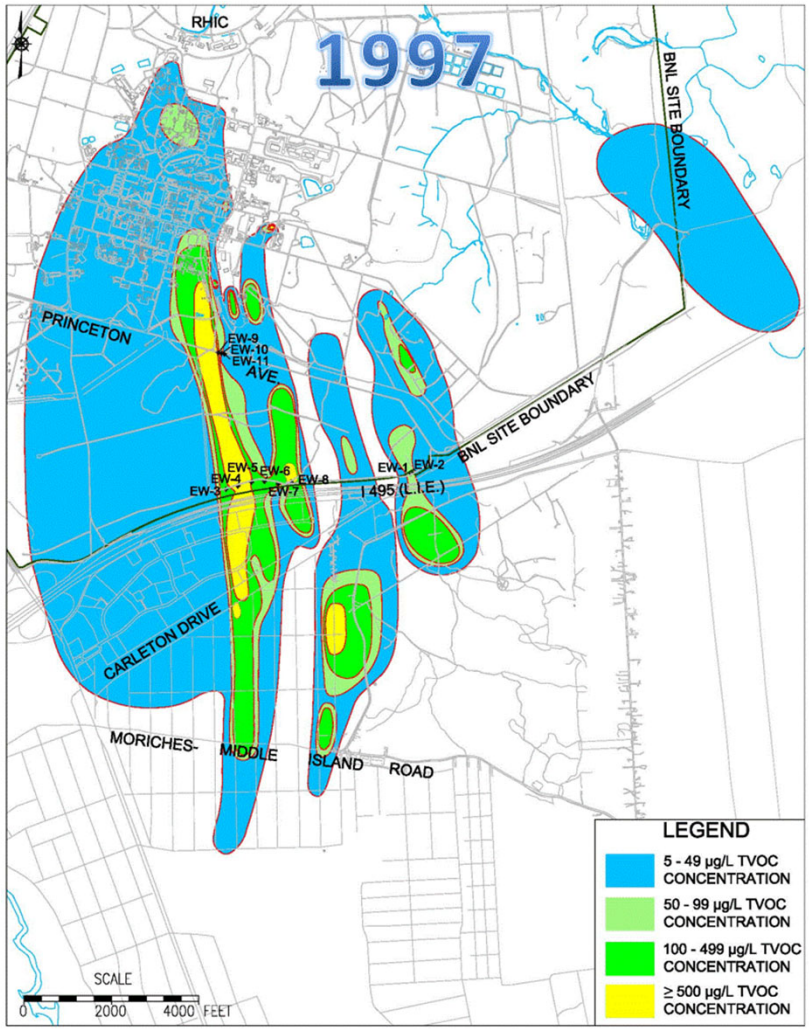
System	Operations	Status
OU X – Current Firehouse/Building 170	2022 –	In Operation
OU X – Former Firehouse	2023 –	In Operation

Legend
On Track
Concerns on Attaining Goals
Closed – Goals Met

VOCs

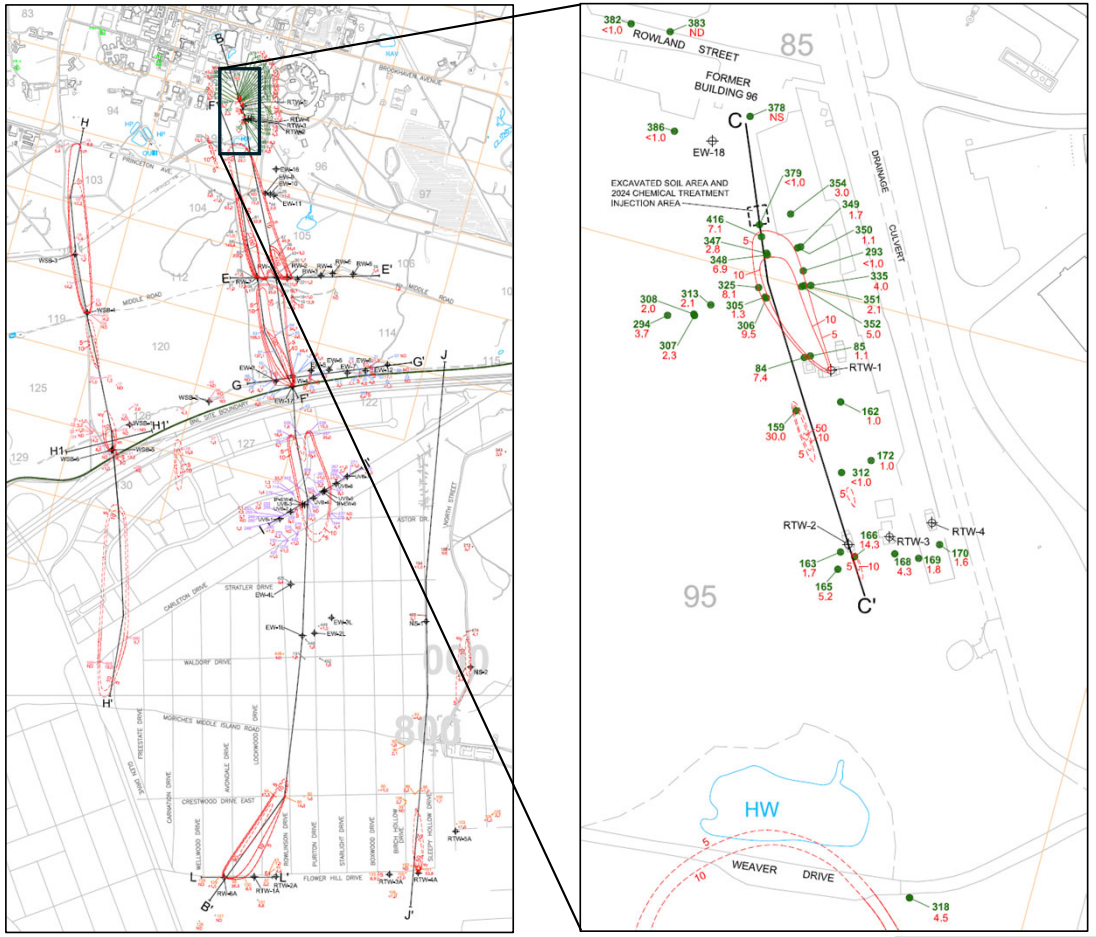
VOC Plume Comparison

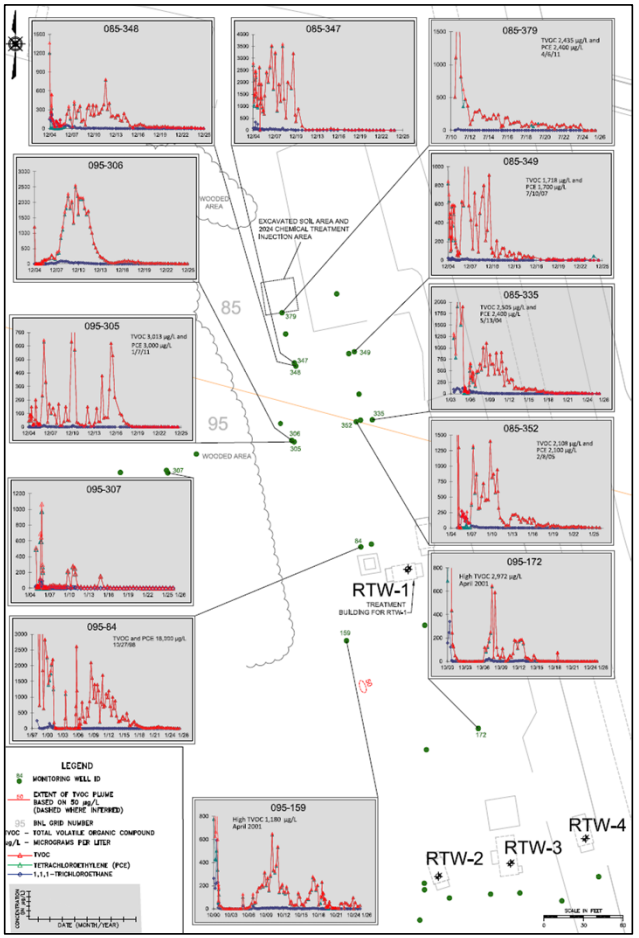




JM1

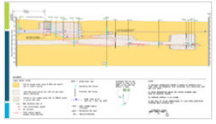
OU III Building 96









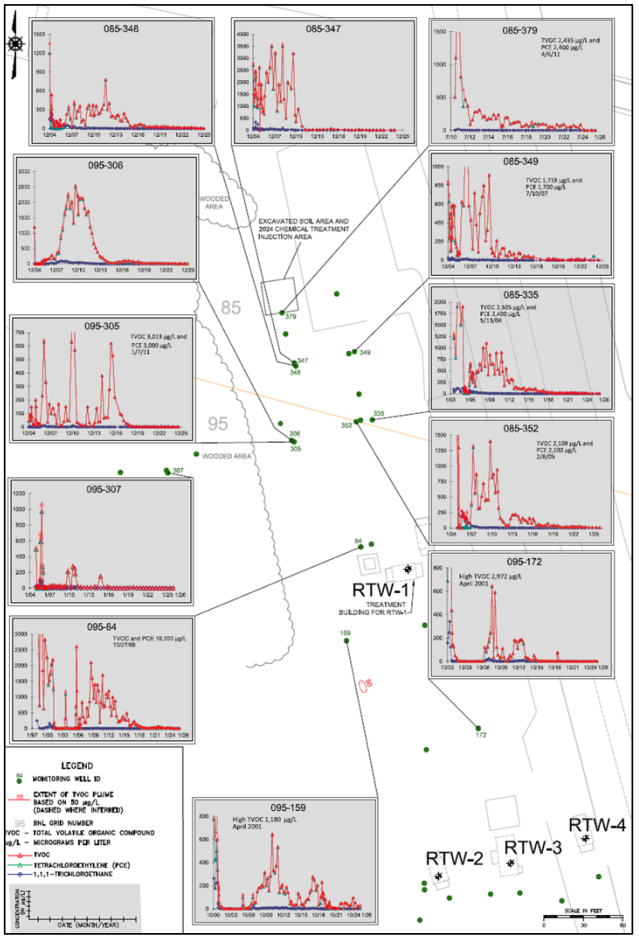


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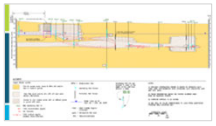
OU III Building 96

- Post-injection monitoring shows a significant reduction in source area PCE concentrations
- Rebound in downgradient monitoring wells has returned to pre-injection concentrations
- Continuing to monitor the plume and pulse-pump RTW-1
- Need sufficient monitoring data to determine when it is appropriate to consider shutting down RTW-1





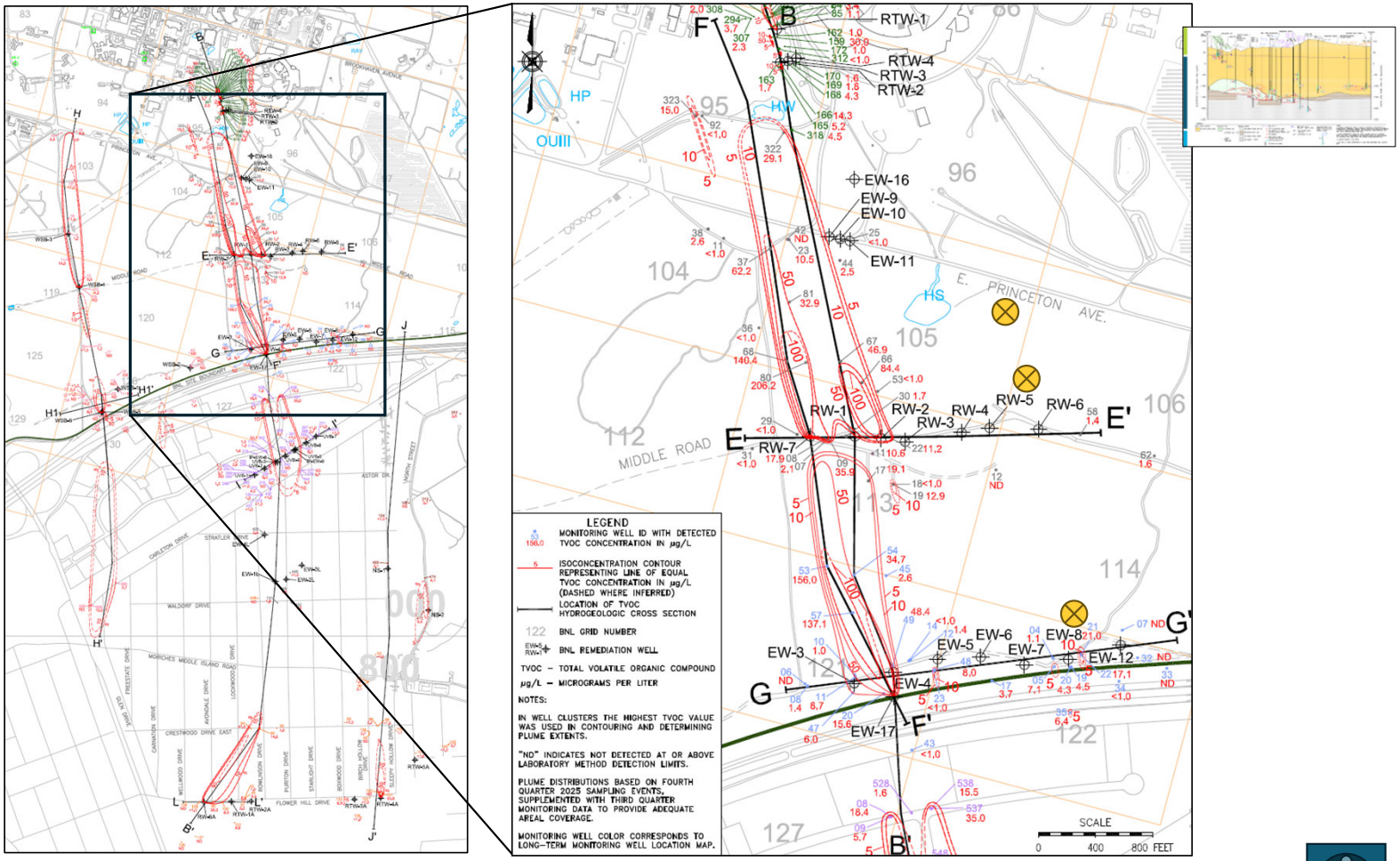




OU III Building 96

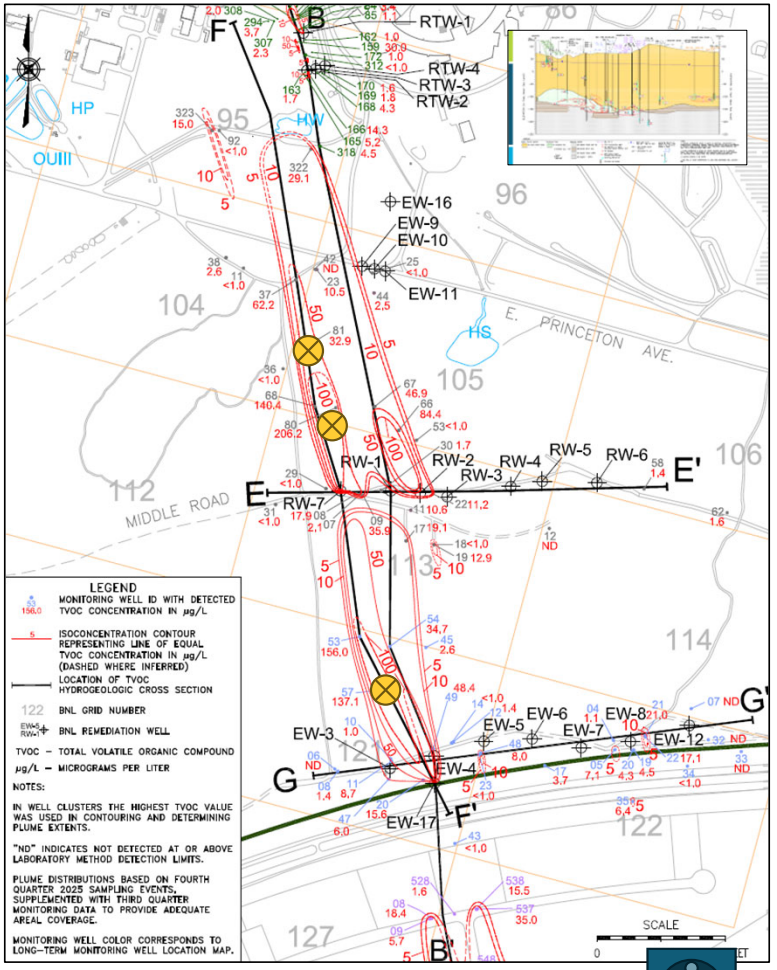
Source	Status	Notes
Five-Year Review	Remedy is Short-Term Protective	➢ Other Finding – Monitor plume and source area. Re-evaluate cleanup timeframe based on post-injection monitoring data.
2025 Groundwater Status Report	Cleanup timeframe may extend beyond 2030	➢ Continue to monitor for rebound and operate RTW-1

OU III Middle Road/South Boundary



OU III Middle Road/South Boundary

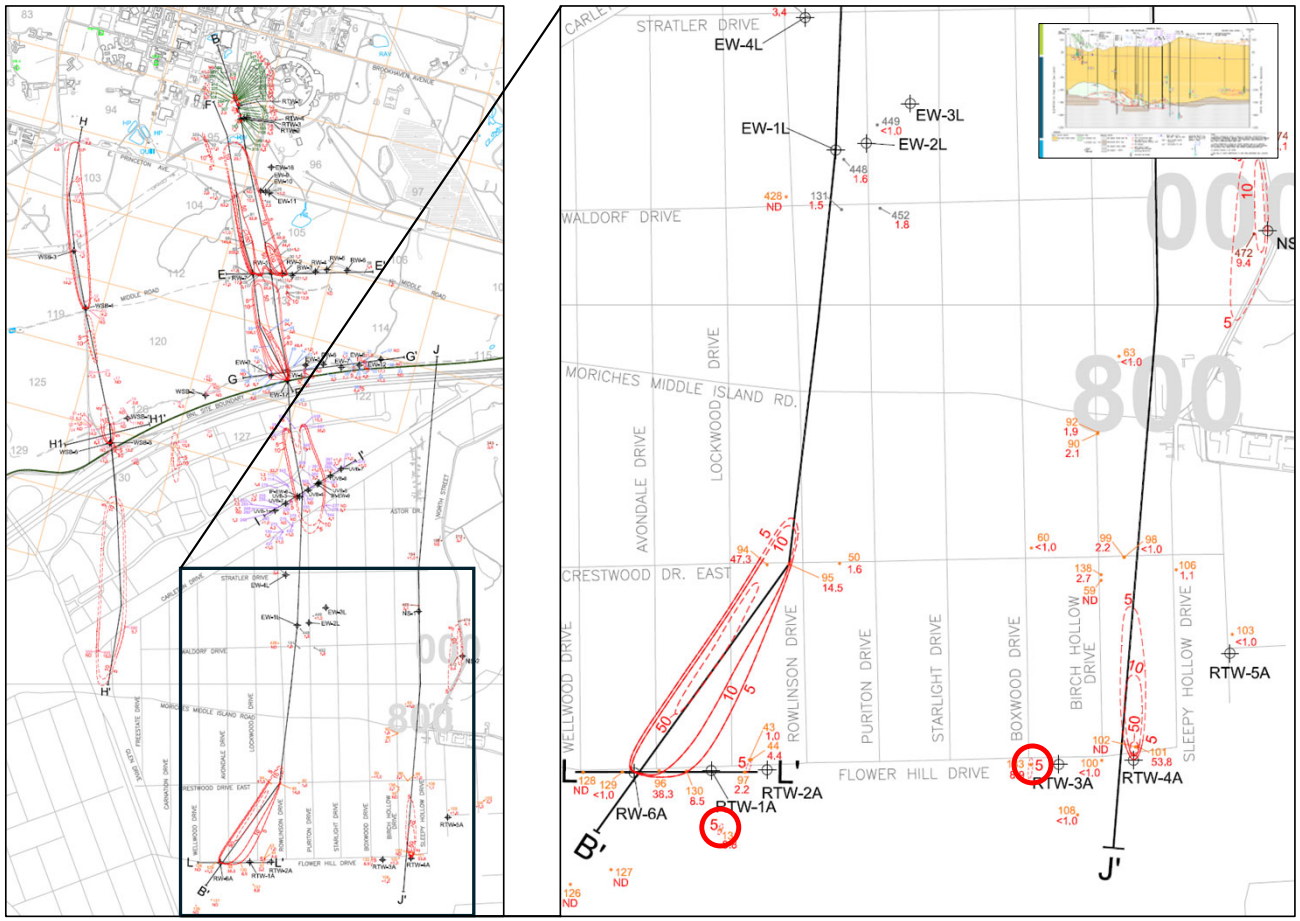
- The existing systems continue to capture the plume and are preventing further migration
- Persistent deep VOC contamination within the lower-permeability Upton Unit is declining more slowly than originally estimated and is unlikely to meet MCLs by 2030
- Additional characterization of the Upton Unit and groundwater modeling recommended adding 3 additional extraction wells to expedite cleanup



OU III Middle Road/South Boundary

Source	Status	Notes
Five-Year Review	Remedy is Short-Term Protective	Other Findings: ➢ 1,4-Dioxane & PFAS in Middle Road/South Boundary – *Complete the 1,4-dioxane treatment design documents* ➢ VOC Contamination – *Prepare design plans for potential installation of additional extraction wells*
2025 Groundwater Status Report	VOC concentrations are not declining at a rate that will definitively meet the ROD cleanup goal	➢ Continue full-time operation of RW-2, RW-7, and RW-17 ➢ Additional extraction wells could expedite the cleanup timeframe. Perform additional technical assessment to help quantify the extent the timeframe can be reduced

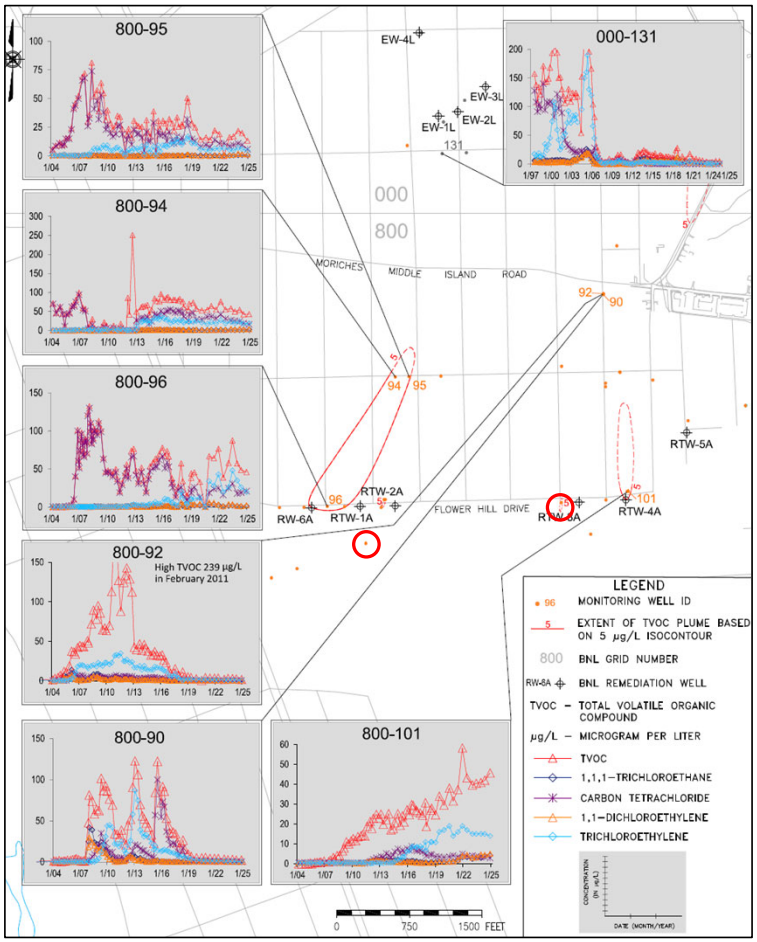
OU III Airport



- Several localized areas of VOCs remain and warrant continued active treatment
- Plume migration slower than anticipated and cleanup by 2030 is unlikely

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OU III Airport



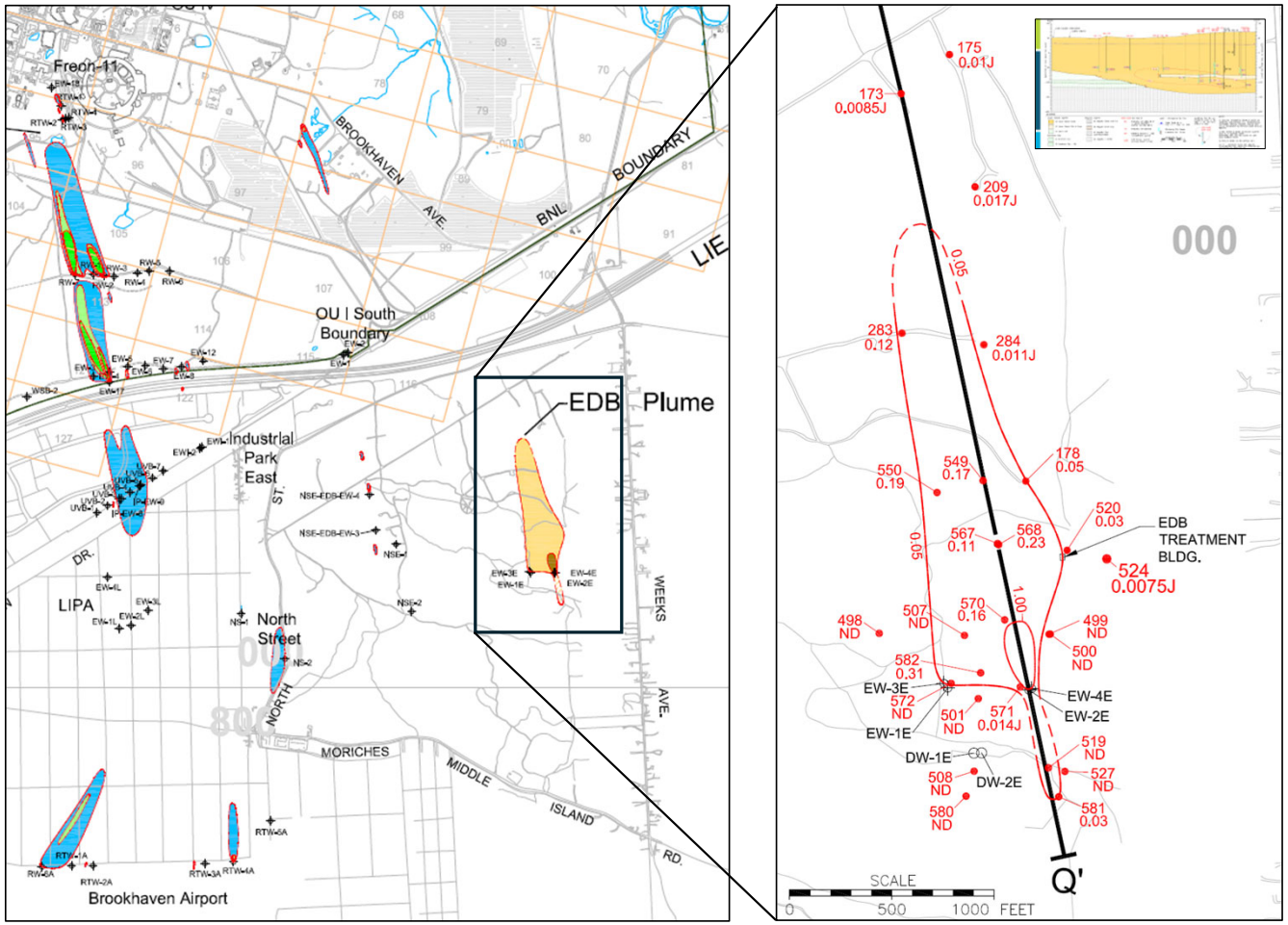
- Increased the pump size in RTW-1A to increase capture to address VOCs observed in 800-131
- Restarted RTW-3A to address VOCs observed in 800-133

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OU III Airport

Source	Status	Notes
Five-Year Review	Remedy is Short-Term Protective	Other Findings: ➢ 1,4-Dioxane & PFAS in Airport Area – *Complete the 1,4-dioxane treatment design documents*
2025 Groundwater Status Report	VOCs concentrations are not declining at a rate that will definitively meet the ROD cleanup goal	➢ Restart extraction well RTW-3A to capture contaminants observed in monitoring well 800-133 ➢ Increase pumping rate at RTW-1A to address contaminants observed in monitoring well 800-131 ➢ Continue full-time operation of RTW-1A, RTW-4A, RTW-3A, and RTW-6A

OU VI EDB



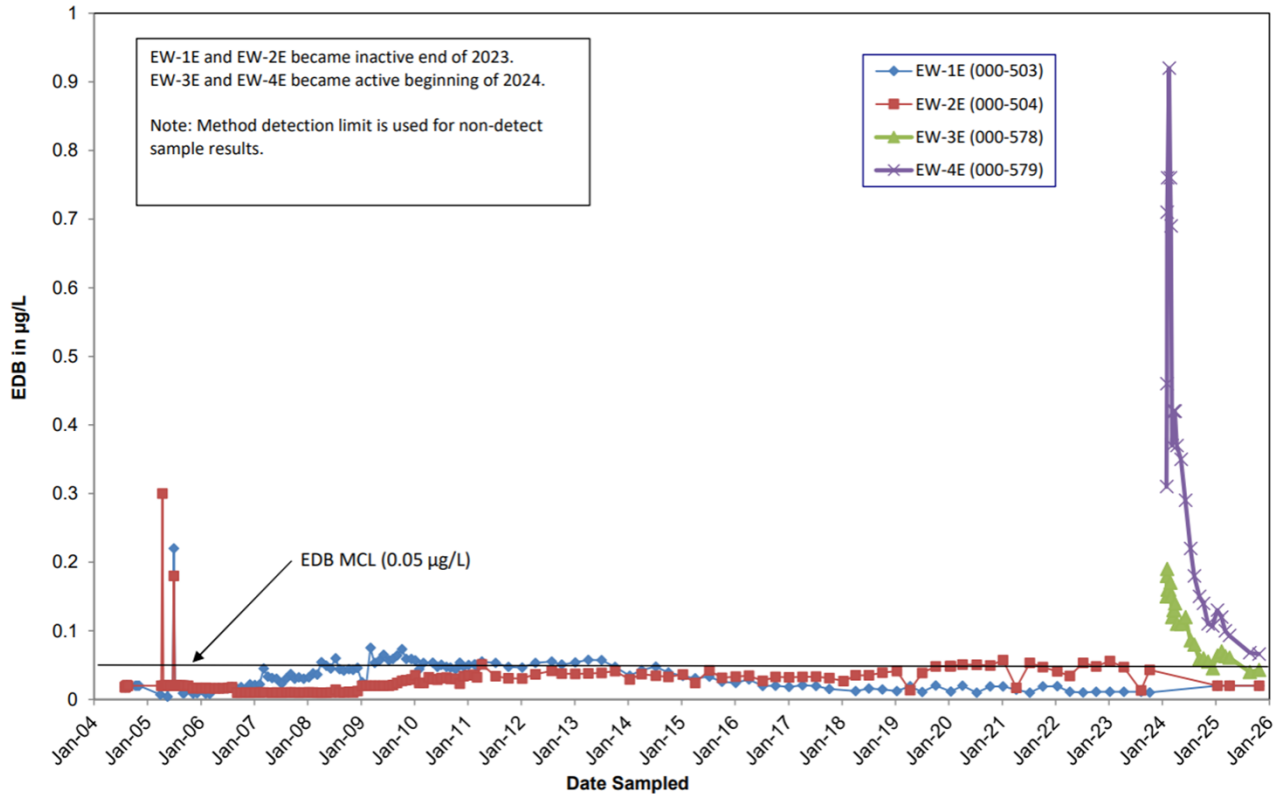
- Two deeper extraction wells began operation in 2024
- 2025 monitoring indicates the new wells are effectively capturing the leading edge and preventing further migration

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OU VI EDB

Figure 3.4-5
OU VI EDB
EDB Concentrations in Extraction Wells

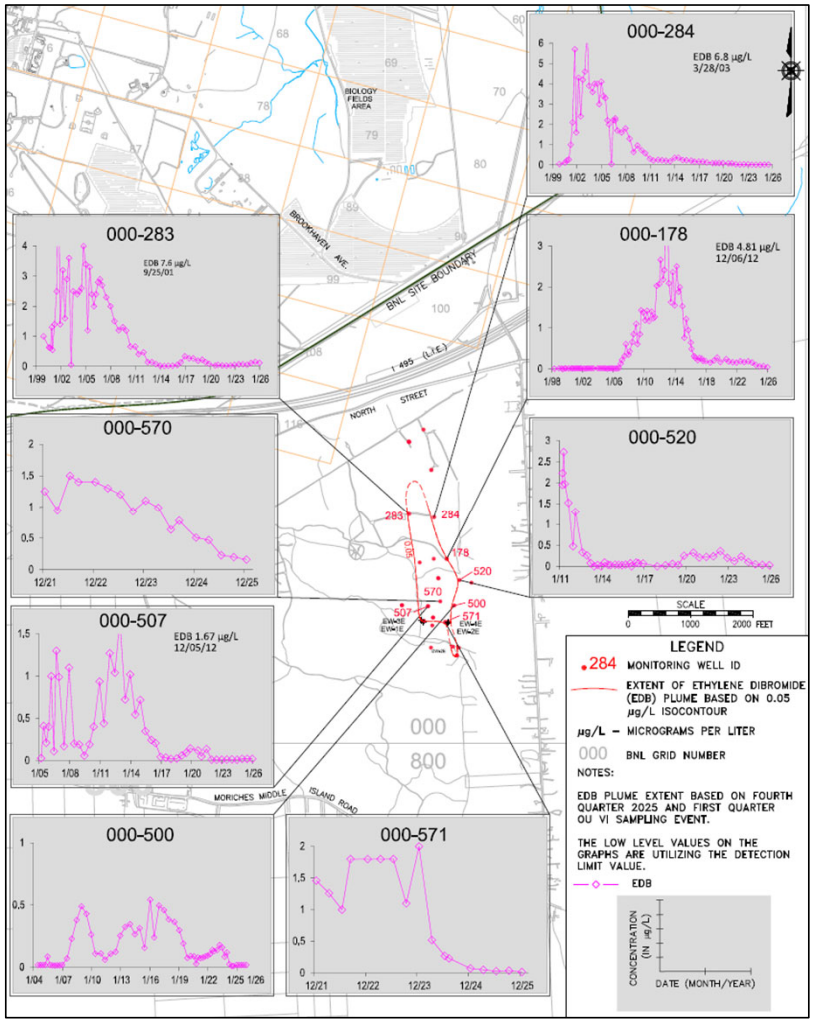
2025 BNL Groundwater Status Report



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OU VI EDB



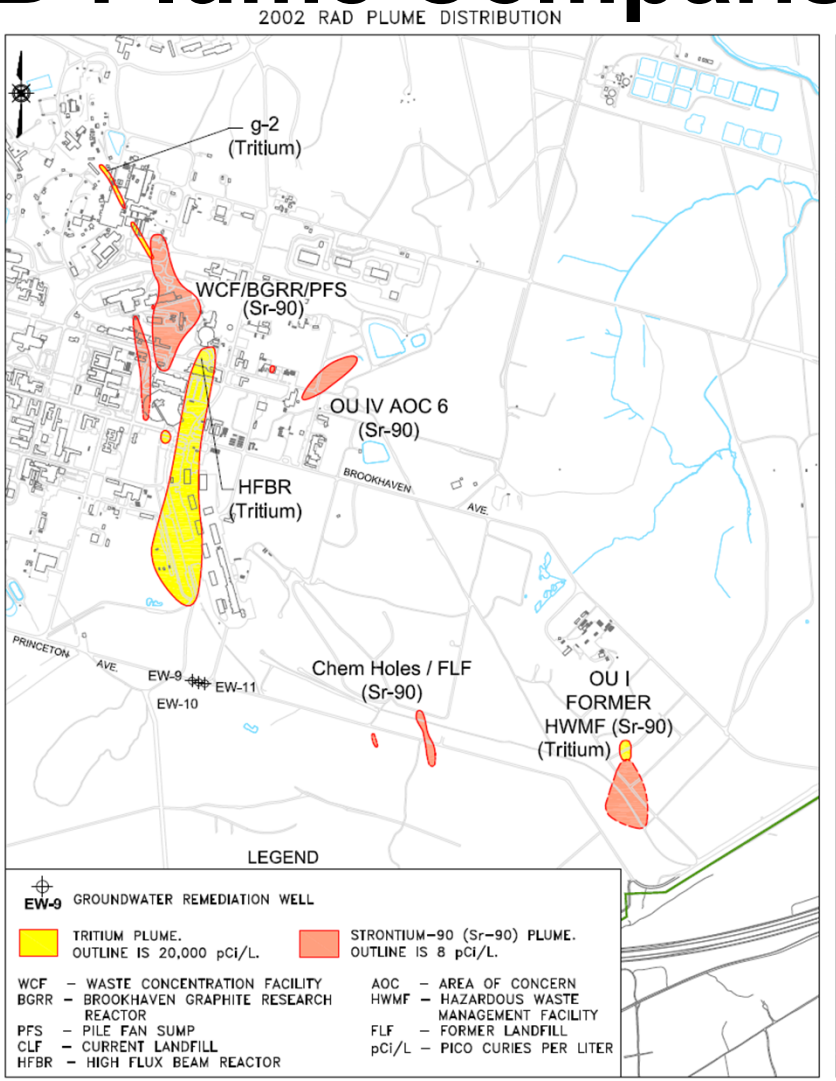
- Two deeper extraction wells began operation in 2024
- 2025 monitoring indicates the new wells are effectively capturing the leading edge and preventing further migration

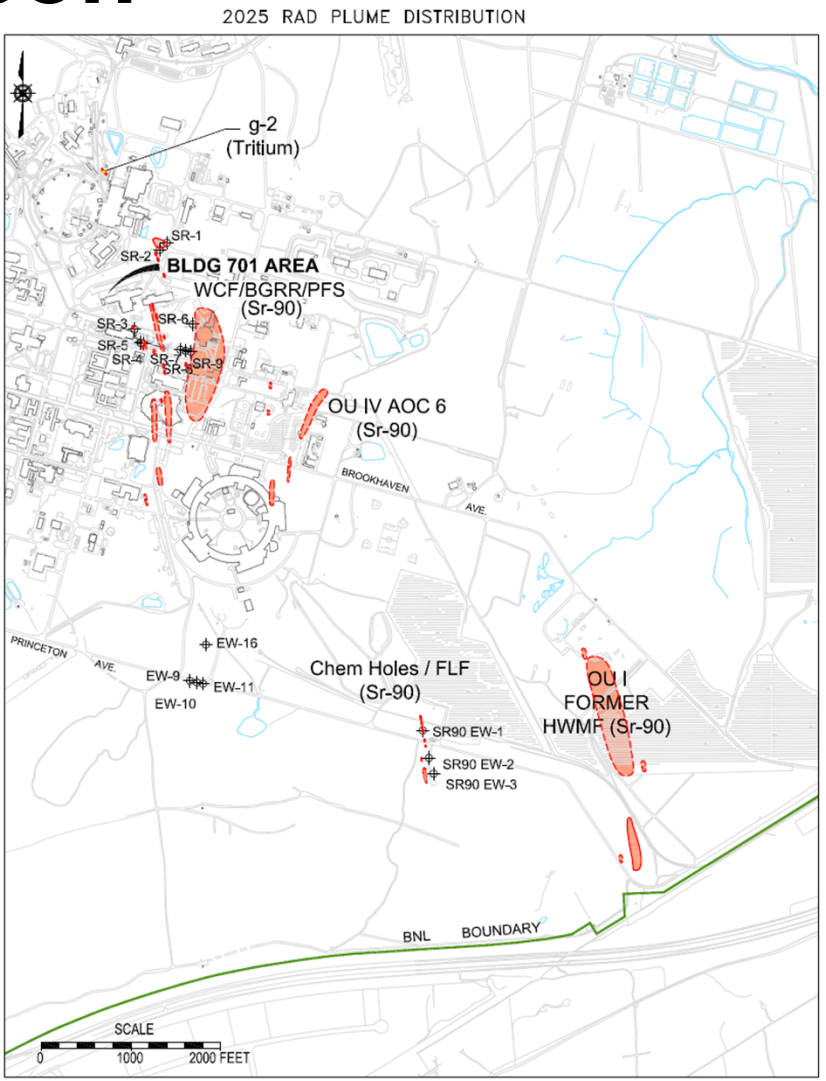
OU VI EDB

Source	Status	Notes
Five-Year Review	Remedy is Short-Term Protective	Other Findings: ➢ Continue operation of the new extraction wells. Reevaluate cleanup timeframe based upon new operational data and pumping test results.
2025 Groundwater Status Report	New extraction wells are effectively targeting EDB, but slower plume migration makes achieving the cleanup timeframe unlikely	➢ Maintain full-time operation of the new deeper extraction wells. ➢ Reevaluate the cleanup timeframe estimate.

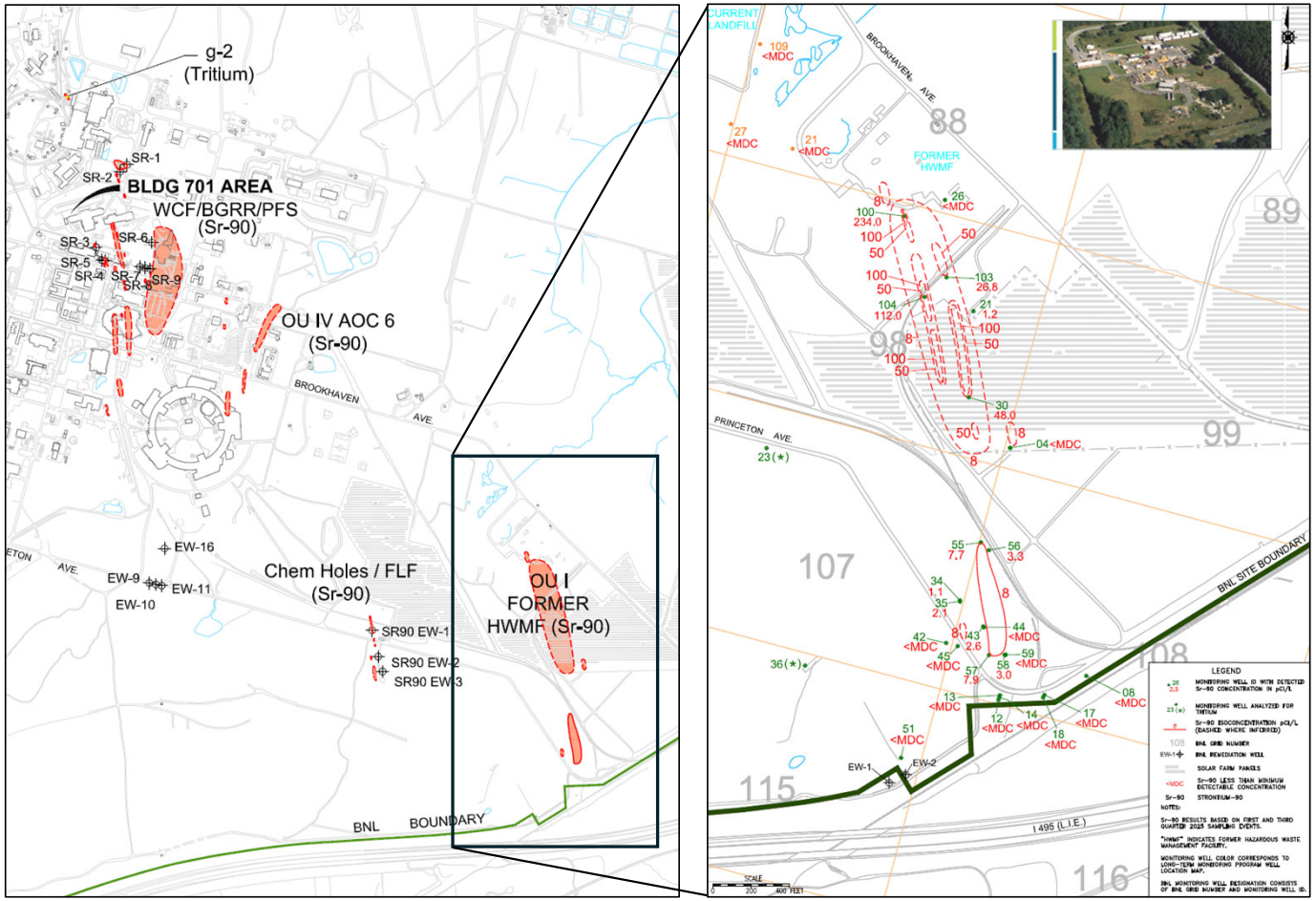
Radionuclides

RAD Plume Comparison





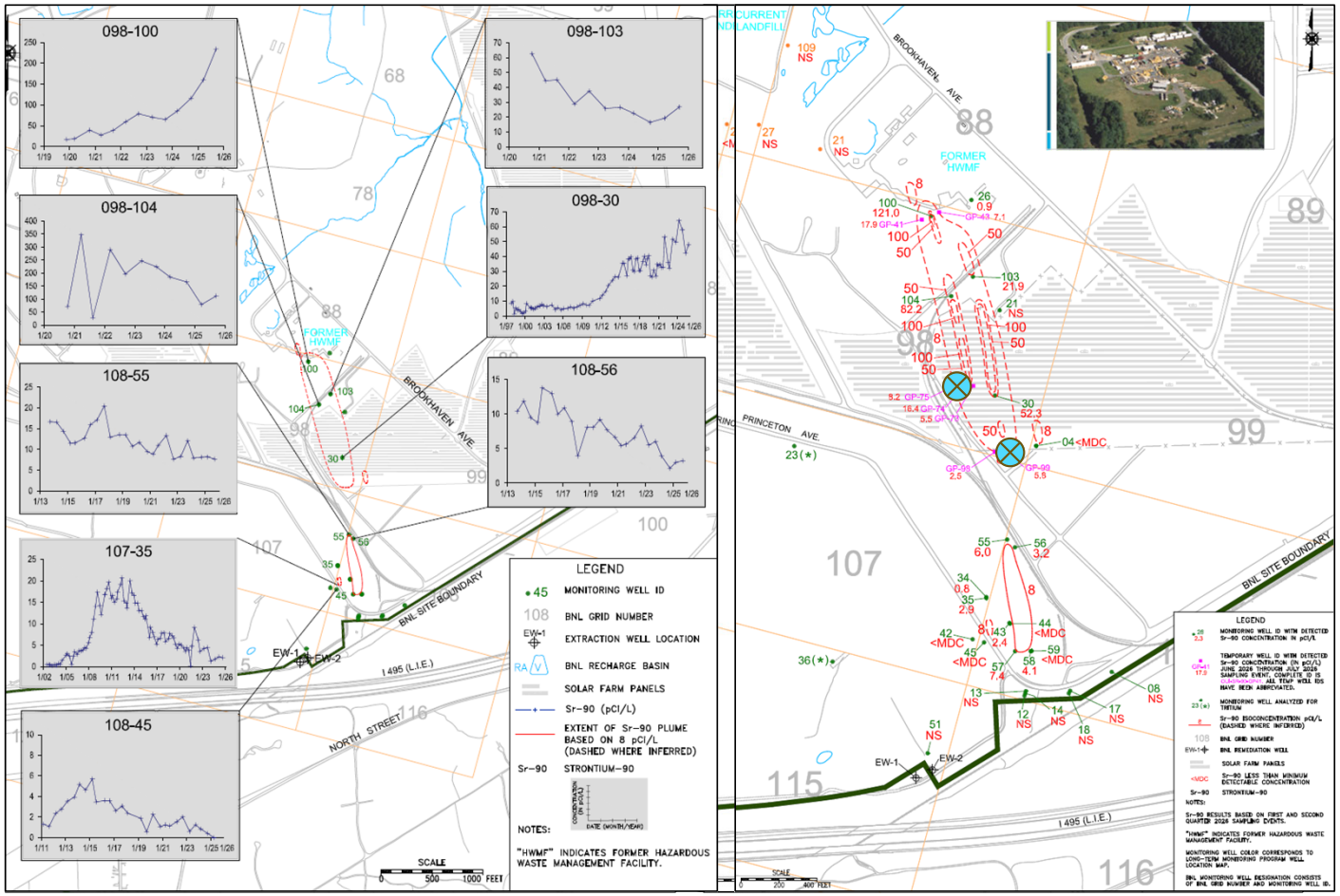
OU I Former Haz. Waste MGMT Facility



- Residual Sr-90 persists in the source area and continues to leach to groundwater
- Increasing trends of Sr-90 in 098-100 and 098-30
- Downgradient plume segments are attenuating to below MCL and supports recent groundwater modeling estimates

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OU I Former Haz. Waste MGMT Facility



- In 2026, seven temporary vertical profiles were installed to verify plume extents
- Two permanent monitoring wells were installed to enhance the monitoring network

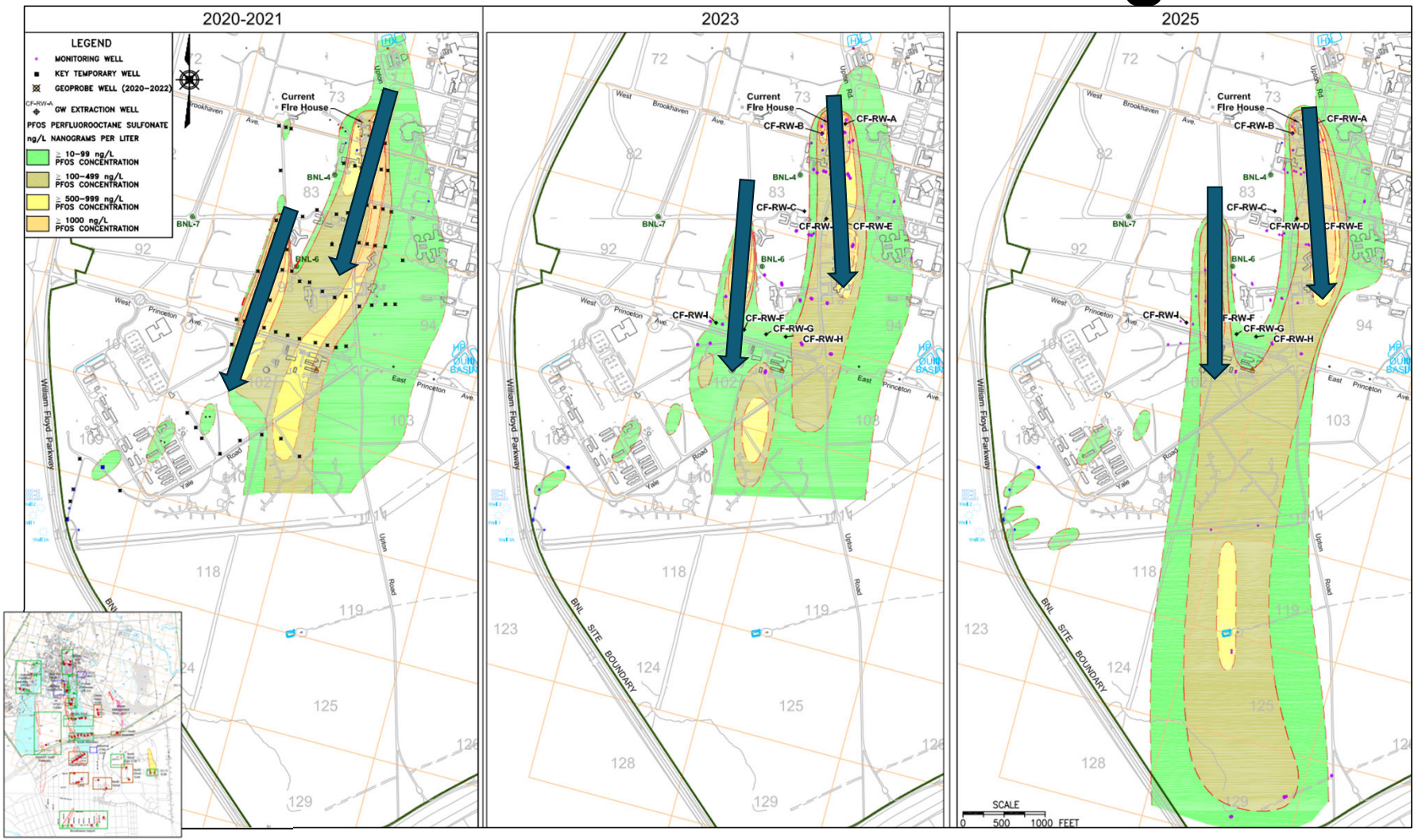
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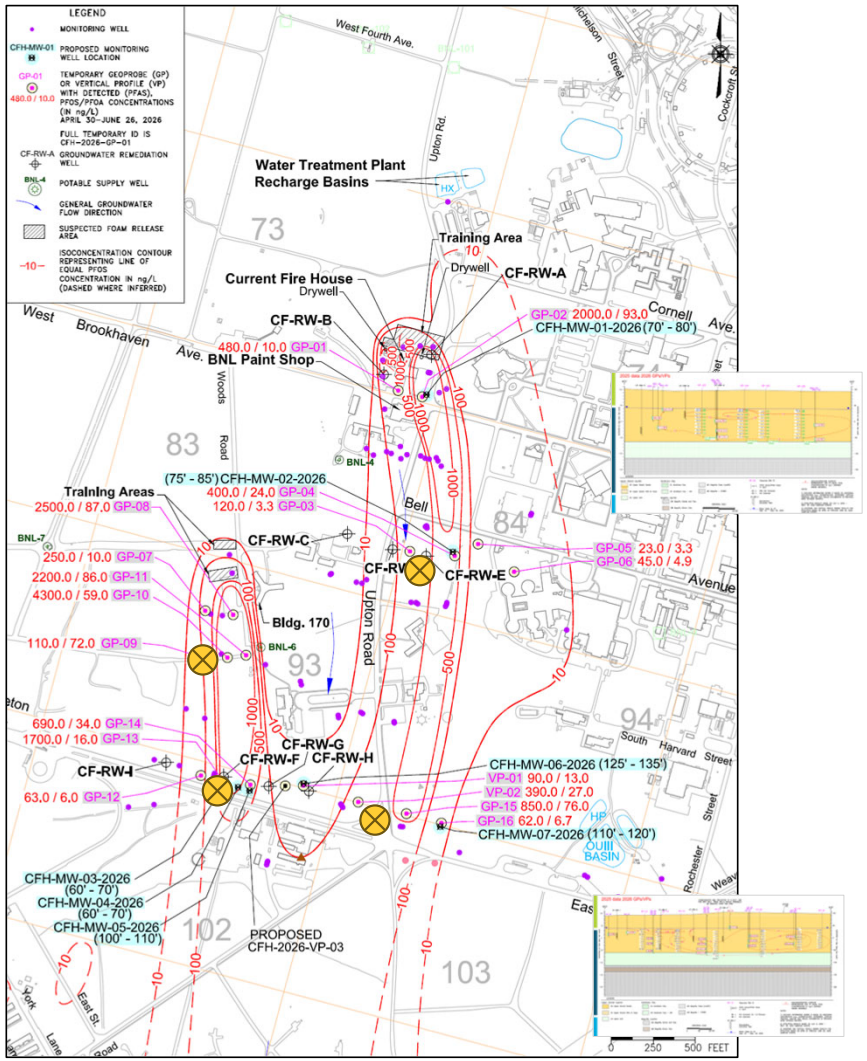
Source	Status	Notes
Five-Year Review	Remedy is Protective	Other Findings: ➢ Sr-90 in groundwater – *Continue to track Sr-90 plume attenuation. Enhance monitoring network as necessary. Monitor plume attenuation progress with 2021 predictions*.
2025 Groundwater Status Report	Residual Sr-90 remains in the source area but is attenuating as predicted	➢ Install temporary wells to characterize the extent of Sr-90 and permanent monitoring wells based on the results to enhance long-term monitoring.

PFAS & 1,4-Dioxane

OU X Current Firehouse/Building 170



OU X Current Firehouse/Building 170

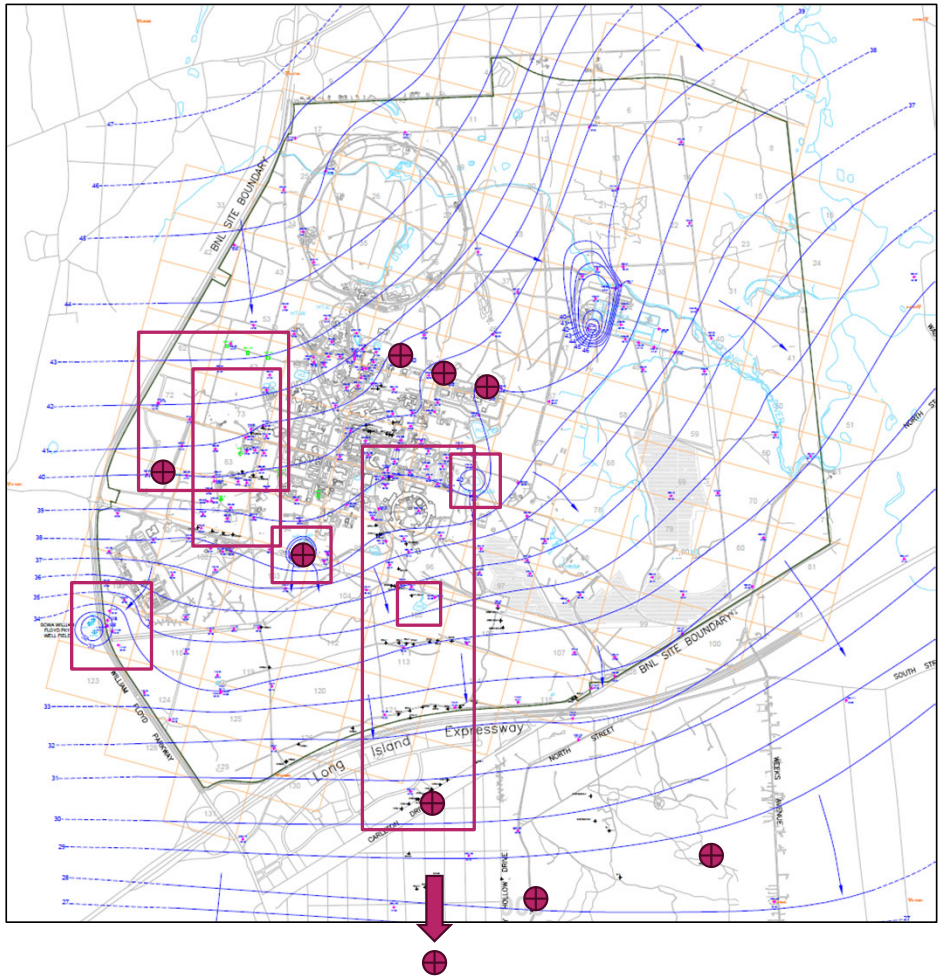


- PFAS concentrations remain above the capture goal in portions of the plume
- Source terms remain and continue to contribute to groundwater contamination
- Completed 18 vertical profile wells in 2026 to characterize the extent of the easterly shift
- The engineering design for the installation of four additional extraction wells is underway
- Timing for funding of the RI/FS and extraction well construction is uncertain

OU X Current Firehouse/Building 170

Source	Status	Notes
Five-Year Review	Not Applicable	Other Findings: ➢ Continue full-time operation of the PFAS treatment system. Evaluate the easterly shift of the Current Firehouse/Building 170 PFAS plumes and design additional extraction wells locations as needed.
2025 Groundwater Status Report	➢ Monitoring indicates that the PFAS plume extends to the site boundary, beyond the capture zone of the existing extraction wells. ➢ The confirmed easterly plume shift has resulted in incomplete capture of high concentration segments of the plume.	➢ Reduce monitoring sampling frequency in plume core and perimeter monitoring wells. ➢ Perform additional characterization to better define the shift in the plume and prepare engineering design documents for the installation of additional extraction well.

1,4-Dioxane Monitoring



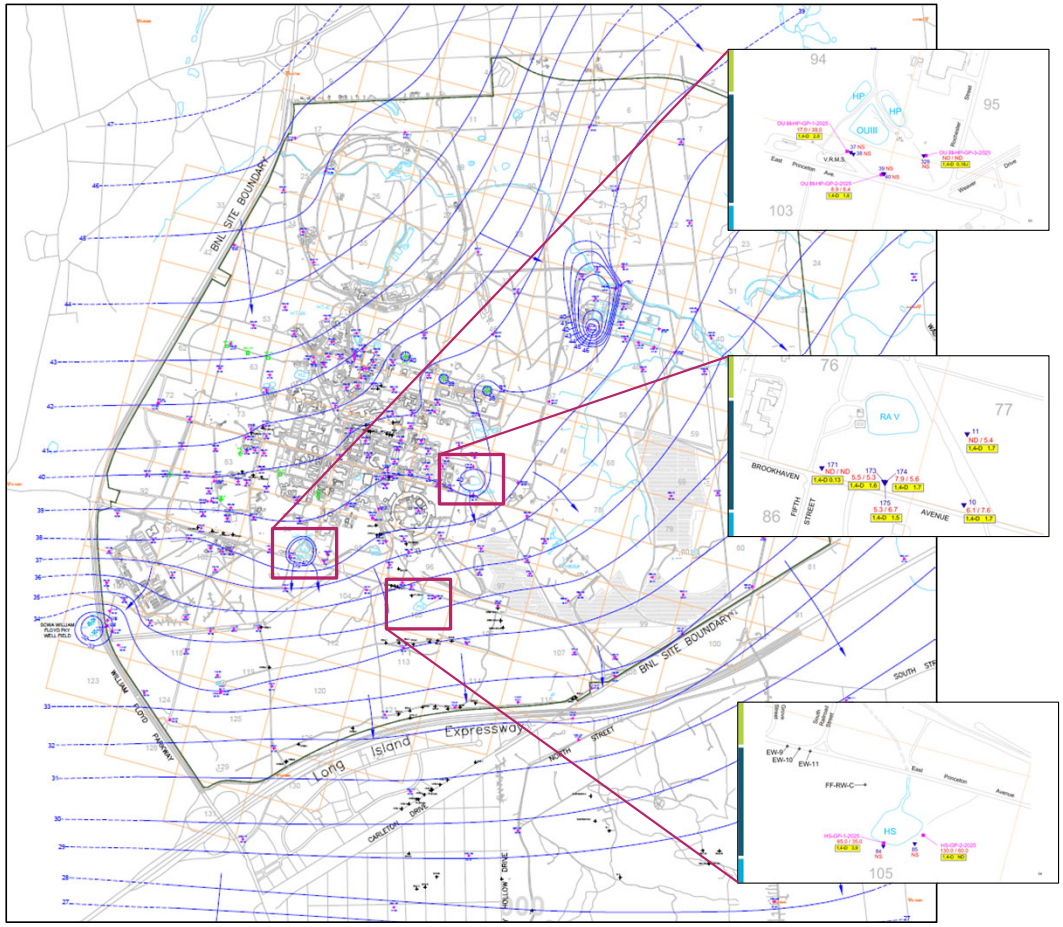
- In 2025, a permanent monitoring well network had not been established specifically for tracking 1,4-dioxane
- Monitoring wells from existing projects and five temporary vertical profiles were used to sample for 1,4-dioxane
- In 2026, received approval to discontinue sampling existing treatment system extraction wells and replace with select monitoring wells from both on- and off-site
  - Will include the recharge basin monitoring

1,4-Dioxane Monitoring

Area/Location	Max 1,4-Dioxane
Current Firehouse/Building 170	2.6 ug/L
William Floyd Wellfield Sentinel Monitoring	0.23 ug/L
Former Firehouse	0.97 ug/L
Treatment System Discharges	1.6 ug/L
Water Supply Wells	0.11 ug/L
Recharge Basins	2.8 ug/L

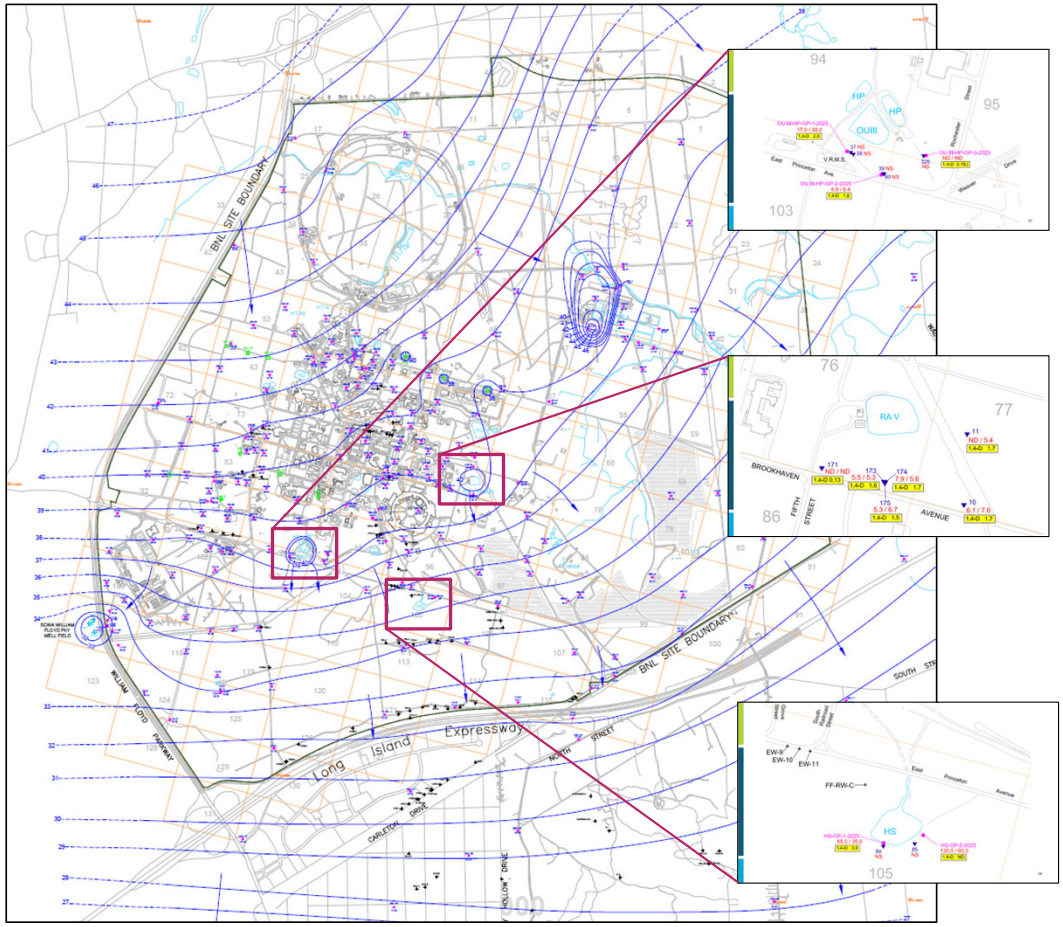
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Recharge Basin Monitoring



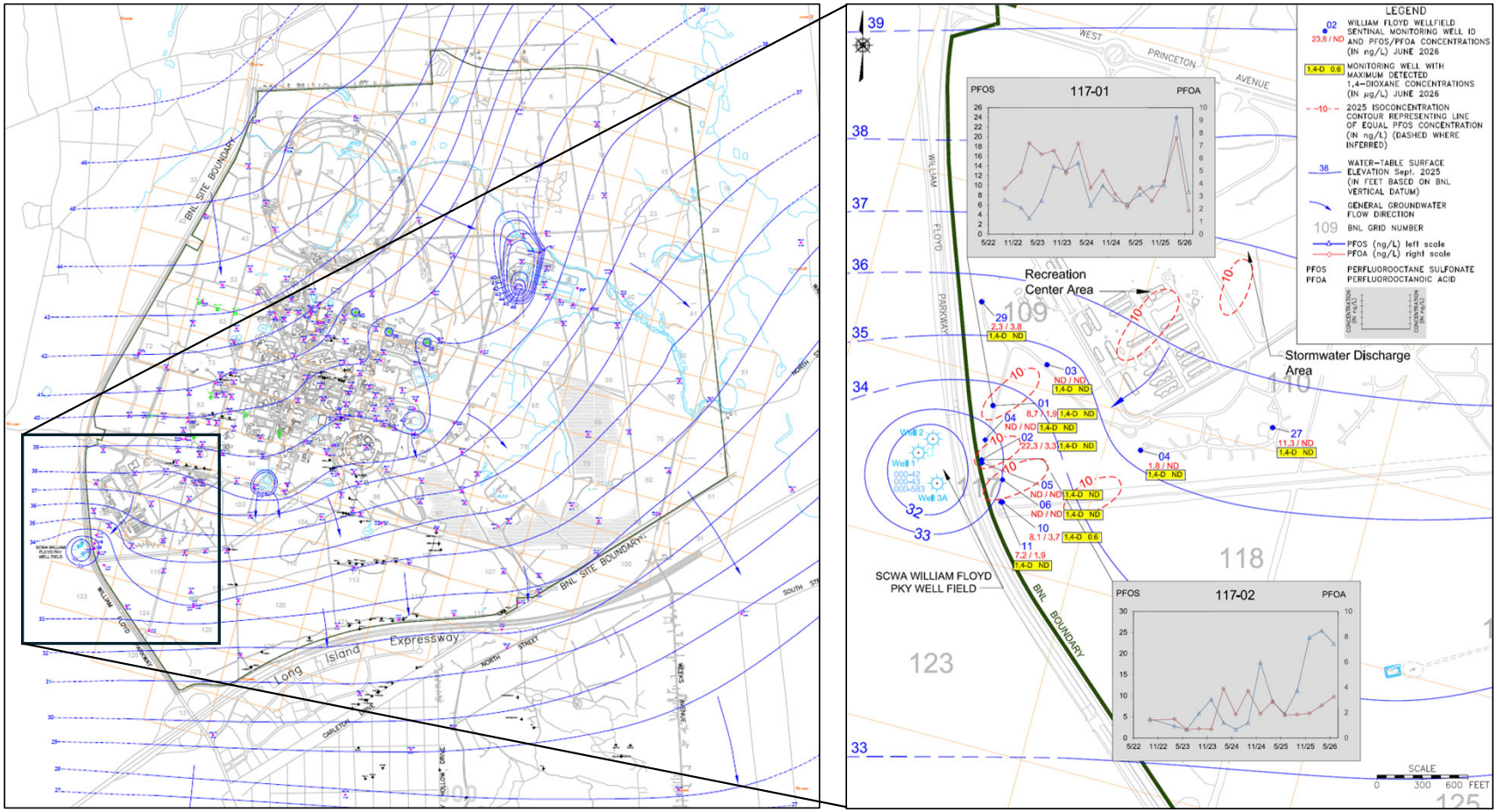
- Established to routinely monitor for PFAS and 1,4-dioxane downgradient of onsite recharge basins
- In 2025, a total of five temporary vertical profile wells were installed to characterize groundwater downgradient of the OU III/HP and HS basins
- Seven permanent monitoring wells installed based on results
- Existing monitoring wells used at the RA V basin
- Wells will be sampled annually starting in 2026

Recharge Basin Monitoring



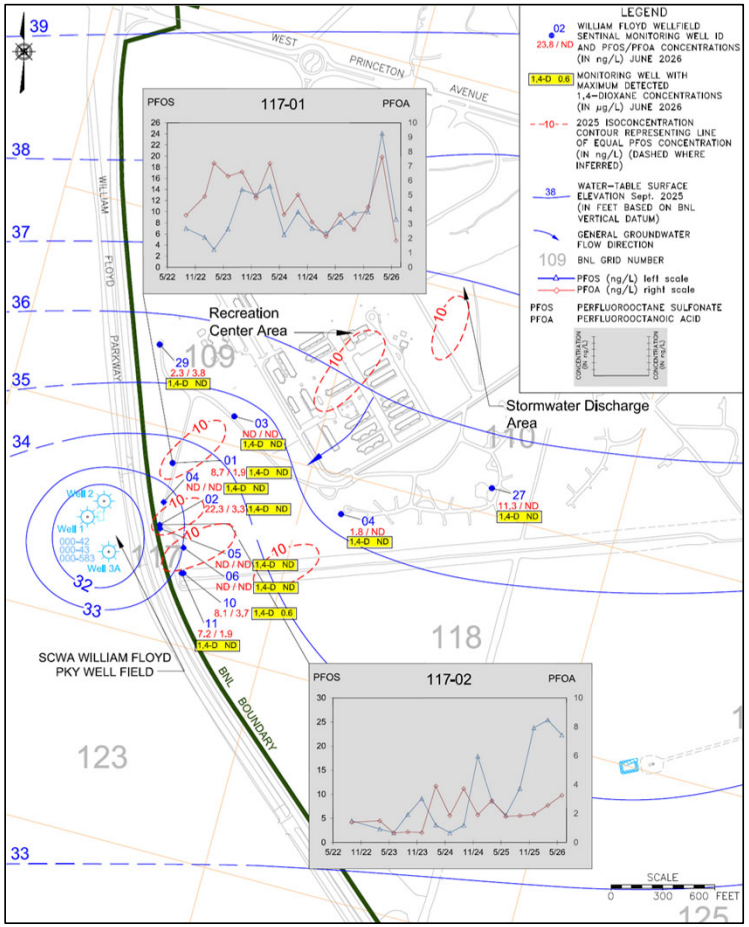
Recharge Basin ID (sample loc)	Max PFOS	Max PFOA	Max 1,4-Dioxane
OU III/HP (temp VPs)	17 ng/L	39 ng/L	2.8 ug/L
HS (temp VPs)	130 ng/L	60 ng/L	3.9 ug/L
RA V (existing MWs)	7.9 ng/L	7.6 ng/L	1.7 ug/L

William Floyd Well Field Sentinel Monitoring



William Floyd Well Field Sentinel Monitoring

- BNL further enhanced the monitoring well network with the installation of two new monitoring wells and the addition of three existing wells
- In 2025, only monitoring wells 117-01 and 117-02 detected PFOS or PFOS above their Federal or NYS standards
- In 2025, 1,4-dioxane was detected in five monitoring wells but below the NYS AWQGV of 0.35 ug/L
- In 2026, PFOS was detected the new monitoring wells 117-10 and 117-11 above the federal and NYS AWQGVs
- In 2026, 1,4-dioxane was detected at a maximum concentration of 0.6 ug/L in 117-10



Other Progress

Other Scope and Milestones

- Established onsite and offsite monitoring well network for PFAS and 1,4-dioxane monitoring. First round of samples to be collected during second half of 2026
- Building 197 – Stabilization measures complete and a remediation plan is being prepared to have ready when funding is secured. A monitoring well was installed downgradient to monitor for mercury in groundwater. Results from the first round of sampling reported mercury as non-detect in both the filtered and unfiltered samples. Annual sampling scheduled to start in 2026
- Supporting the demolition of Building 526
- Stockpiled PFAS impacted soil was properly disposed of at a RCRA C permitted facility

Next Steps

Key Recommendations

- OU I South Boundary – Discontinue post-closure VOC groundwater monitoring. Maintain Current Landfill sentinel monitoring well 098-99
- OU III Middle Road/South Boundary – Further evaluate the cleanup timeframe with three additional extraction wells and complete engineering design
- OU III Western South Boundary – Prepare a petition for shutdown
- OU III Chemical/Animal Holes – Prepare a petition for closure
- OU III Airport – Restart RTW-3A and increase pumpage in RTW-1A
- OU VI EDB – Reevaluate cleanup timeframe
- OU X Current Firehouse/Building 170 – Reduce monitoring frequency. Complete the characterization of the plume shift and engineering design for additional extraction wells
- OU X Former Firehouse – Reduce monitoring frequency

Next Steps

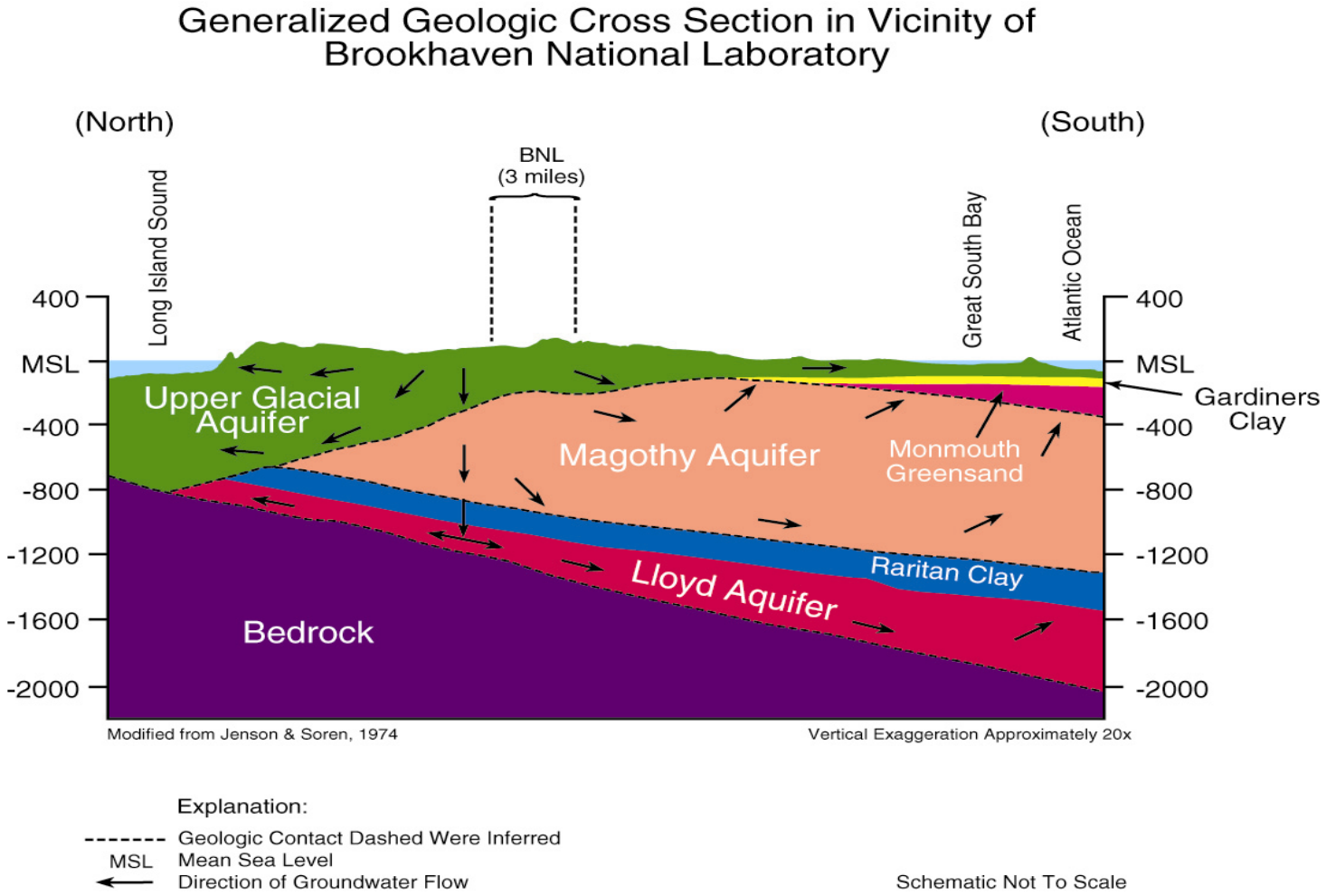
- Briefings being held with EPA, NYSDEC, and SCDHS in September
- Address regulator comments and finalize the 2025 Groundwater Status Report
- Redistribute final report and publish to the BNL website
- Airport RTW-3A has been restarted and a larger pump has been installed in RTW-1A
- Complete engineering design for OU X Current Firehouse/Building 170 additional extraction wells
- Complete updates to the Draft OU X RI/FS Work Plan to include work performed since it was tentatively approved
- Complete the Building 197 Mercury Remediation Work Plan
- **Brief CAC in the fall 2026**

Questions & Discussion

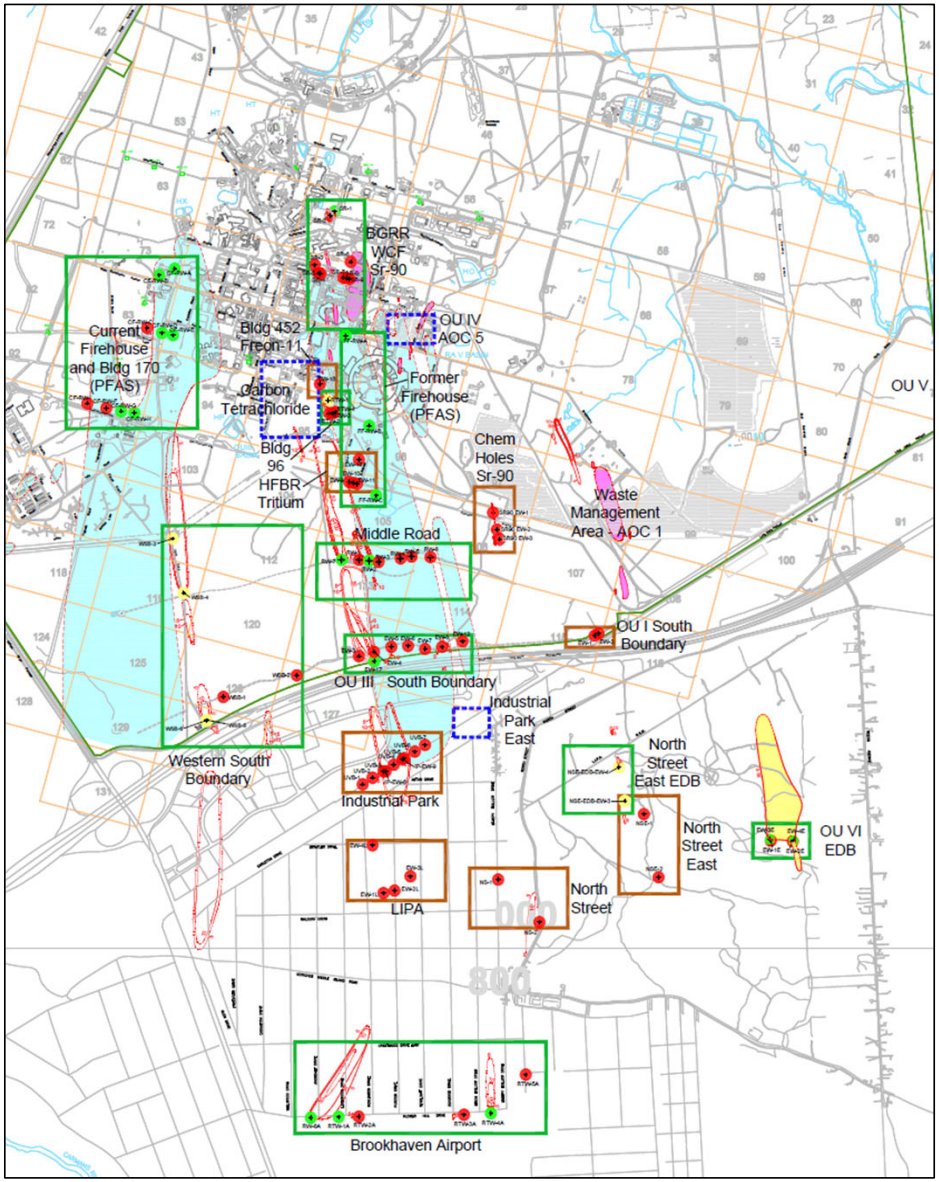
Thank you.

Linked Slides

BNL Geology



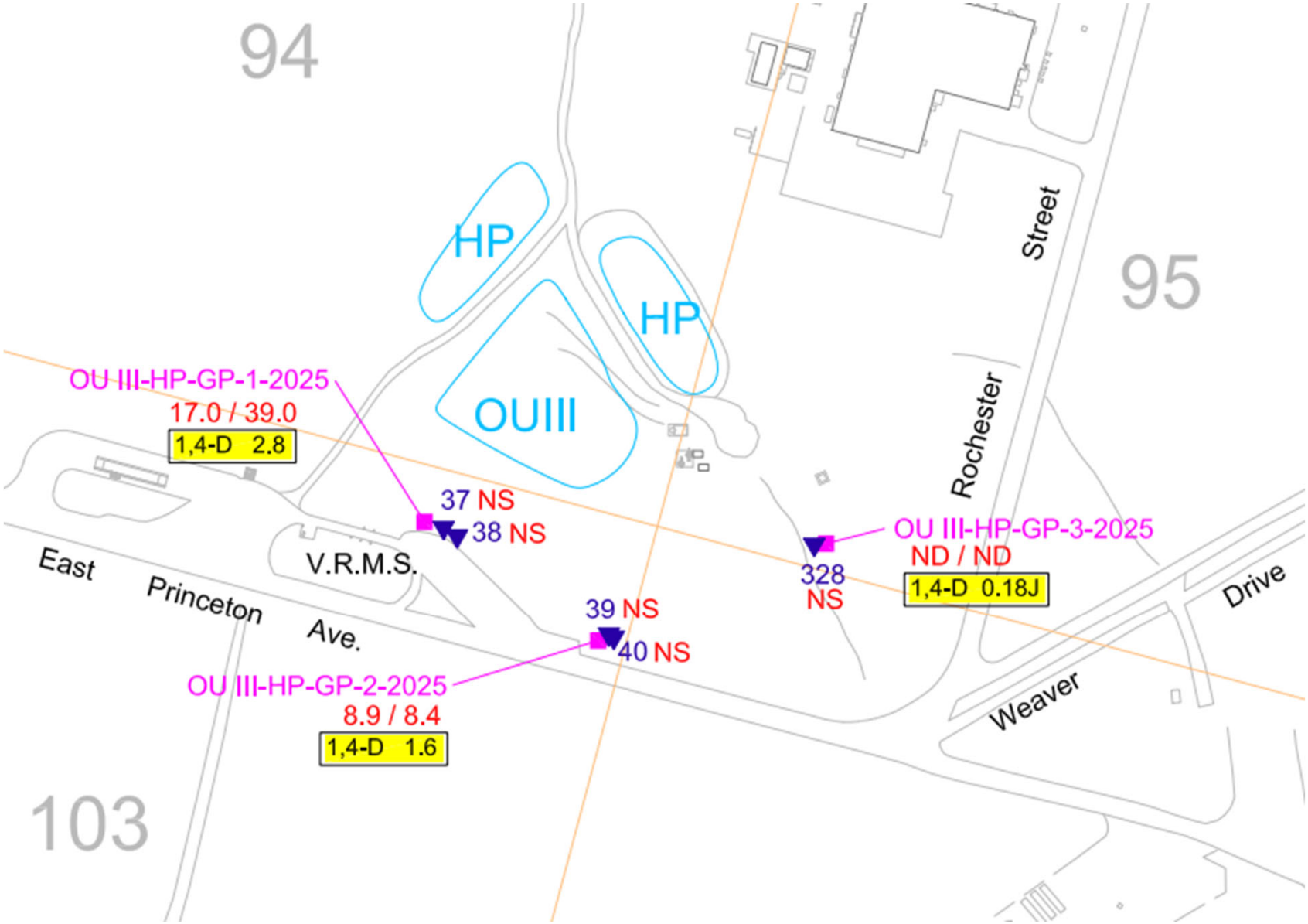
Brookhaven National Laboratory

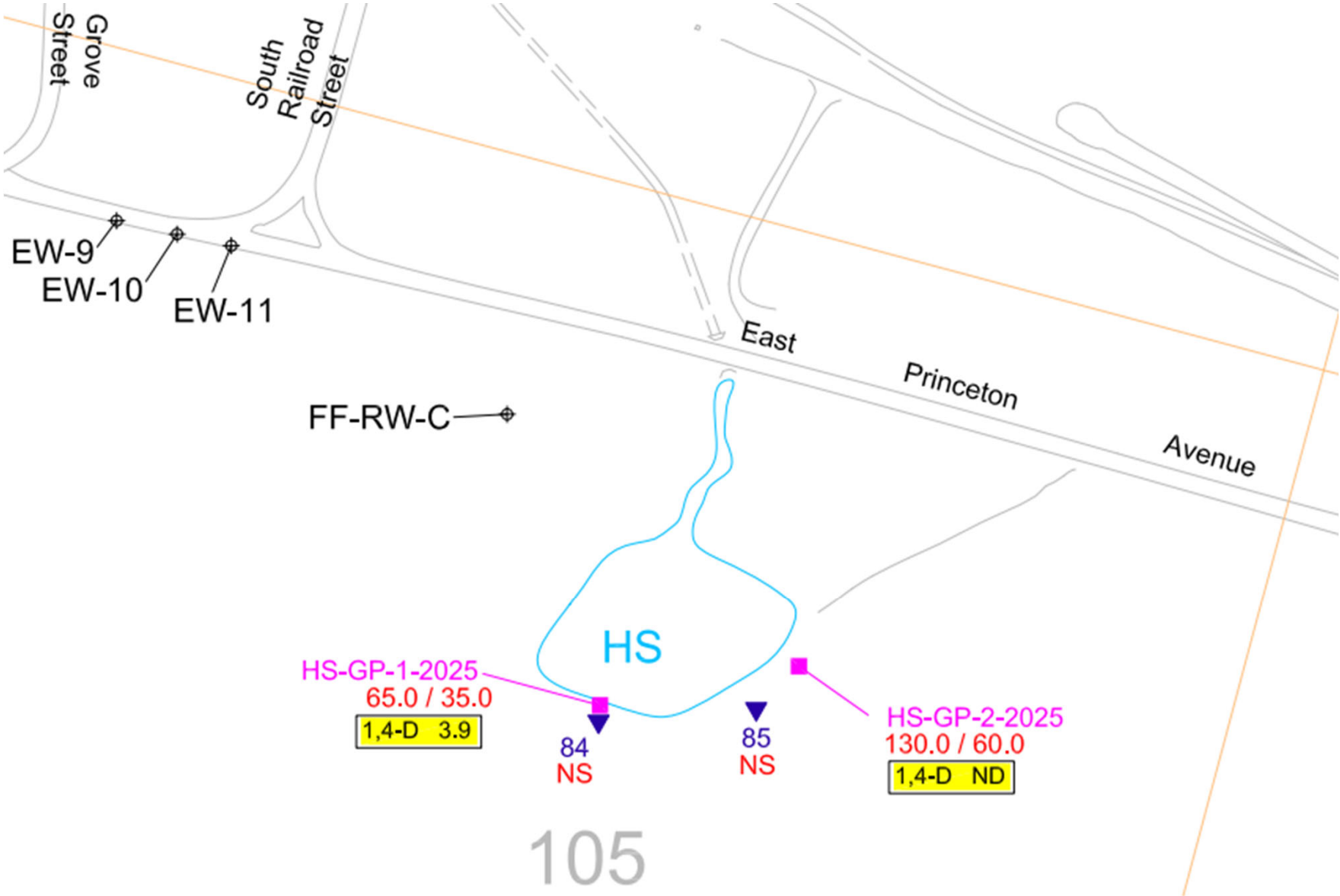

BGRR
WCF
Sr-90
OU IV
AOC 5
Current
Firehouse
and Bldg 170
(PFAS)
Bldg 452
Freon-11
Carbon
Tetrachloride
Former
Firehouse
(PFAS)
OU V
Bldg
96
HFBR
Tritium
Chem
Holes
Sr-90
Waste
Management
Area - AOC 1
Middle Road
OU I South
Boundary
OU III South Boundary
Industrial
Park
East
Western South
Boundary
Industrial Park
North
Street
East EDB
North
Street
East
OU VI
EDB
LIPA
North
Street
Brookhaven Airport

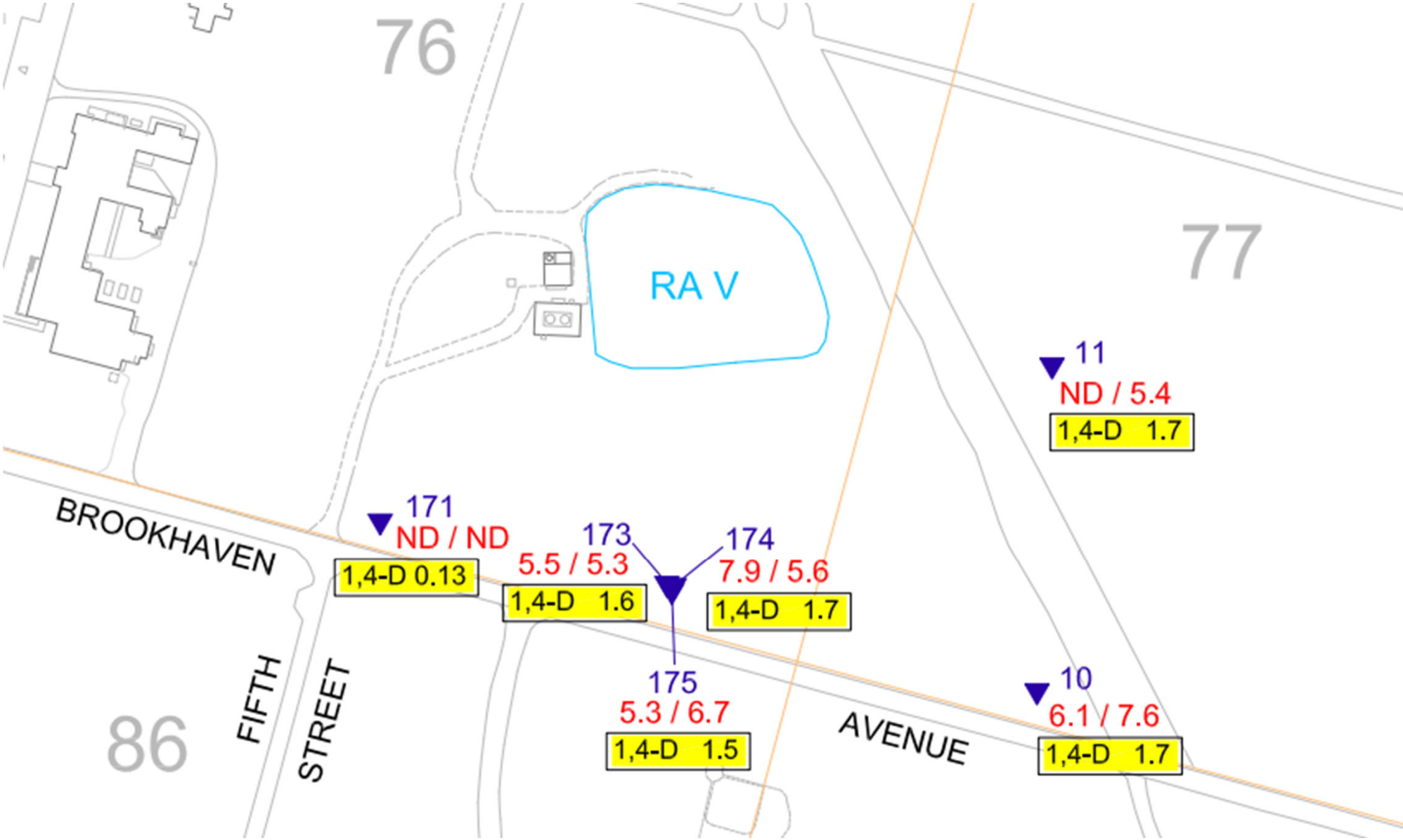



NO
WAKE




94
95
103
HP
HP
OUIII
Rochester
Street
OU III-HP-GP-1-2025
17.0 / 39.0
1,4-D 2.8
37 NS
38 NS
V.R.M.S.
East
Princeton
Ave.
39 NS
40 NS
OU III-HP-GP-2-2025
8.9 / 8.4
1,4-D 1.6
328
NS
OU III-HP-GP-3-2025
ND / ND
1,4-D 0.18J
Drive
Weaver


Grove Street
South Railroad Street
EW-9
EW-10
EW-11
East Princeton Avenue
FF-RW-C
HS
HS-GP-1-2025
65.0 / 35.0
1,4-D 3.9
84
NS
85
NS
HS-GP-2-2025
130.0 / 60.0
1,4-D ND
105


76
77
86
RA V
BROOKHAVEN
FIFTH
STREET
AVENUE
171
ND / ND
1,4-D 0.13
173
5.5 / 5.3
1,4-D 1.6
174
7.9 / 5.6
1,4-D 1.7
175
5.3 / 6.7
1,4-D 1.5
11
ND / 5.4
1,4-D 1.7
10
6.1 / 7.6
1,4-D 1.7