



Welcome to the RAB Meeting!

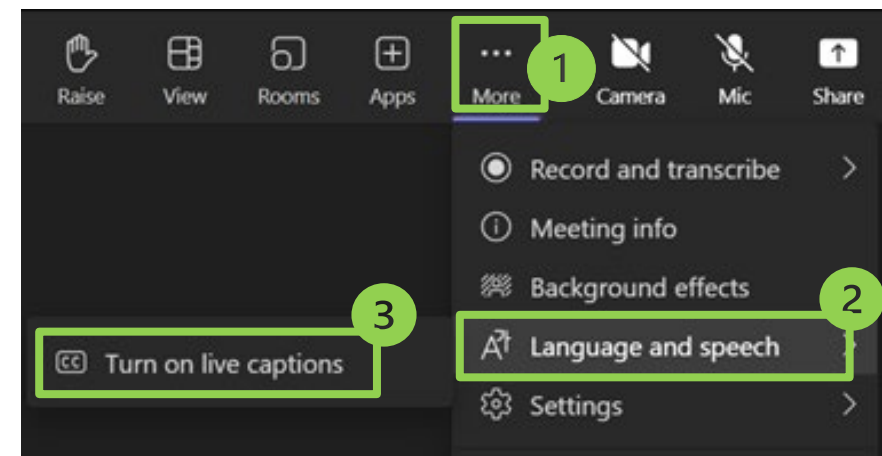
Thank you for joining the

Restoration Advisory Board (RAB) Meeting for Former Naval Air Station Joint Reserve Base (NASJRB) Willow Grove and Biddle Air National Guard Base

The meeting will begin at 6:00 p.m.

For Captions:

- Click More ●●● on the screen
- Select 'Language and Speech'
- Click 'Turn on Live Captions'

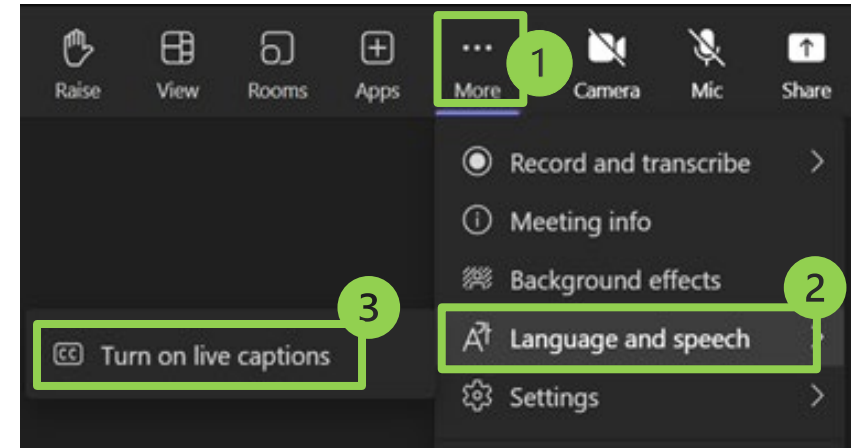




Teams Tools

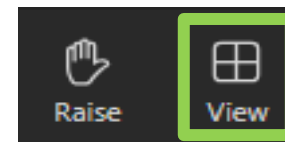
• Closed Captioning

- Select More ●●● at the top of the screen
- Select “Language and speech”
- Click “Turn on live captions”



• Screen Layout

- To adjust the layout on your screen, select View
- Choose the preferred view from available choices. Options include Full Screen, Gallery View, and Focus on Content





NASJRB Willow Grove Restoration Advisory Board Meeting April 30, 2026

Hybrid Meeting Information

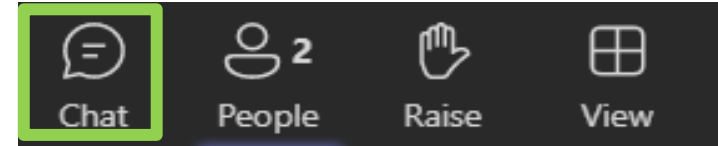
- This is a hybrid meeting with in-person and virtual attendees.
- The virtual meeting will show the presentations.
- The presenters and in-person attendees will be audio-only.
- The meeting is being recorded for the purpose of preparing meeting minutes.
- In-person attendees are asked to sign the attendance sheet. Names displayed in MS Teams will be used to record attendance for virtual participants in the meeting minutes.
- Public notices were published on April 16, 2026, and April 23, 2026, posted on the Navy website, and provided to the mailing list.

Outline / Agenda

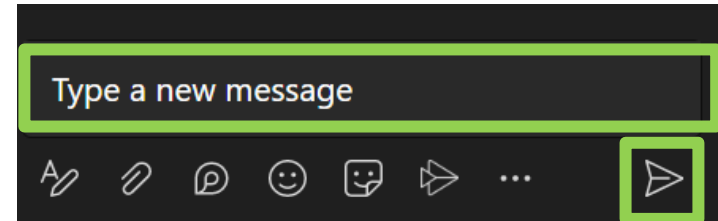
- Welcome and Announcements
- Navy Restoration/Drinking Water Update
- Groundwater Sampling via Discreet Intervals in Monitoring Wells
 - RAB Member or Community Comments / Questions
- Air National Guard Environmental Restoration Presentation
 - RAB Member or Community Comments / Questions
- Regulatory Agency Comments
 - RAB Member or Community Comments / Questions
- Meeting Conclusion

Virtual Attendee Questions

1) To ask a question, select 'Chat'

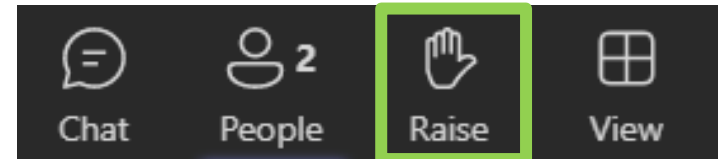


Type question in the text box, and then select Send.



2) Raise your hand to be recognized and have your microphone unmuted.

Select Raise your hand icon.



3) Phone-only attendees can dial *5 to raise their hand and have the opportunity to ask a question. Once recognized, dial *6 to unmute the microphone.

RAB Background Information

- A Restoration Advisory Board (RAB) is a stakeholder group that meets on a regular basis to discuss environmental restoration at a specific property that is either currently, or was formerly, owned by Department of Defense, but where Department of Defense oversees the environmental restoration process.
- RABs enable people interested in the environmental cleanup at a specific installation to exchange information with representatives of regulatory agencies, the installation, and the community. RABs may only address issues associated with environmental restoration activities.
- Mr. Bill Walker, Horsham Township Manager, is the RAB community co-chair.
- Applications for new RAB members are always being accepted. Hardcopies are available on the back table, or you may apply via website here: [WG RAB MEMBER APPLICATION.PDF](#).
- Health-related issues are not addressed by the RAB. Health agency professional contact information will be provided after the Navy and Air National Guard Environmental Restoration presentations.

Source: 10 USC 2705 and DoD Restoration Advisory Board Rule Handbook
<https://denix.osd.mil/rab/home/unassigned/rab-rule-handbook/>

Current RAB Members

RAB Co-Chairs:

- Mr. Jonathan Harris (Navy Co-Chair)
- Colonel Daniel Molina (Air National Guard Co-Chair)
- Mr. Bill Gildea-Walker (Community Co-Chair)

RAB Community Members:

- David Craig
- Hope Grosse
- Alan McPeak
- Alex Meyers
- Rick Newsome
- Mike Pickel
- Danette Richards
- Samantha Slaff
- Joanne Stanton
- Mike Shinton
- Tom Ames

Future Planned RAB Meetings

Future RAB Meeting Target Dates:

- Thursday, July 16, 2026
- Thursday, November 19, 2026

Private Drinking Water Well Sampling for PFAS

- January 14, 2023: PA maximum contaminant levels (MCLs) for PFOA (14 ppt) and PFOS (18 ppt) were published.
- April 10, 2024: EPA established final MCLs for several PFAS in drinking water.
 - MCLs for PFOA and PFOS: 4 ppt
 - MCLs for PFHxS, PFNA, HFPO-DA: 10 ppt
 - Mixtures of two or more of PFHxS, PFNA, HFPO-DA, and PFBS: Hazard Index MCL of 1
- Department of Defense policy released in September 2024.
 - Prioritizes action to address private drinking water wells with PFAS levels at or above 3x MCL
 - Directed addressing drinking water down to the MCLs or background per remedial investigation findings

Private Drinking Water Well Sampling for PFAS (Cont.)

- Fall 2023: Awarded modification to the Cooperative Agreement with Horsham Water and Sewer Authority (HWSA) to address 100 additional properties. Began issuing offer letters for municipal water connections in HWSA service area for locations above PA MCLs.
 - The Navy has provided over \$22 million to HWSA to address PFAS via Cooperative Agreement:
 - Filtration systems at five HWSA municipal wells
 - Over 100 public water connections for private wells
- Spring 2026: HWSA completed physical connections to the public water system under current ESCA.

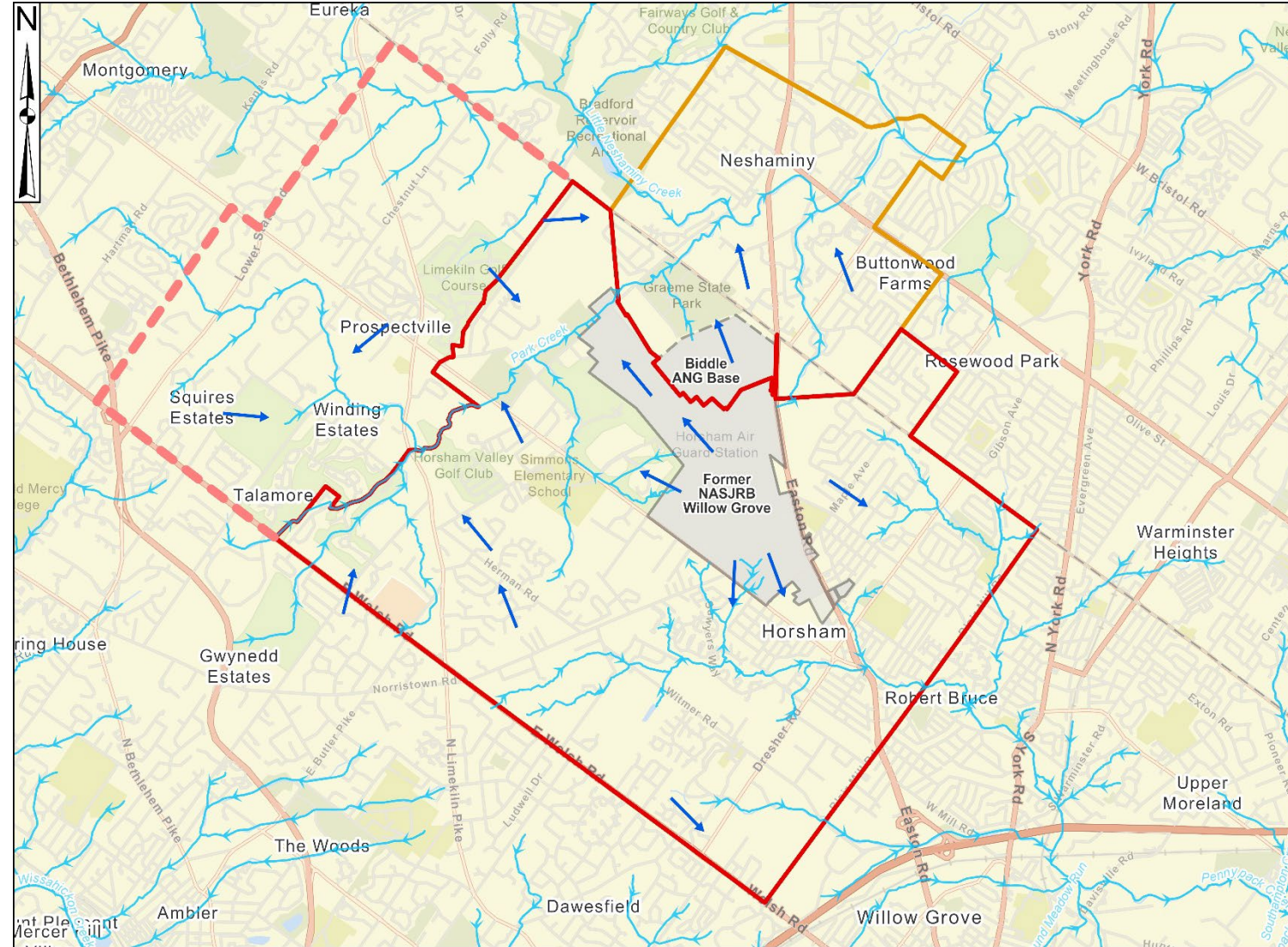
Private Drinking Water Well Sampling for PFAS (Cont.)

If you have a private drinking water well in the Navy's sampling area, please reach out to Resolution Consultants, a U.S. Navy contractor to schedule an appointment.

Points of Contact:

Bonnie Mace
Resolution Consultants Deputy CTO Manager
Email: bonnie.mace@aecom.com
Phone: (800) 605-7599

- > 600 wells sampled to date
- > 460 wells have been connected to municipal water under prior actions
- 120 wells connected to municipal water due to exceedance of 3x EPA MCLs
- 4 wells with PFAS between the EPA MCL and 3x the EPA MCL to be connected under future action



Action Summary Since Previous RAB Meeting

- Documents in Preparation:
 - Internal Draft Phase 2 RI for PFAS in On-Base Groundwater Sampling and Analysis Plan (SAP)
 - Internal Draft 2026 Site Management Plan
 - Internal Draft GWTS Pumping Test Work Plan
 - Internal Draft Site 5 Year 10 (2025) Annual Report
 - Internal Draft Finding of Suitability for Early Transfer
 - Internal Draft Site 12 (OU-13) Groundwater Supplemental Sampling Tech Memo
 - Internal Draft Northern Ponding Area Tech Memo

Action Summary Since Previous RAB Meeting

- Documents under Regulatory Review:
 - Draft Watershed Contaminated Source Document
 - Draft Northern Ponding Area (NPA) UAS Thermal Imagery Tech Memo
 - Draft Phase 2 PFAS RI Off-Base Groundwater Investigation Tech Memo
 - Draft Final Soil Pore Water Investigation Tech Memo
 - Draft Final Surface Water and Sediment SAP
 - Draft Water Tower and Barn Area SAP

Action Summary Since Previous RAB Meeting

- Documents Finalized:
 - Final Groundwater Extraction and Treatment System (GWTS) Action Memo, Design, and Construction Quality Analysis Plan
 - Combined Annual Surface Water and Sediment Report
 - Final Site 5 Year 9 (2024) Annual Report
 - Final 2025 Site Management Plan

Documents Anticipated to be Submitted by Next RAB

- Final Basewide Surface Water and Sediment SAP
- Internal Draft Northern Ponding Area Wetland Survey Report
- Internal Draft PFAS Background Study SAP
- Final Watershed Contaminated Source Document

Field Activities Summary Since Previous RAB Meeting

- Conducted baseflow period investigation at Northern Ponding Area
- Conducted quarterly groundwater sampling at NASJRB Willow Grove Site 5 – Former Fire Training Area (OU 2)
- Conducted annual groundwater sampling at Site 3 (OU 6) and Site 12 (OU 11)
- Performed Land Use Control Inspections at Site 3 (OU 6) and Site 12 (OU 11)
- Completed survey for South of the Runway parcel and Horsham Road Right-of-Way in support of Finding of Suitability for Early Transfer

Field Activities Anticipated to be Completed by Next RAB

- Perform groundwater sampling at the Northern Ponding Area
- Conduct quarterly groundwater sampling at NASJRB Willow Grove Site 5
– Former Fire Training Area (OU 2)
- Perform Site 5 Land Use Control inspection and bioremediation application

Property Transfer Update

- Approximately 850 acres of Navy-owned surplus property remain at former NASJRB Willow Grove
- Surplus property will be transferred to Horsham Land Redevelopment Authority (HLRA) through an Economic Development Conveyance (EDC)
- An EDC Memorandum of Agreement (MOA) memorializing the planned transfer from Navy to HLRA of 118 acres (of the total 850 acres) was executed and recorded in August 2025
- Initial transfer area consists of two distinct parcels outside the former installation fence line; Maple Avenue, Easton Road, and Horsham Road rights-of-way; and an area within the fence line identified as the south of the runway area



Property Transfer Parcels



Early Transfer

- Early transfer allows property transfer prior to completing environmental cleanup (i.e. CERCLA process) and requires the deferral of the CERCLA covenant until cleanup is complete. A cleanup schedule is also required including final remedy.
- Finding of Suitability for Early Transfer (FOSET) will be provided to the community prior to transfer including a 30-day public comment period. The FOSET will describe environmental conditions and any proposed land use restrictions.
- Land use restrictions to ensure protection of human health and the environment must in place at the time of property transfer and maintained during active redevelopment.
- Revised deed with CERCLA covenant will be recorded once CERCLA cleanup is complete and will include final use restrictions.

Groundwater Sampling Via Discrete Intervals In Monitoring Wells Demonstration

Groundwater Sampling Via Discrete Intervals Demonstration

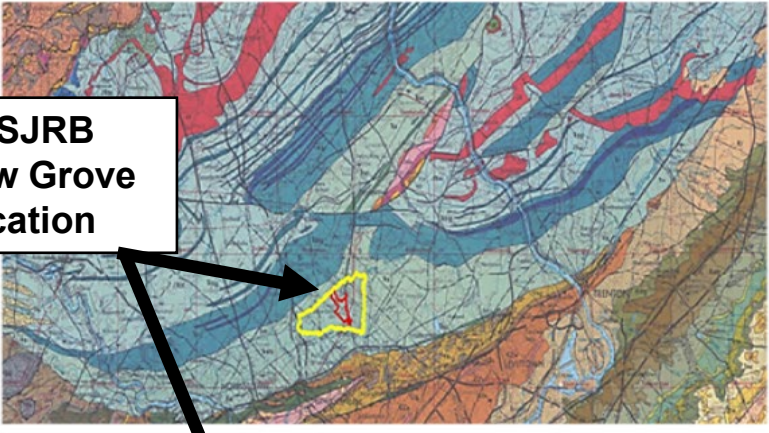
Presentation Overview

- Background
 - Geology / hydrogeology context
 - Remedial investigation discrete interval groundwater sampling needs
- Discrete interval sampling demonstration for PFAS
 - Technology selection
 - Demonstration implementation steps
 - Groundwater sampling to test the technology
- Demonstration results
- Summary

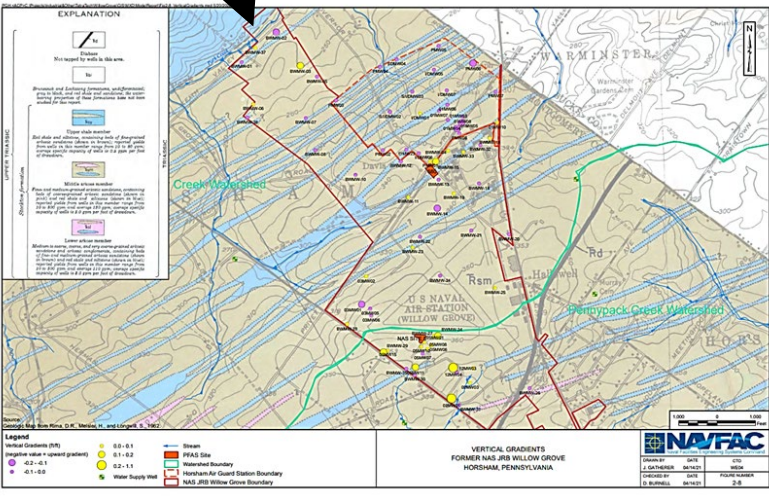
Groundwater Sampling Via Discrete Intervals Demonstration

Stockton Formation

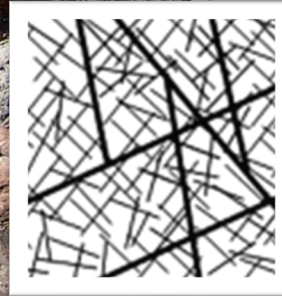
NASJRB Willow Grove Location



Geologic Map (Regional Scale)



Geologic Map (Local Scale)

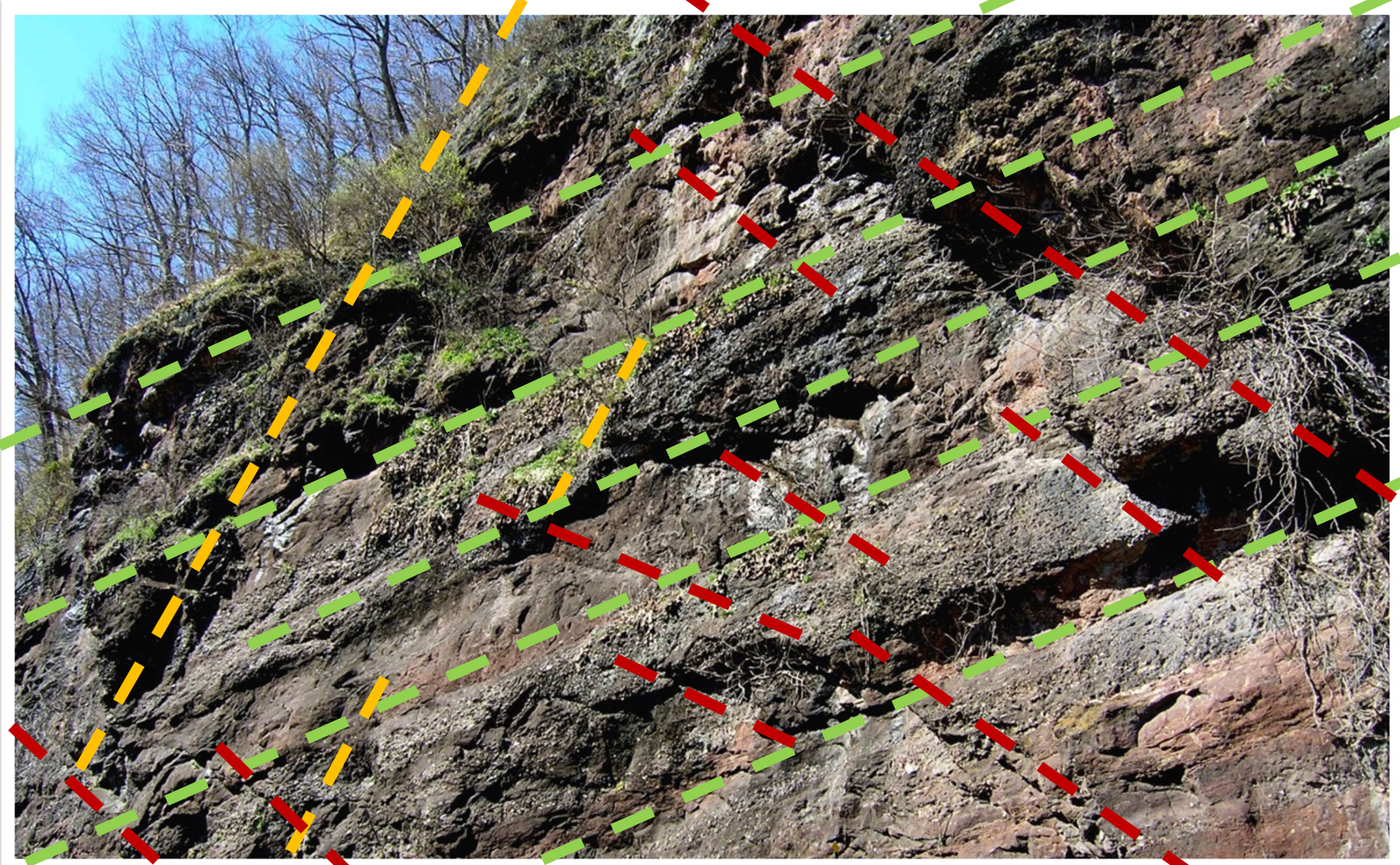


Fractured Bedrock Example

The Stockton Formation:
Interbedded medium to coarse grained sandstone, siltstone and mudstone up to 4700 feet thick deposited by an ancient late Triassic age river system.

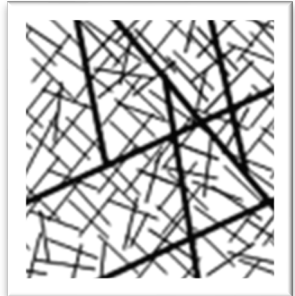
Groundwater Sampling Via Discrete Intervals Demonstration

Bedrock Fracturing At The Surface



Fracture Examples

Fracture Examples



Fracture Patterns Example

Groundwater Sampling Via Discrete Intervals Demonstration

Bedrock Fracturing In The Subsurface



Fractures in Rock At Ground Surface



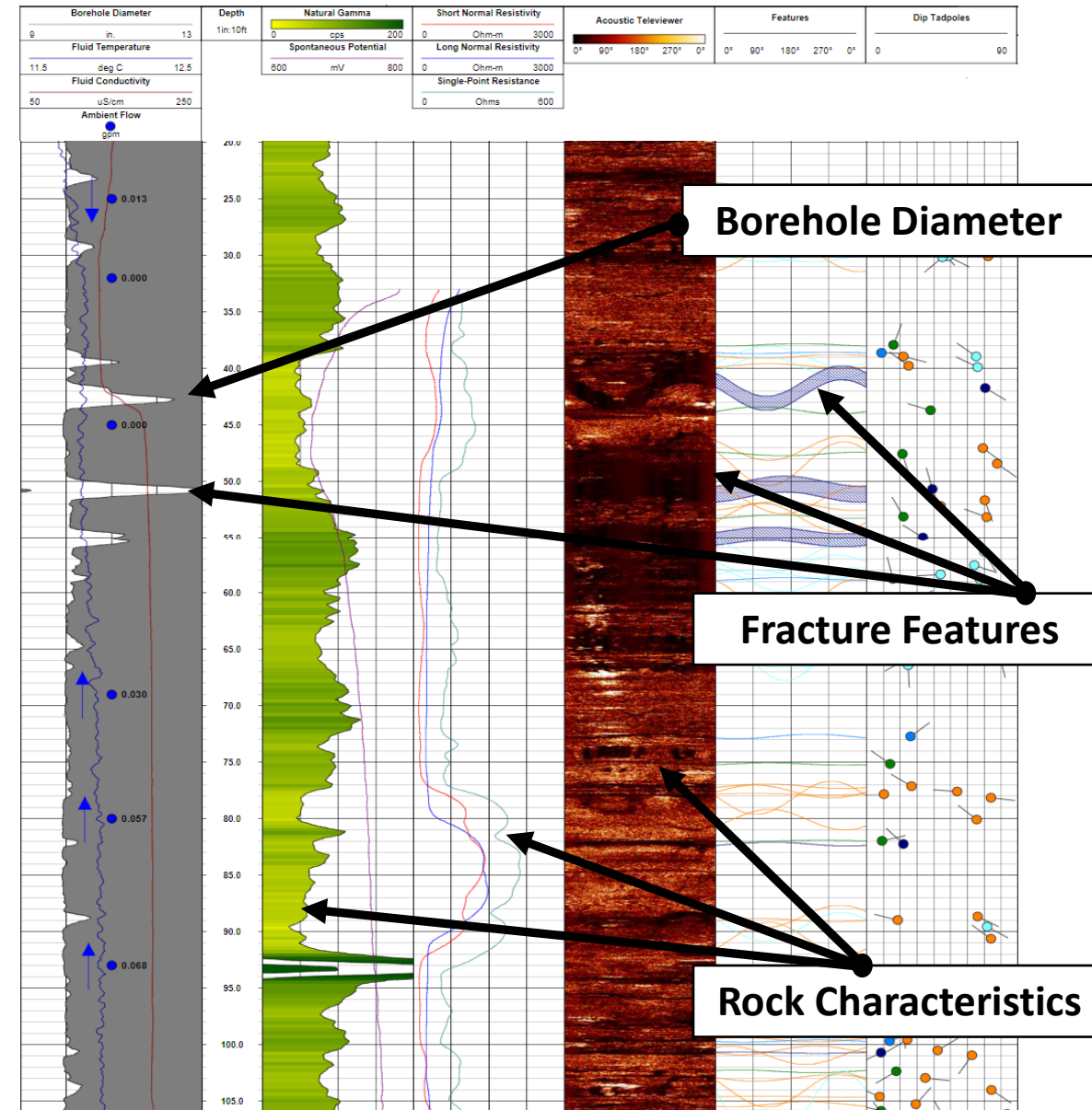
Fractures in Rock Obtained From Depth

Example of Fractured Bedrock Obtained From Rock Core Drilling

Groundwater Sampling Via Discrete Intervals Demonstration

Well Logging Fracture Analysis

- Stockton formation bedrock is fractured at the surface and in the subsurface.
- Fractures may include bedding planes, joints, faults and other cracks / breaks.
- Fracture type, intensity, spacing, and orientation are assessed with borehole logging and geophysics during well completion to identify zones that may most transmit water due to them.
- Testing is completed in targeted zones using packers and pumps to assess how transmissive they are for water.

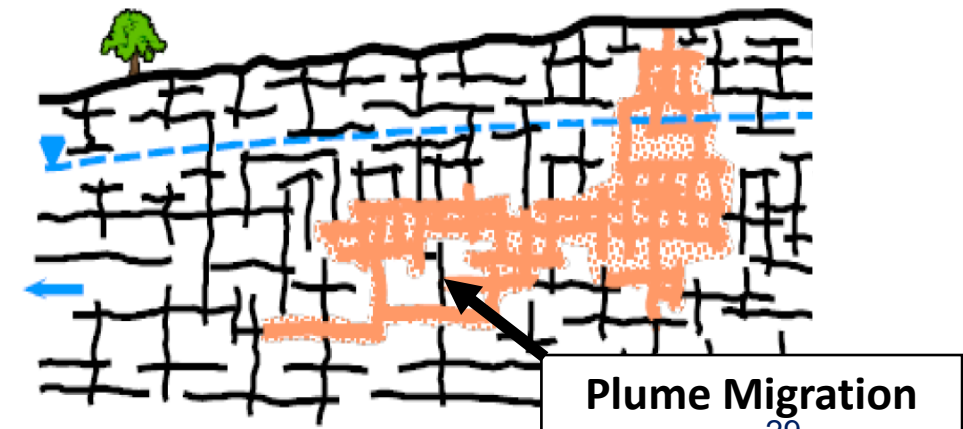
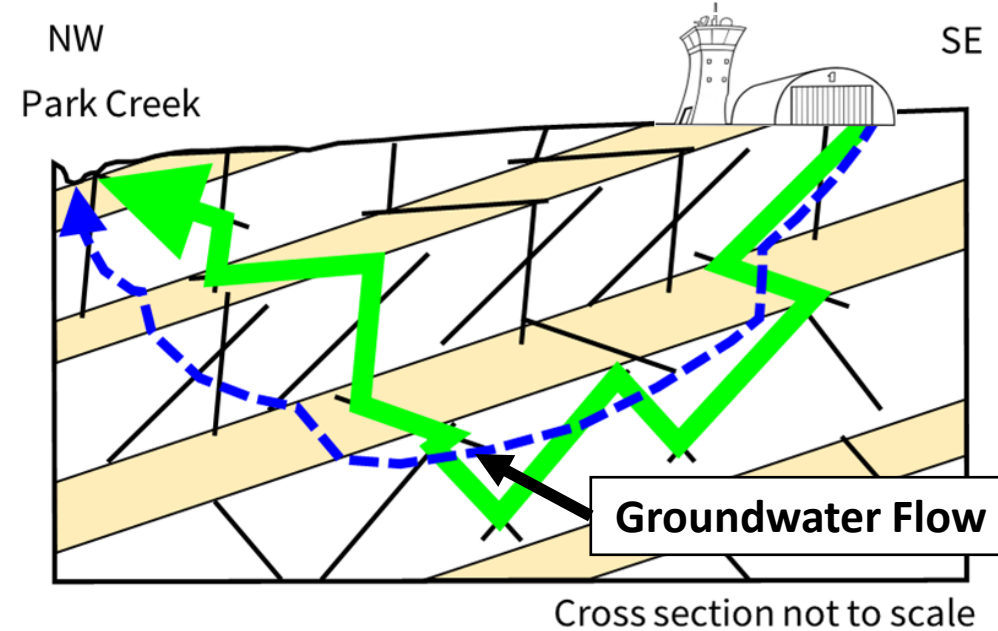


Groundwater Sampling Via Discrete Intervals Demonstration

Groundwater Flow Through Fractures

- Groundwater occurs in the bedrock's natural pore spaces and/or in fractures.
- Groundwater flows more readily, and PFAS migration is increased, in more permeable (e.g., highly porous or fracture) zones.
- Fracture zones can substantially vary laterally and with depth, and they may or may not be interconnected at the local scale.
- Groundwater may occur in different discrete intervals that guide flow in different directions. PFAS may vary with depth in fractured rock.

Simple Conceptual Models of Groundwater and Contaminant Migration in Fractured Bedrock

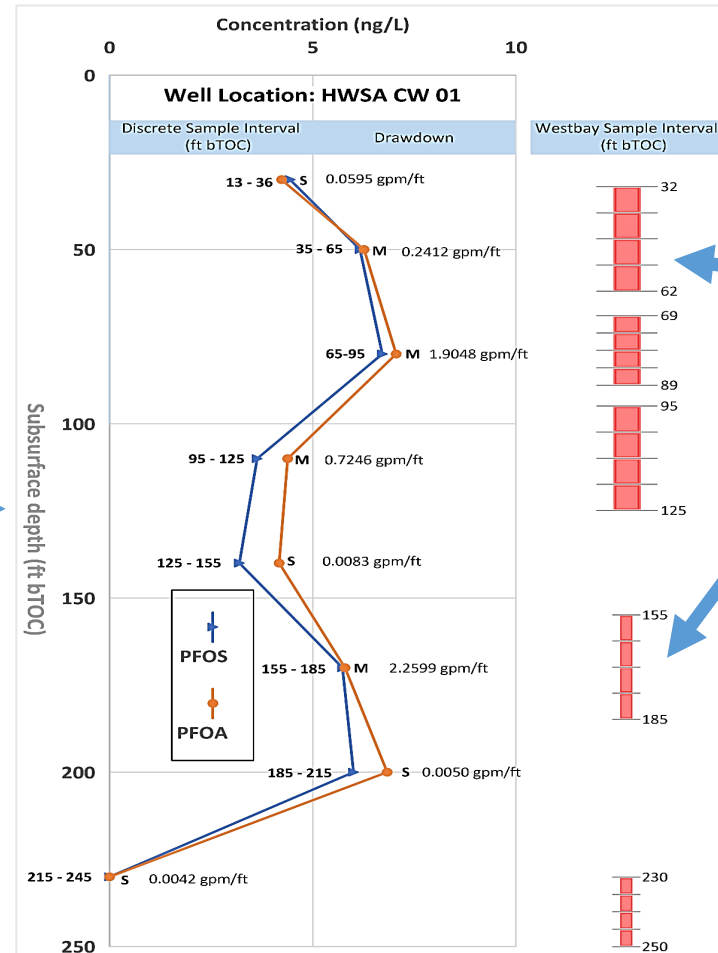


Groundwater Sampling Via Discrete Intervals Demonstration

- Borehole information (e.g., rock type, fracture frequency, depth to water, permeability information, and initial PFAS data can be used to select sampling program depth intervals.

Location ID and Depth Interval (ft btoc)	Static Water Level (ft btoc)	Calculated Vertical Hydraulic Gradient ¹	Final (Sample Time) Water Level (ft btoc)	Drawdown (ft)	Final Pumping Rate (gpm)
CW 01					
CW 01 (13.4-36.4)	10.69	0.0024	27.5	16.81	1
CW 01 (35-65)	10.75	0.0027	23.19	12.44	3
CW 01 (65-95)	10.83	0.0107	12.93	2.1	4
CW 01 (95-125)	11.15	0.0003	16.67	5.52	4
CW 01 (125-155)	11.16	0.0000	131.25	120.09	1
CW 01 (155-185)	11.16	0.0023	12.93	1.77	4
CW 01 (185-215)	11.23	-0.0043	211.44	200.21	1
CW 01 (215-245)	11.10	NA ²	200.96	189.86	0.8

Example Well Data From Borehole Testing



Example Groundwater Sampling Target Intervals From Borehole Data

- 32 – 62 feet depth
- 69 – 89 feet depth
- 95 – 125 feet depth
- 155 – 185 feet depth
- 230 – 250 feet depth

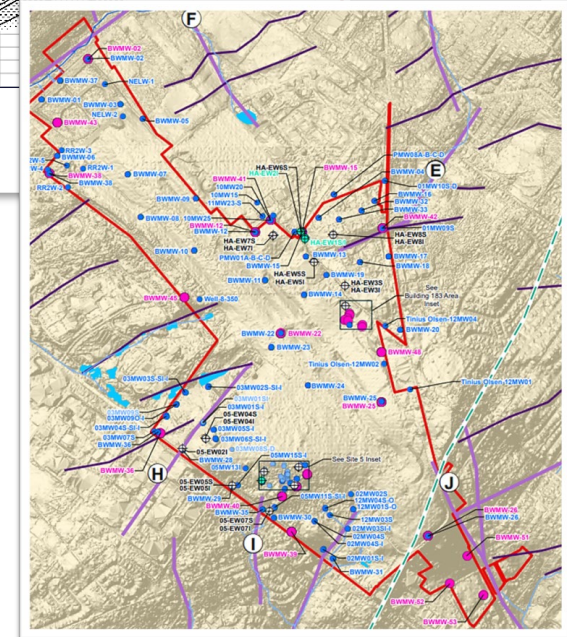
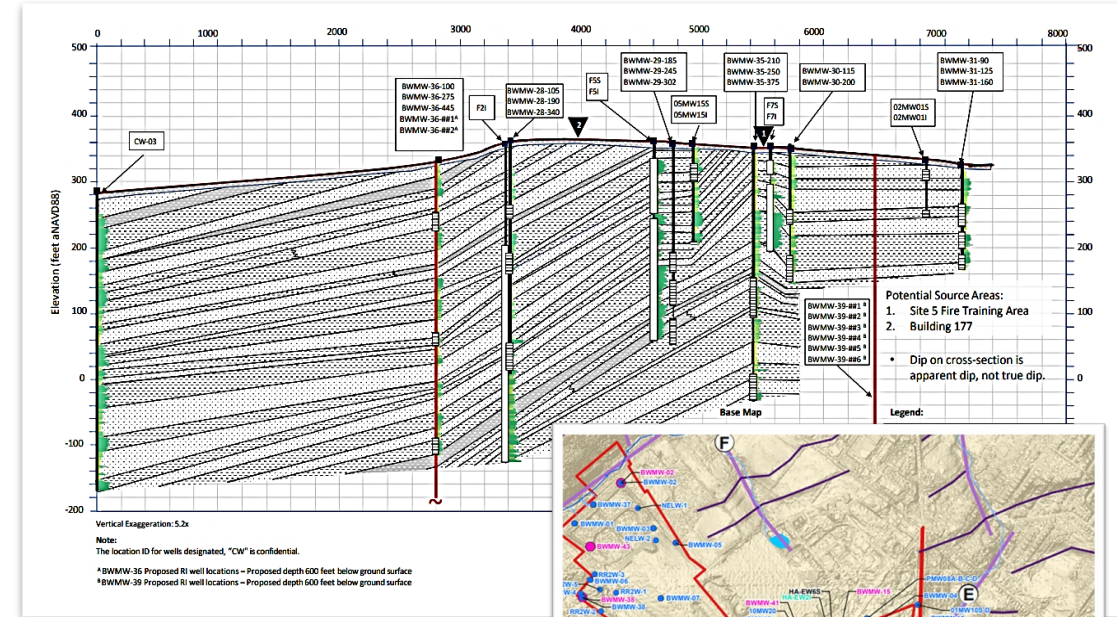
- Definitions:
- ft btoc - feet below top of casing
 - ng/L - nanograms per liter
 - PFOA - Perfluorooctanoic acid
 - PFOS - Perfluorooctanesulfonic acid
 - M - Moderate Drawdown
 - S - Significant Drawdown
 - Specific capacity measurements provided in gallons per minute per foot (gpm/ft)

Example Sampling Interval Design From Borehole Data

Groundwater Sampling Via Discrete Intervals Demonstration

Phase II RI Groundwater Sampling Planning Underway

- The Phase 2 RI On-Base Groundwater Sampling & Analysis Plan is underway:
 - Geologic knowledge of the Base's fractured rock geology from recent work being used.
 - New monitoring wells (20 deep, 7 shallow) will be installed into bedrock.
 - Approximately 500 samples will be collected from wells at multiple depth intervals.
 - PFAS presence and extent will be assessed in multiple depth intervals across the Base.
- ❖ Demonstration of discrete interval sampling technology for PFAS was needed.



Figures: Phase II RI monitoring well planning using geologic insight from earlier work.

*Full scale figures will be included in the Final SAP

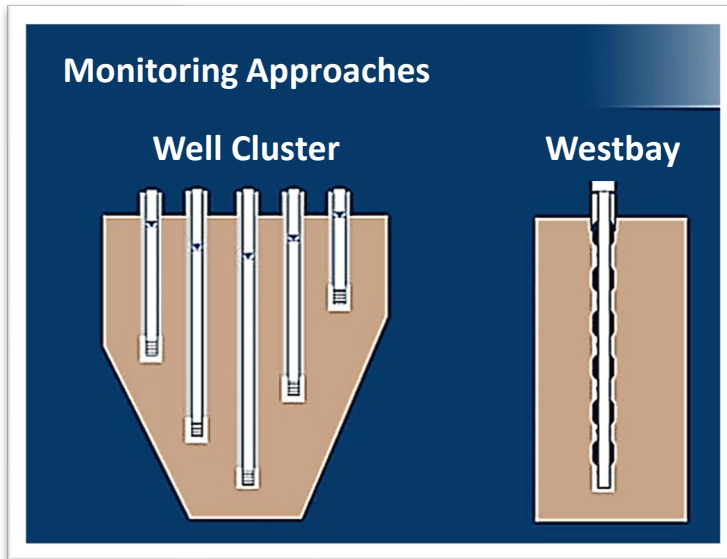
Groundwater Sampling Via Discrete Intervals Demonstration Demonstration Approach

- 1) **Technology Selection:** Available technology was evaluated, and the Westbay® system was selected ('Westbay® Demonstration Letter', 2023).
 - **Westbay® System** - Westbay® Instruments (<https://www.westbay.com>)
 - Designed for discrete subsurface interval characterization tasks.
 - Allows assessment of fluid pressure and hydraulic conductivity in discrete borehole zones in fractured bedrock environments.
 - Allows groundwater sampling in discrete intervals; designed to produce reliable data representative of aquifer *without conventional purging*.
 - Previously used at other CERCLA sites:
 - Crossley Farm – Hereford Township, PA
 - Butz Landfill – Stroudsburg, PA
 - Berkley Products Co. Dump – Denver, PA
 - Hunterstown Road – Straban Township, PA
 - Safety Light Corporation Site – Bloomsburg, PA

This study was performed to test this for PFAS.

Groundwater Sampling Via Discrete Intervals Demonstration

Westbay® System



Well Clusters vs Multiple Discrete Interval Sampling

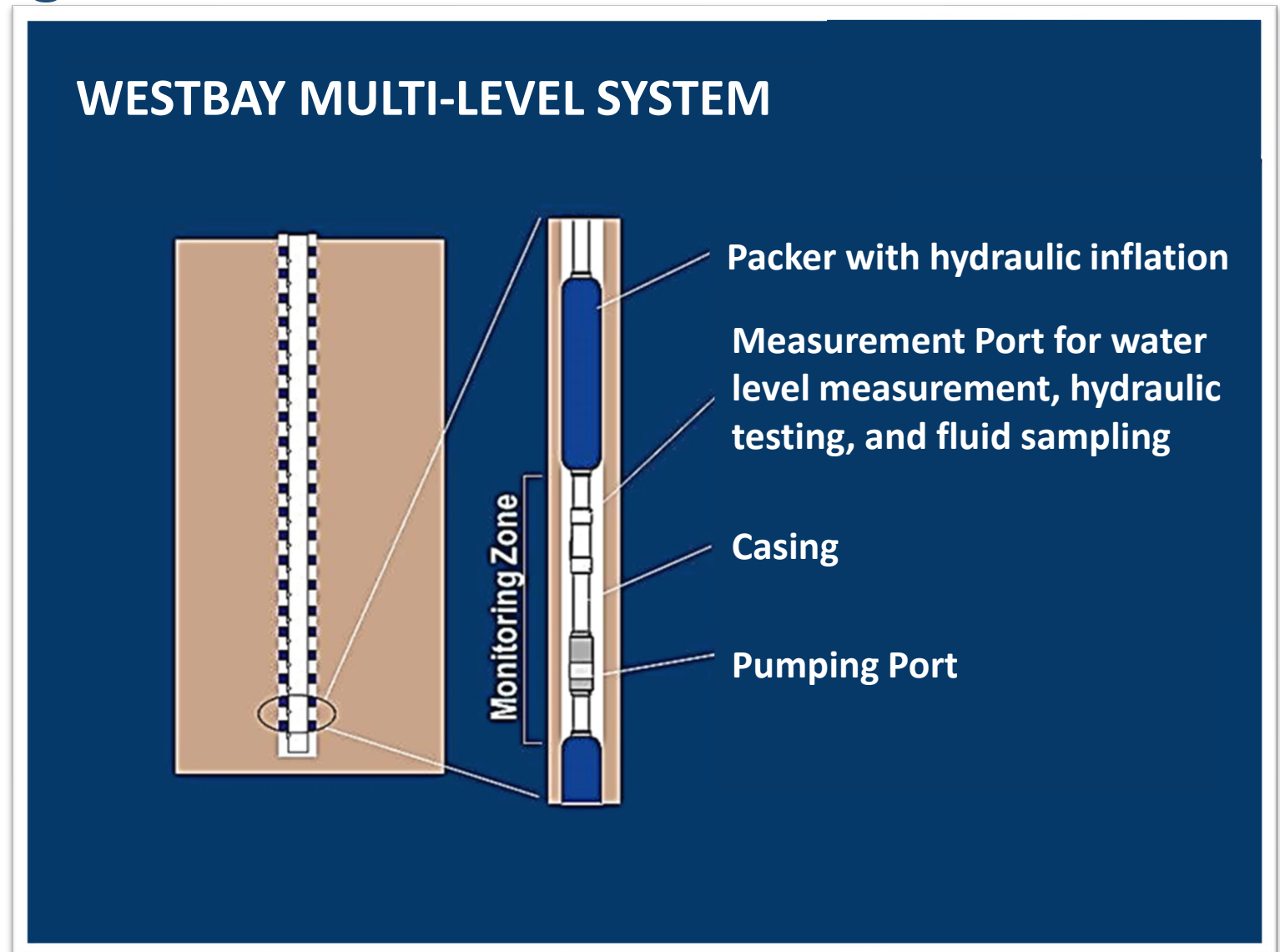
For More Information:

Westbay Instruments LLC

<https://www.westbay.com/>

Earth Data Northeast, Inc.

<https://earthdatane.com/>



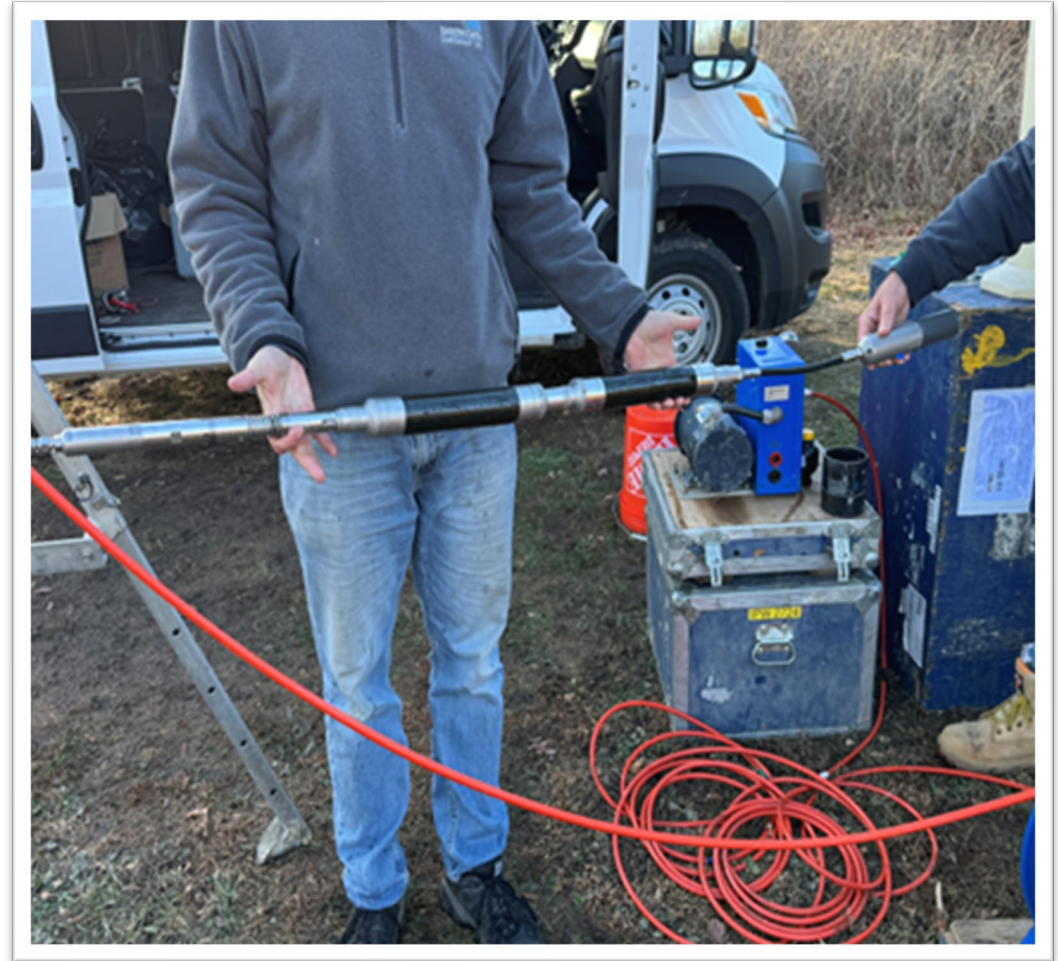
Westbay® System Schematic

Groundwater Sampling Via Discrete Intervals Demonstration

Westbay® System



Westbay Casing Segment



Westbay Sampling Probe

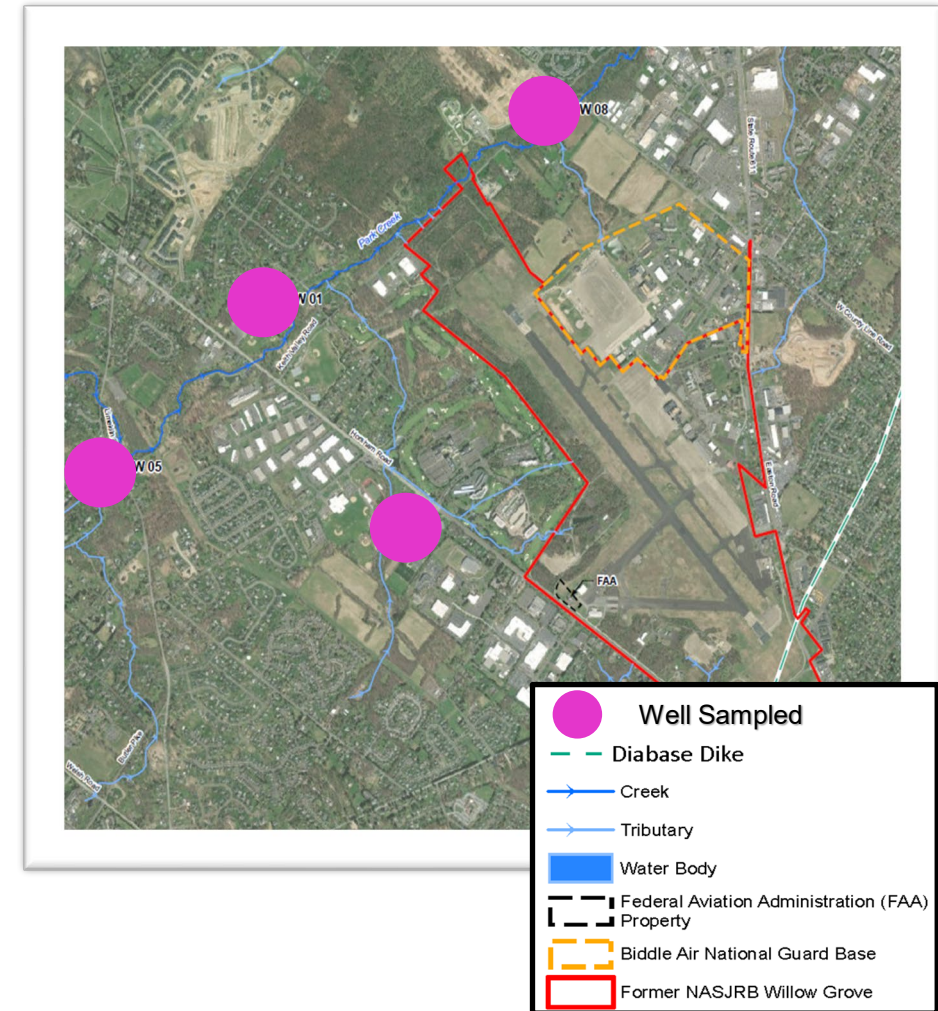
Groundwater Sampling Via Discrete Intervals Demonstration

Demonstration Approach (continued)

- 2) **Well Selection** – Off-Base observation wells were identified for sampling based on discussions with HWSA.
- 3) **System Design** – Westbay® casings were designed for each well based on packer testing data that identified more highly conductive (e.g., fracture) zones.
- 4) **System Installation and Well Development** – Westbay® casings were installed in the off-Base wells in December 2024 and developed.

References:

Westbay Demonstration Letter (2023); Sampling & Analysis Plan (2025), & Interim Findings Memorandum for Off-Base Groundwater (2024).



Off-Base Wells Sampled

Groundwater Sampling Via Discrete Intervals Demonstration

Approach (Continued)

- 5) **Groundwater Sampling** – Samples collected from 17 total subsurface intervals in four wells using two methods (July 2025):
 - ❖ **Westbay System Method**: No groundwater purging before sampling.
 - ❖ **Volume Average Method**: Three well volumes purged before sampling.
- 6) **Results Comparison** – Data were compared for PFAS in groundwater for multiple depth intervals in each of the wells and for both sampling methods.



Groundwater Sampling

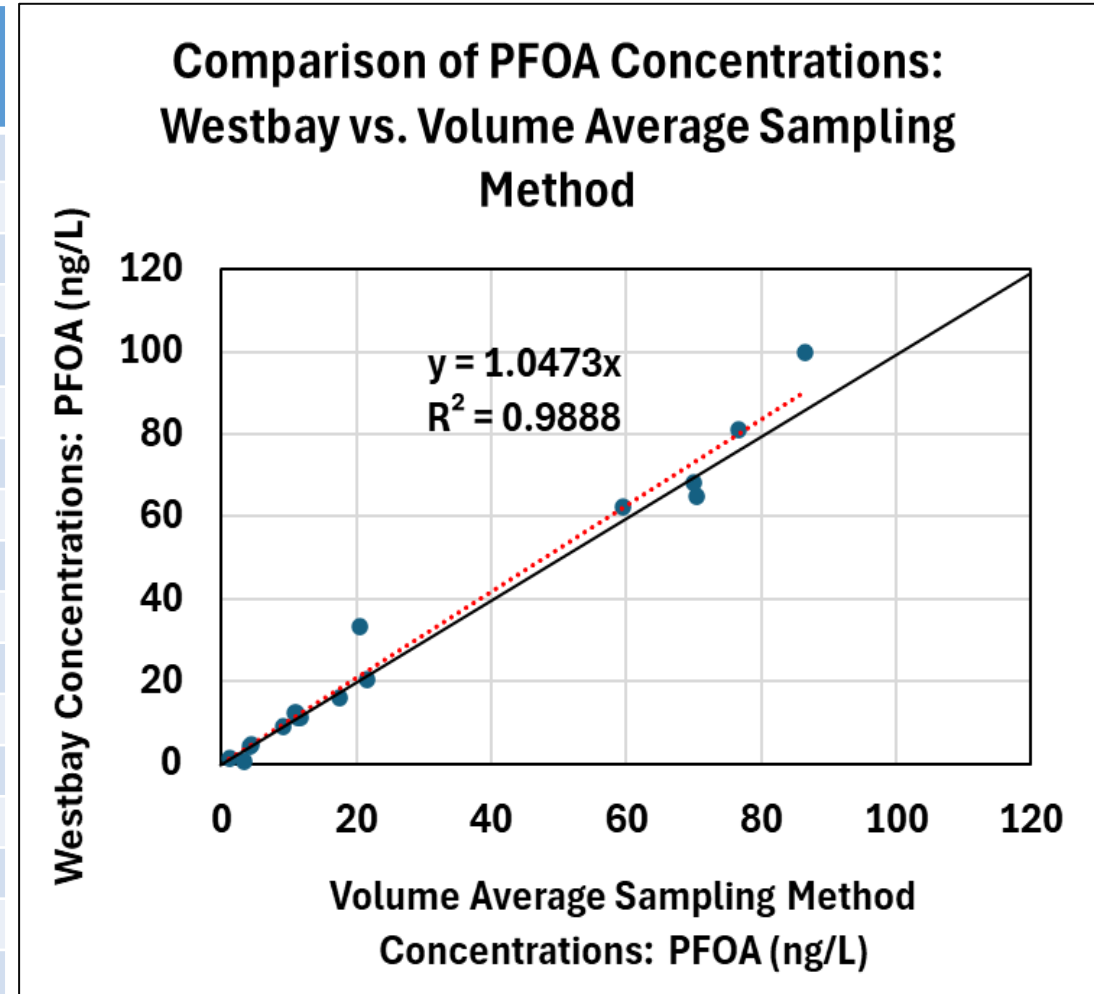
References:

Westbay Demonstration Letter (2023); Sampling & Analysis Plan (2025), & Interim Findings Memorandum for Off-Base Groundwater (2024).

Groundwater Sampling Via Discrete Intervals Demonstration

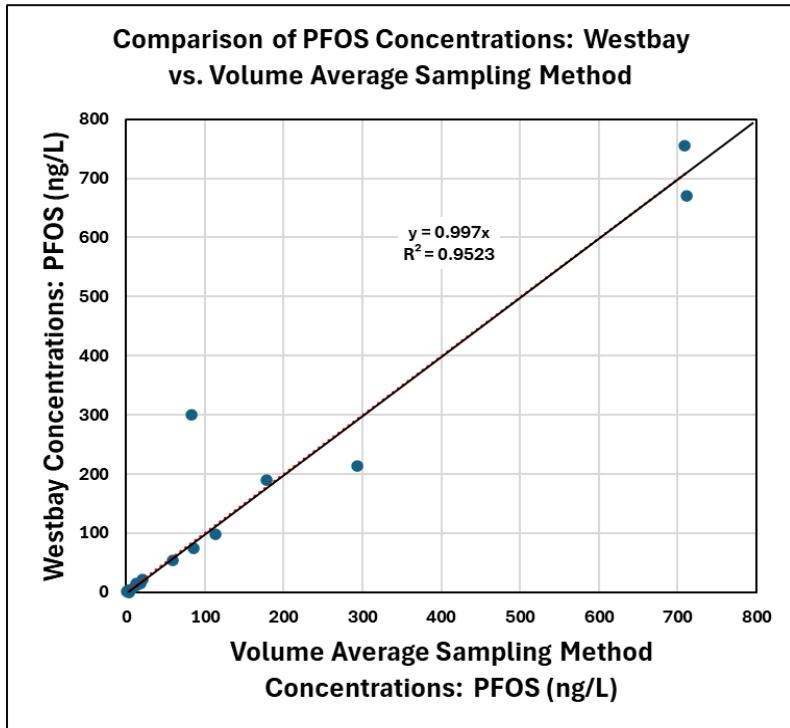
Comparison of PFAS Results by Sampling Method

Sample Numbers (Well No. – Sample Depth)	PFOA Volume Average Sampling Method ng/L	PFOA Westbay Probe ng/L
CW01-32-62	4.53	4.81
CW01-69-89	4.29	4.23
CW01-95-125	1.25	1.42
CW01-155-185	9.18	9.16
CW01-230-250	3.46	0.564
CW02-60-90	86.5	100
CW02-145-175	70.5	64.9
CW02-265-295	76.6	81.0
CW02-355-410	70.1	68.2
CW05-28.2-48.2	11.7	11.2
CW05-93.2-118.2	10.9	12.4
CW05-143.2-178.2	11.4	11.3
CW05-238.2-273.2	11.2	12.5
CW08-30-55	21.7	20.4
CW08-104-136	20.6	33.2
CW08-136-167	59.6	62.3
CW08-218-248	17.6	16.0

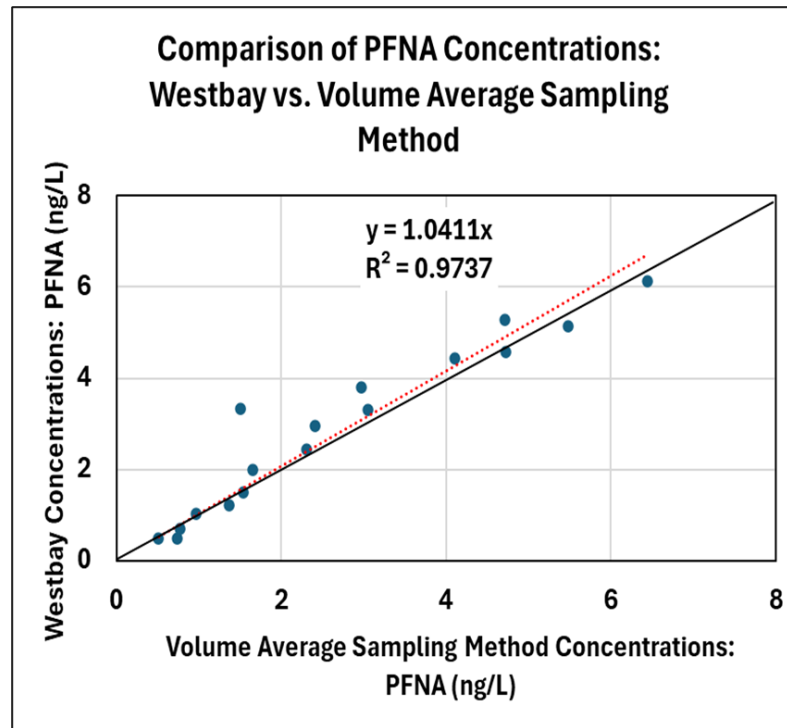


Note: Results are shown for both methods. Sample numbers include well number and sample depth interval.

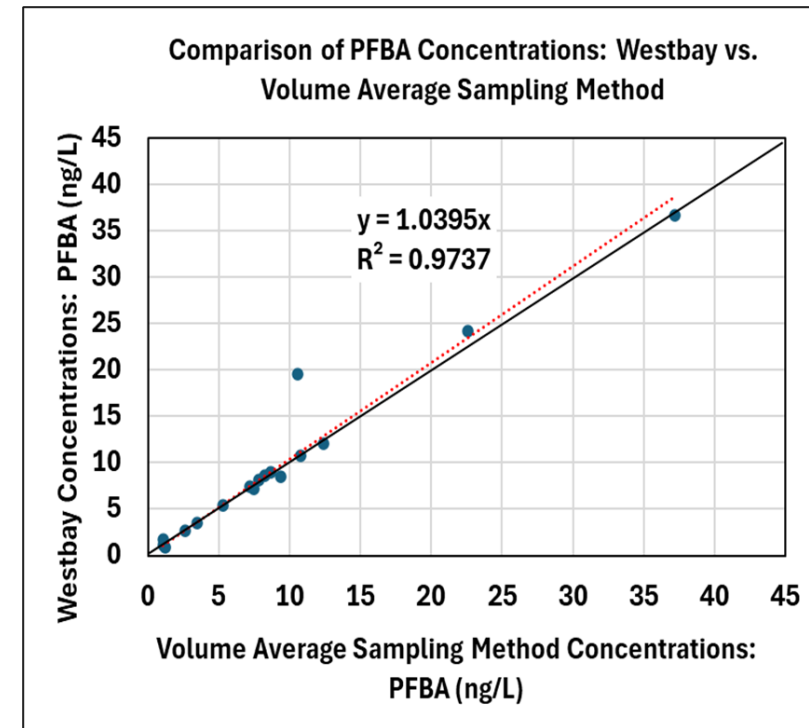
Groundwater Sampling Via Discrete Intervals Demonstration



PFOS Results Comparison

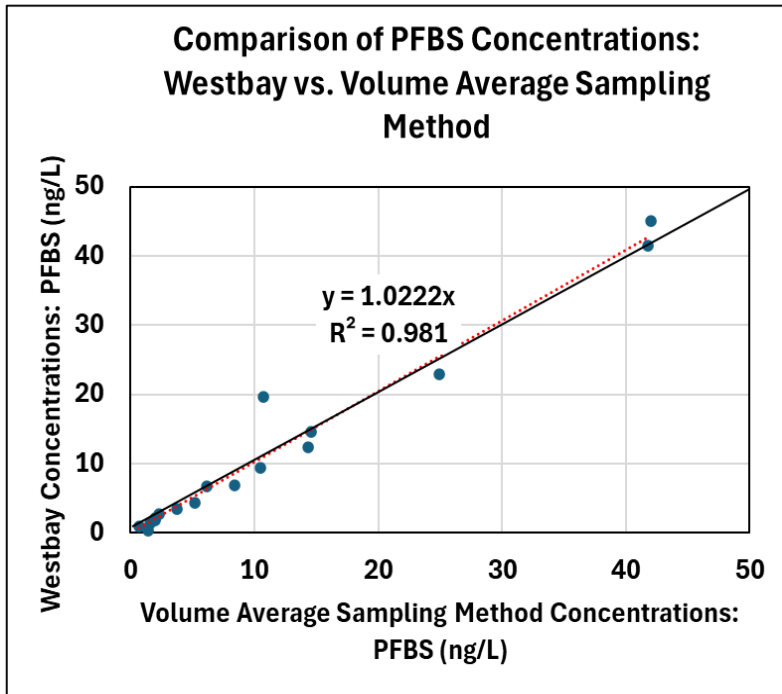


PFNA Results Comparison

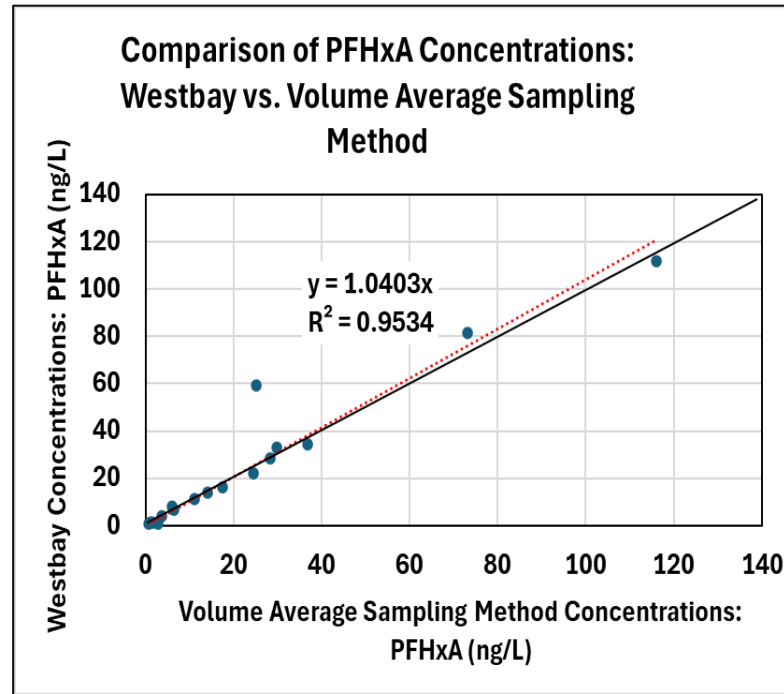


PFBA Results Comparison

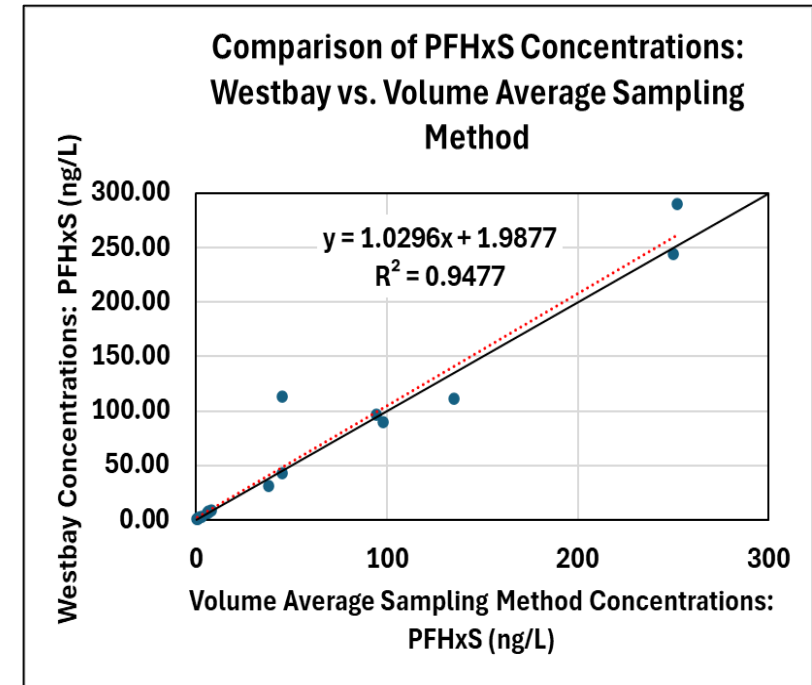
Groundwater Sampling Via Discrete Intervals Demonstration



**PFBS Results
Comparison**



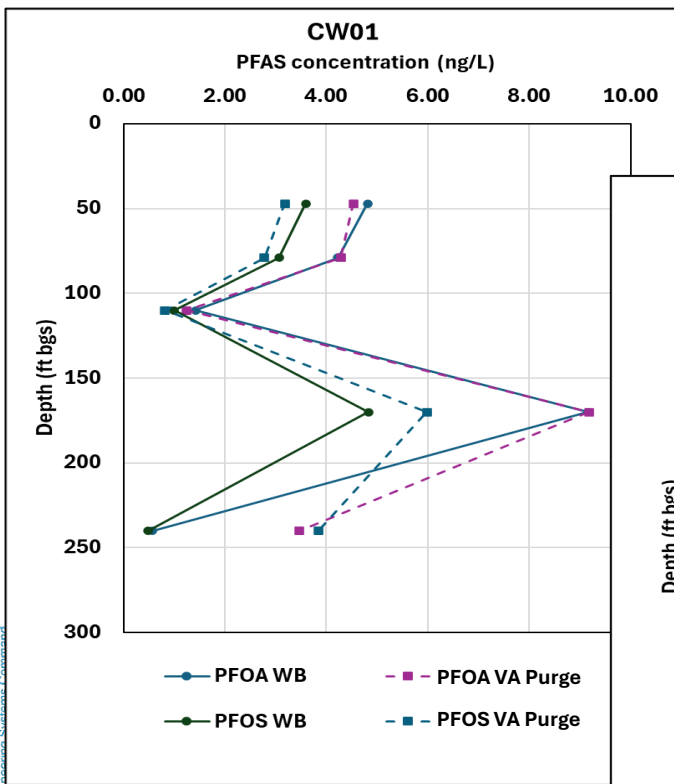
**PFHxA Results
Comparison**



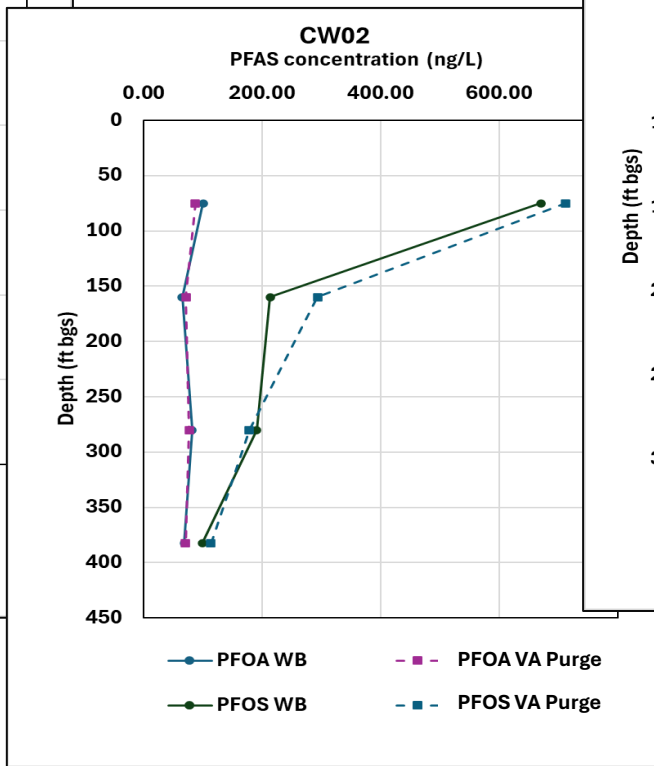
**PFHxS Results
Comparison**

Groundwater Sampling Via Discrete Intervals Demonstration

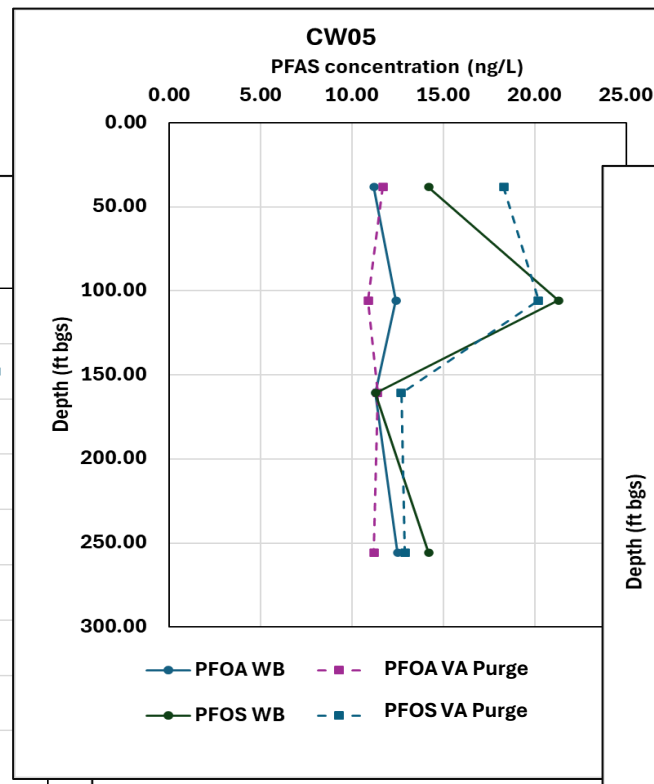
PFAS Results by Sample Depth for Each Sampling Method



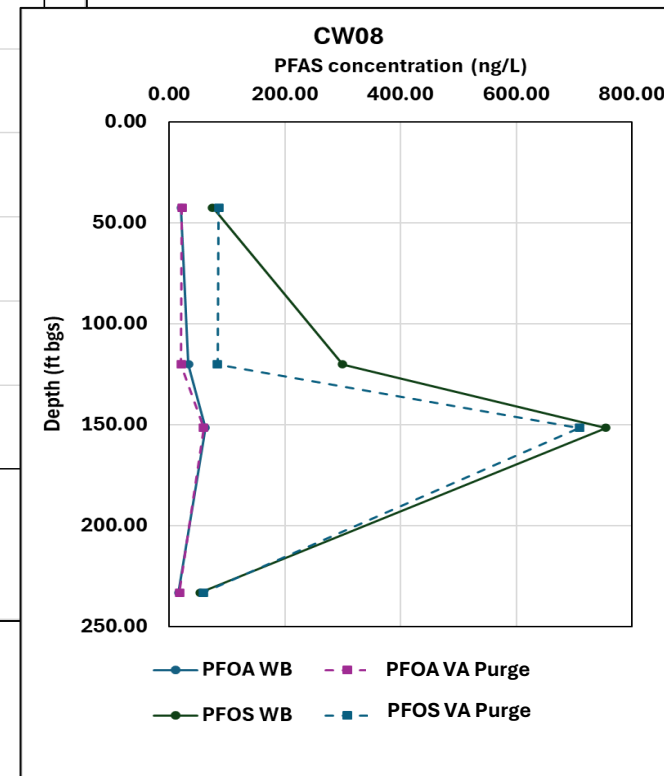
Well CW-01



Well CW-02



Well CW-05



Well CW-08

Note:

WB = Westbay Method

VA Purge = Volume Average Purge Method

Groundwater Sampling Via Discrete Intervals Demonstration

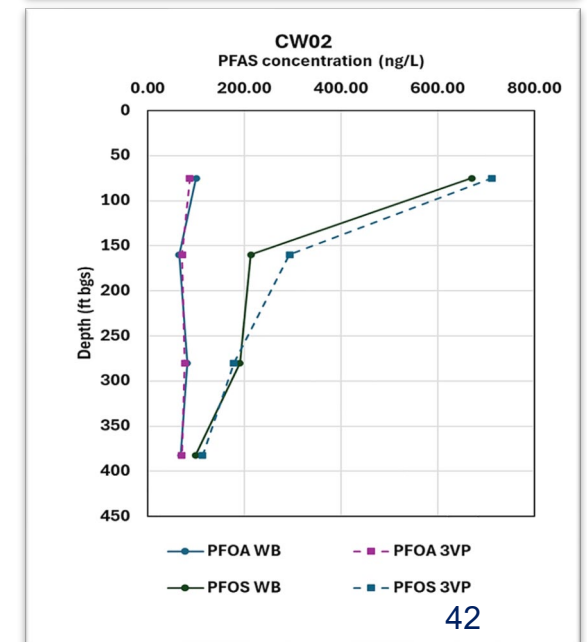
Benefits of Discrete Interval Sampling Technology

- **Comparable Results** – Allows collection of reliable groundwater samples and analytical data representative of aquifer conditions in discrete depth intervals.
- **Fewer ‘Nested’ Wells** – One-third fewer individual wells may be needed to monitor multiple subsurface zones vs. a conventional ‘nested’ well cluster.
- **Less Investigation-Derived Waste (IDW)** – One third of the waste volume (e.g., drilling cuttings) may be generated for handling, treatment and/or disposal.
- **Reduced Schedule** – A shorter well installation schedule is anticipated than that required for more ‘nested’ well clusters due to less drilling.
- **Reduced Costs** – Reduced labor & expenses due to less drilling, less geologic oversight, and less IDW management.

Groundwater Sampling Via Discrete Intervals Demonstration

Summary

- Collected groundwater samples in each well using both Westbay[®] and volume average sampling methods.
- PFAS concentrations in groundwater were assessed in different discrete subsurface depth intervals.
- Demonstrated use of Westbay[®] system to produce reliable PFAS data with a discrete interval tool.
- Obtained PFAS data for off-Base groundwater that will also support future Phase II RI planning.
- Results will be reported in Technical Memorandum and used in Phase II RI On-Base Groundwater SAP.



Additional Information and Resources - Website



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Meeting Material

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Proposed Remedial Action Plan (PRAP) Meeting

[23 Sep 2020 PRAP Meeting Presentation for Sites 3 and 12](#)

Open House Meetings

[23 & 24 May 2016 Open House Meeting Posters](#)

[24 & 25 February 2015 Open House Handouts](#)

[7 October 2014 Open House Meeting Posters](#)

Meeting Information

All Restoration Advisory Board (RAB) Meetings are held quarterly at the Horsham Township Library.

[RAB Member Application](#)

[RAB Meeting Topic Survey Form](#)



[2025 RAB Meeting Material](#)

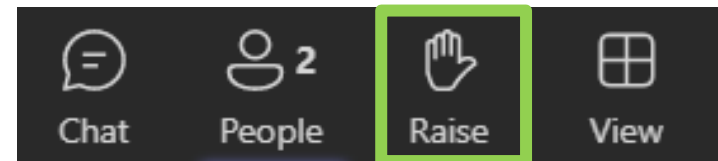
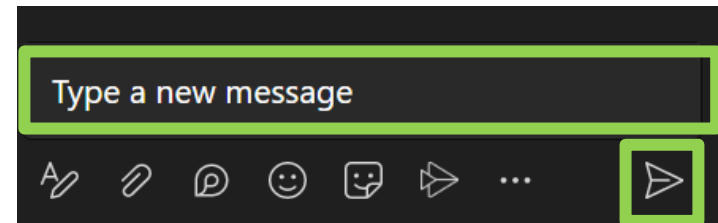
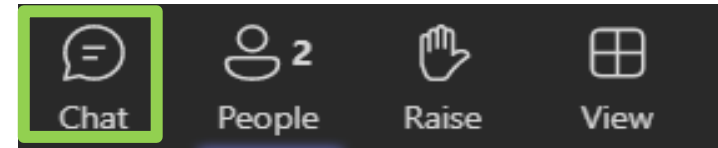
[2024 RAB Meeting Material](#)

[2023 RAB Meeting Material](#)

Virtual Attendee Questions

1) To ask a question, select 'Chat'

Type question in the text box,
and then select Send.



2) Raise your hand to be recognized
and have your microphone unmuted.

Select Raise your hand icon.

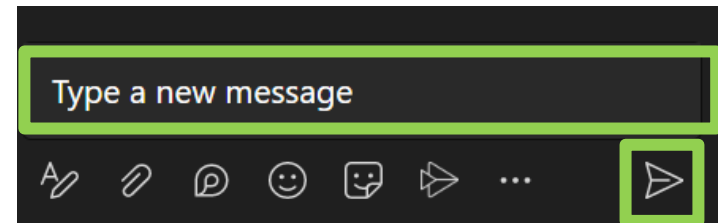
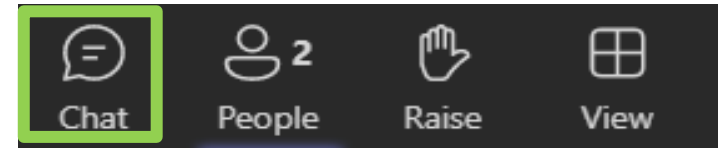
3) Phone-only attendees can dial *5 to raise their hand and have the opportunity to ask a question. Once recognized, dial *6 to unmute the microphone.

Environmental Protection Agency and Pennsylvania Department of Environmental Protection Comments

Virtual Attendee Questions

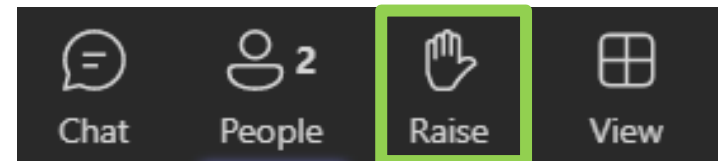
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Next RAB Meeting

Next RAB meeting targeted for:
Thursday, July 16, 2026

Environmental Restoration discussions have concluded.

Health Professional Contact Information

Dr. Linda Brown

RTI International

*lindabrown@rti.org
(301) 816-4626*

**Thank you for joining the RAB meeting for the
former NASJRB Willow Grove and
Biddle Air National Guard Base.**

The meeting has concluded.