

Former NASJRB Willow Grove: Applying Evolving Knowledge and Technologies to PFAS Related Issues

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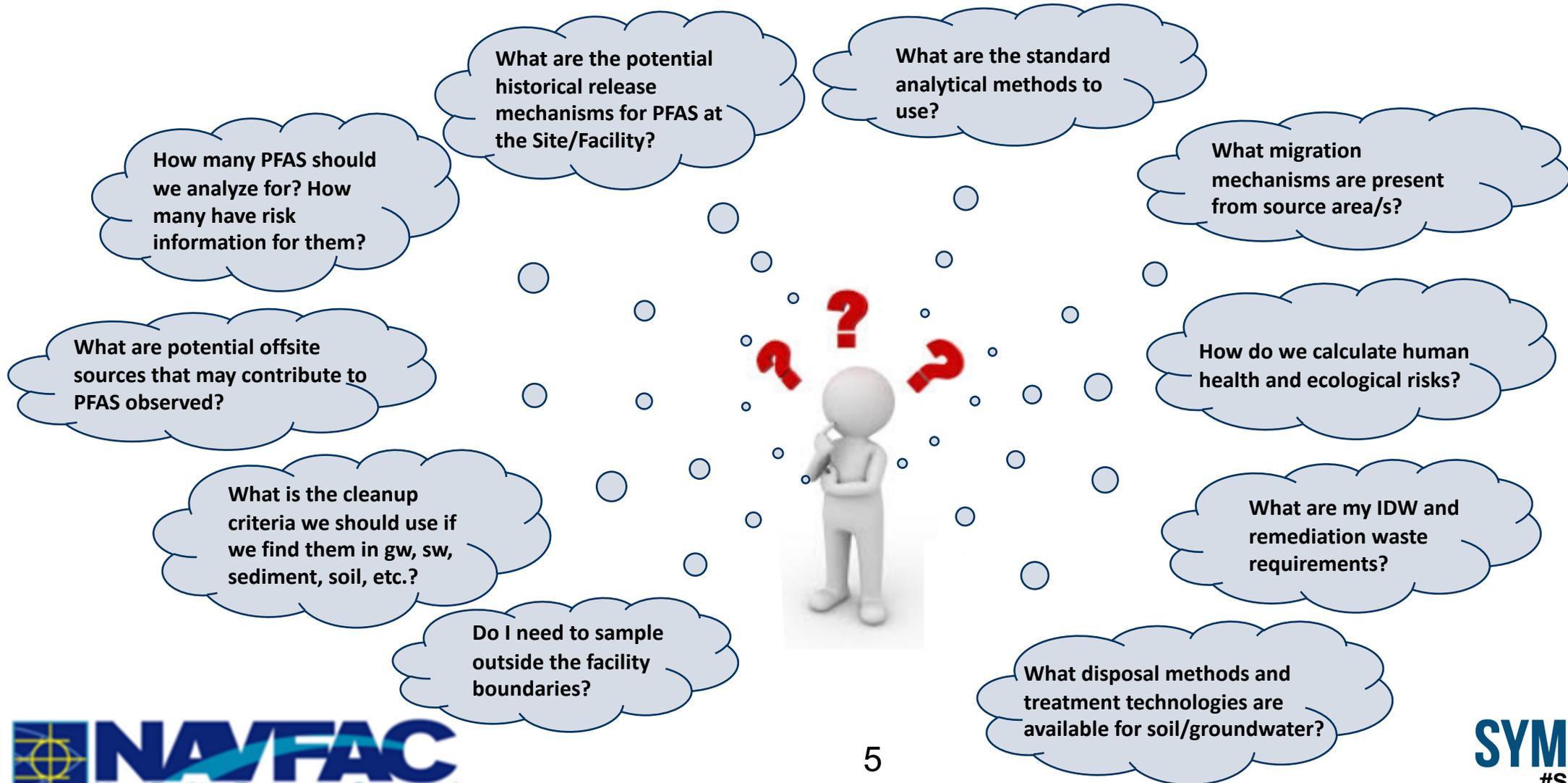
Presentation Overview

- Framing PFAS Issues
- History of Former NASJRB Willow Grove
- PFAS timeline at NASJRB Willow Grove
- Summary of PFAS Actions
- Site-Specific PFAS Issues
- Actions taken and ongoing to address issues
- Integrating research and emerging technologies in NASJRB Willow Grove investigation and interim remediation strategies
- Summary

Framing the Issues: Navigating the Path

- Navy/Marine Corps is following the CERCLA process for assessing and addressing PFAS
- If the potential for historical releases is identified at current or former facilities, the presence of PFAS is assessed. If PFAS is determined present, the nature and extent as well as risks is then evaluated.
 - Many facilities currently in Preliminary Assessment (PA)/Site Inspection (SI) stage.
 - Select sites have entered the Remedial Investigation (RI) stage.
 - Interim actions to eliminate exposure in drinking water have been taken when determined necessary.
 - Interim actions to address source areas have been initiated at select sites.
- ★ • Assessing drinking water and cutting off exposure when determined necessary

Framing the Issues: THE RPM PFAS PARADOX



Framing the Issue: Path of Curves/Challenging Terrain

- PFAS as a class of contaminants are still considered chemicals of emerging concern
 - Regulatory uncertainty
 - Analytical method uncertainty
 - Fate & Transport uncertainty
 - Risk uncertainty
 - Effective and cost efficient remedial technology availability and scalability
 - Disposal/Destruction options for IDW and remediation waste relevant, costs vary, and potential long-term liability uncertain.
 - Communication with current uncertainties presents risk communication challenges
- Navigation by the RPM requires more than just traditional strategies
 - Unfortunately not an “App” for this.

Former NASJRB Willow Grove History

- Naval Air Station Joint Reserve Base (NASJRB) Willow Grove
 - Located in Horsham Twp. Pennsylvania
 - Originally 1,142 acres (~900 Acres Awaiting Transfer)
 - Open from 1942 to 2011
 - Provided support infrastructure and services to assigned units and support commands.
 - Supported Navy, Marine Corps, Air Force Reserve, and PA Air National Guard and Army Guard Units
 - In 2005 the Defense Base Closure Realignment Commission (BRAC) recommended NASJRB for closure.
 - In 2011, NASJRB ceased flight operations and entered caretaker status, pending property transfer to the Horsham Land Redevelopment Authority



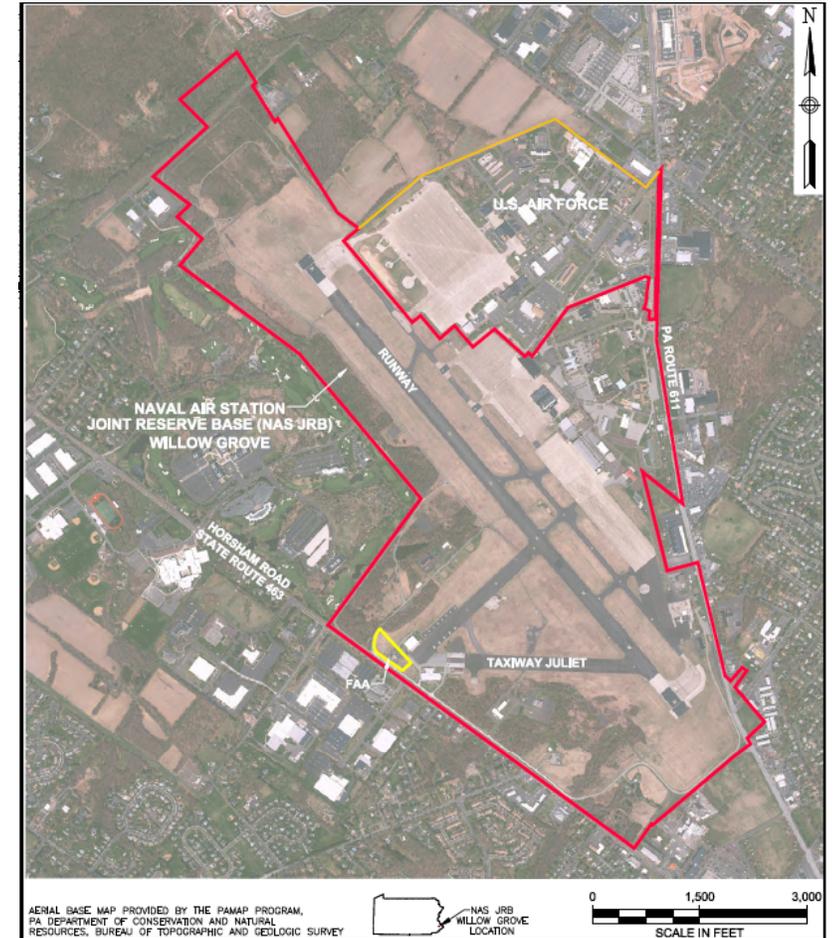
1950s And 1970s Air Traffic Control Towers At NASJRB Willow Grove

Photo from BRAC NASJRB Willow Grove website:

https://www.bracpmo.navy.mil/brac_bases/northeast/reserve_base_willow_grove.html

Overview of PFAS Timeline

- 2011-2012 – Former Fire Training Area (FTA) - Site 5 tested and found Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) in groundwater
 - Associated with historic use of Aqueous Film Forming Foam (AFFF) at Site
- Mid-2014 – PFOA and PFOS were found in public drinking water wells near former NASJRB Willow Grove and NAWC Warminster.
- Summer 2014 – Navy began sampling for PFOA/PFOS in private drinking water wells and worked with water authorities on impacted municipal drinking water wells.
 - From 2014 – mid 2017, the Navy requested support from the EPA to sample nearby private drinking water wells for PFOA and PFOS.
 - Private drinking water well sampling for PFOA/PFOS and provision of bottled drinking water is now being performed the Navy.
- Multiple public meetings held between 2014-2016
 - Over 1,500 people attended May 2016 meeting
- ★ • The Navy's priority has been and continues to be eliminating exposure to PFOA/PFOS above EPA health advisory (HA) levels in drinking water.



Summary of PFA Actions: Drinking Water

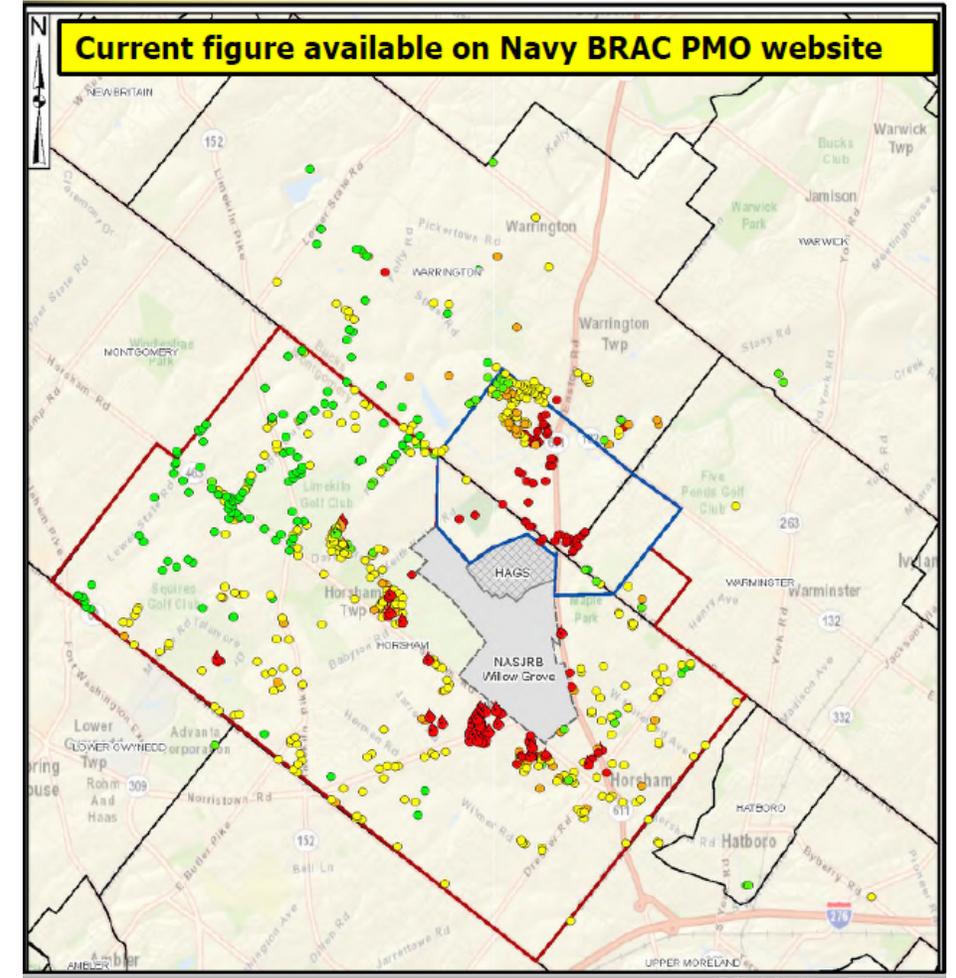
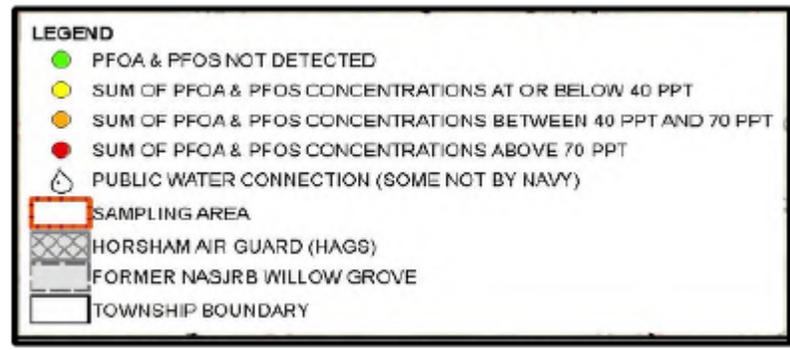
- As of 2019, the Navy has provided over \$18 million in funding to the Horsham Water Sewer Authority (HWSA) for filtration system costs and drinking water connections to private residents above HA.
- The Navy has funded filtration systems at five HWSA public wells which were found to be above the HA. All are back to drinking water service.

Private well sampling	Feb 2017	Current
Private wells sampled for PFOA/PFOS *	490	512
Private wells above lifetime HA (>70 ppt)	89	100
Private wells below HA/monitored (>40 ppt)	70	60

Table based on Sept. 2019 RAB Meeting

Summary of PFAS Actions: Drinking Water *cont.*

- Figure shows approximate location of private wells samples and associated PFOS + PFOA tested concentrations
- Shows combined sampling area for both Horsham Air Guard Station and Former NASJRB Willow Grove



Summary of PFAS Actions: RI

- Comprehensive base-wide RI initiated in 2015
 - Final Phase I RI report for PFAS issued in September 2019
 - Included collection of 231 groundwater, 277 soil, 60 sediment, and 67 surface water samples.
- Completed video inspection of 2 miles of the former base's storm water system for groundwater intrusion into system.
- Initiation of Phase II RI planning in December 2018
 - Preparation Sampling and Analysis Plans for various field efforts underway.
- Initiation of quarterly surface water and annual sediment sampling in July 2019 to assess migration and trends

Summary of PFAS Interim Actions

- Completion of soil excavation and disposal, as a time-critical removal action, in vicinity of former base fire station and aircraft maintenance hangar in 2019.
 - ~4,359 tons of soil excavated and disposed of.
- Installation of 20 gpm pilot groundwater pump-and-treat system in source area proximal to Hangar 680 in September 2019
 - GAC followed by single use IX-Resin treatment
 - Initial startup testing completed
 - Anticipate pilot operations for at least 6-months starting in December 2019
- Preparation of Work Plan for 2nd pilot groundwater pump-and-treat system
 - Targeted for install proximal to Site 5 (Former FTA) by Summer/Fall 2020
- Other interim actions being assessed and considered

Summary of PFAS Interim Actions *cont.*



**Photo of Completed Soil Excavation
in front of Former Fire Station –
November 2018**



Photos of Hangar 680 Pilot GW Pump-and-Treat System – September 2019

Site-Specific Issues Faced

- Highly visible and great degree of public and political attention
- Defining nature and extent of impact from historic base releases of AFFF challenging for evaluating groundwater migration pathways
 - Complex hydrology (fractured bedrock aquifer)
- Understanding if off-site non-DOD related sources are present and what their influence regionally on PFAS found in groundwater is.
- Defining fate and transport and pathway contribution will be important for implementing long-term remedial strategies.
- Fully characterizing risk (both human health and ecological) as part of the RI will need to represent current state of science and will likely present challenges in accounting for uncertainty.

Site-Specific Issues Faced cont.

- As RI proceeds, and interim actions undertaken, properly managing IDW and remediation waste will continue to present challenges
- Identifying demonstrated and cost effective remediation strategies that are scalable, adaptable to site-specific situations, and have a reasonable probability to be successful in long-term.
- In the long-term effectively addressing PFAS contamination to enable BRAC property disposal.

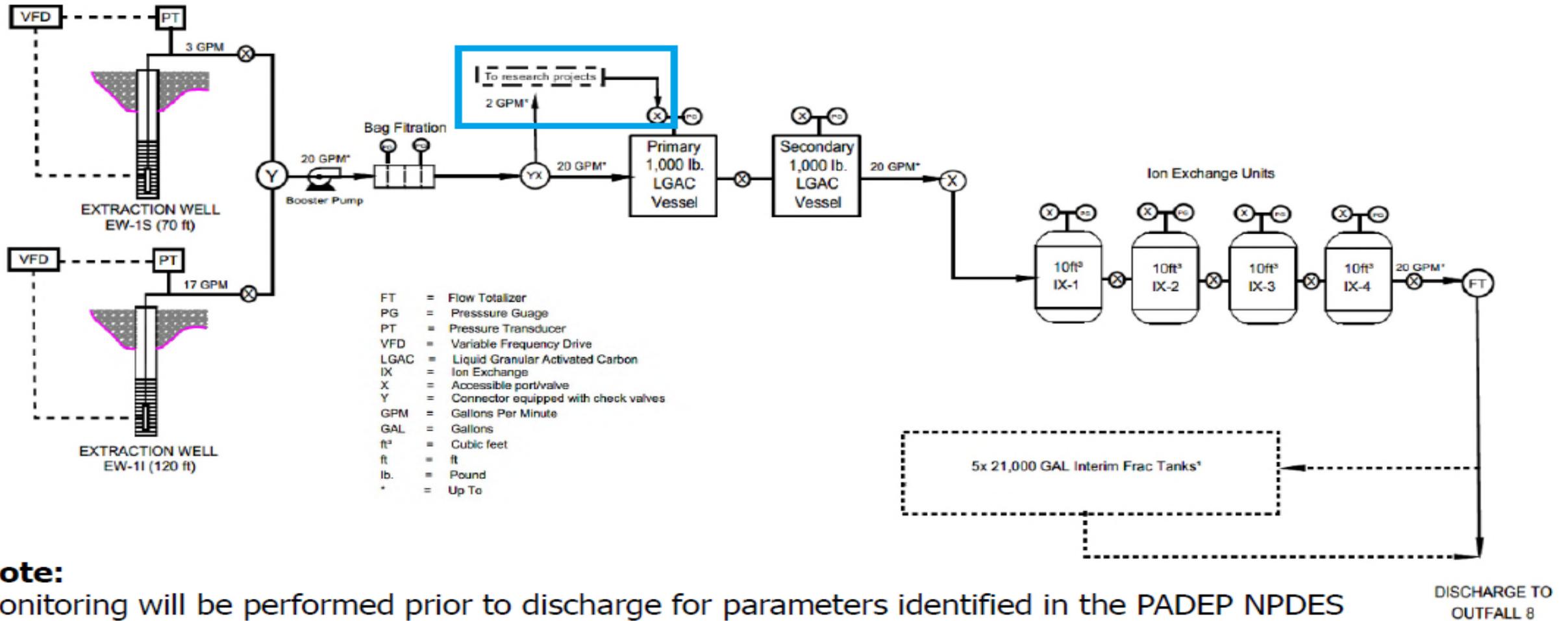
Integration of Research at NASJRB Willow Grove

- BRAC and ER,N DOES NOT fund basic environmental research
 - Demonstrated, cost effective, scalable technologies/methods that have a reasonable probability of addressing our site-specific PFAS issues
- SERDP/ESTCP (DOD) and NESDI (Navy) are programs that fund research and demonstration.
- The Willow Grove BRAC Team and Management has been very receptive to allowing PFAS research funded by DOD environmental research programs.
 - By supporting research it is BRAC's hope that a few of the technologies/methods researched will have site-specific applicability to addressing Willow Grove's PFAS issues.
 - Provides for a good message

Integration Efforts for Research

- Coordination of collecting media for research
 - During 2018-2019 soil removal action 8 SERDP projects collected and utilized soils from the removal area for their research.
 - From Oct 2018 to April 2019, similarly SERDP projects looking at treatment of groundwater or IDW water collected samples from the same monitoring well at NASJRB Willow Grove in the area where the Hangar 680 Pilot System is currently located.
- Planning for potential integration of research for field demonstration
 - The Hangar 680 Pilot System was designed to allow for small scale column/vessel treatment testing.
 - The Site 5 Pilot System will be designed similarly if possible.

Treatment Direction



Communicating SERDP/ESTCP Related Research

- Beginning at the December 2018 RAB the BRAC Willow Grove Team started presenting information on participation in research projects
 - Used as a tool to communicate:
 - We were supporting the DOD's research efforts on PFAS
 - While not directly funding research, we are looking at new technologies/methods and information that could be gathered to understand fate and transport of PFAS in abiotic and biotic media better
- ★ • It is important to note that we caveat our participation in DOD research
 - Research, especially basic (SERDP SEED) projects, are not all anticipated to be successful and/or provide a path to scalable and cost effective technologies.
 - Research doesn't always agree leaving inherent uncertainty.
 - However, if 1 out of 10 projects provides valuable information, or produces a promising technology for Willow Grove applicable in the future, support for the research was worth it.

Communicating SERDP/ESTCP Related Research



Participation in DoD Funded PFAS Research



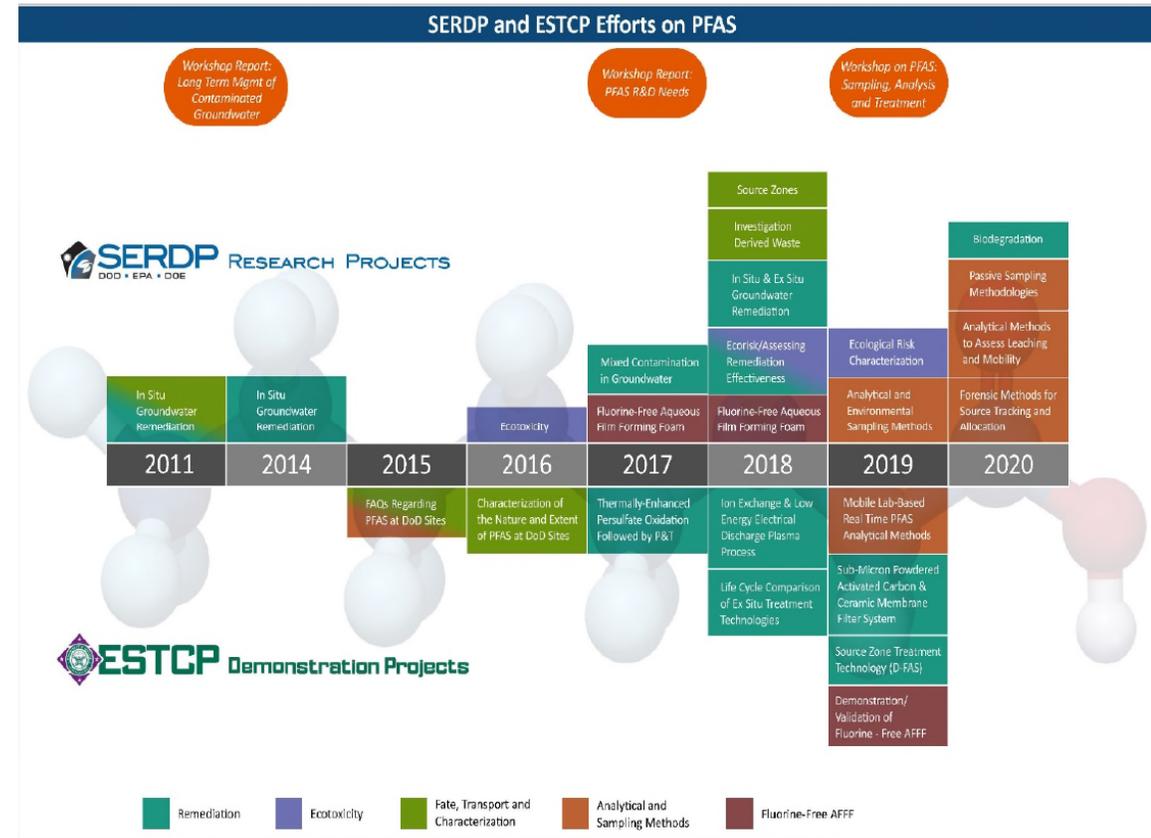
- SERDP/ESTCP are DoD-funded environmental research programs.
- NASJRB Willow Grove is supporting ~\$8M of SERDP/ESTCP funded research investigating new PFAS assessment and remediation technologies.
- Will continue to seek participation in additional SERDP/ESTCP work at NASJRB Willow Grove or nearby NAWC Warminster.
- Participate in other Navy or USEPA funded research.

SERDP/ESTCP Projects and organizations leading the research:

- **Soil or Groundwater Treatment**
12 Total Projects Participated Projects Since Last RAB
ER-1026 – Cornell University
ER-1497 – Univ. of CA Riverside
ER-1491 – Univ. of Illinois at Chicago
ER18-1300 –College of Wooster
Working with College on field column study on new adsorptive resin.
- **Passive Treatment of Storm Water**
ER18-1230 –Oregon St. Univ.
- **Assessment of Fate and Transport of PFAS in Surface Water**
ER19-1073 (New Start) –Academy of Natural Sciences of Drexel University
ER19-1193 (New Start and potential participation) –Towson State University

DoD's SERDP/ESTCP PFAS website:
http://serdp-estcp-pfas.com/pfas_efforts/pfas_efforts.pdf

Slides from Sept 2019 NASJRB Willow Grove RAB Presentation



Recommendations for Planning Research Work

- Good Assumptions
 - Checks and balances are necessary in proposal phase of research.
 - Assume you'll have to discuss merits of research at potential Navy sites
 - Get buy-in early and often
 - Upon receiving funding for research, always assume that a kick-off meeting and periodic update meetings with Navy staff will be required.
 - Assume you, or a hired consultant, will need to collect field samples needed to conduct planned research.
 - If timing matches with when Navy consultants will already be in field, make sure any sample containers, coolers, and pre-paid shipping is provided to get samples back to your lab.
 - Know your security requirements before mobilizing
 - BRAC (i.e., closed) vs Active Bases/Facilities
 - Assume Navy will want to see results and final report deliverables to SERDP/ESTCP
 - Be a good communicator in addition to trying to be a good researcher, otherwise your project could be in for a rough road.

Recommendations for Planning Research Work

- Bad Assumptions
 - The Navy will go out of their way to accommodate your SERDP/ESTCP research and its schedule.
 - I can just show up to the site with minimal (e.g., few days) advance notice.
 - I will have unfettered access to the Navy facility I plan to do work at for my research.
 - I submitted my proposal, demonstration plan, and final report to SERDP/ESTCP for their review, and therefore the Navy will not want to review these items.
 - All RPMs will be fast to volunteer their sites for PFAS related research.
 - If I can't collect the media (e.g., groundwater) I need for my research the Navy's staff or their consultants will.

Summary

- At former NASJRB Willow Grove the Navy has taken several steps to investigate and take interim actions regarding past PFAS related contamination.
- Additional investigation and remediation work is still left to be accomplished in efforts to address data gaps and issues.
- SERDP/ESTCP related research is viewed as a component to assisting BRAC with its efforts to cleanup and transfer former Navy property at Willow Grove.
- Successfully implemented research is aided by good communication.

SPECIAL THANKS!!!

- BRAC
 - Greg Preston – Director, BRAC PMO East
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 - Willie Lin – Base Environmental Coordinator (BEC) for NASJRB Willow Grove, BRAC PMO East
 - Jim Rugh and Marty Schy – CSO, NASJRB Willow Grove (the heavy lifters)
- NAVFAC Mid-Lant
 - Brian Helland – Remedial Project Manager (RPM) for NASJRB Willow Grove
- NAVFAC Atlantic
 - Byron Brant, Tim Reisch, Jenn Corack, and Laura Wood

QUESTIONS????

BACKUP SLIDES

SERDP and ESTCP Efforts on PFAS

Workshop Report:
Long Term Mgmt of
Contaminated
Groundwater

Workshop Report:
PFAS R&D Needs

Workshop on PFAS:
Sampling, Analysis
and Treatment

SERDP RESEARCH PROJECTS



ESTCP Demonstration Projects

