USACE - OMAHA ENVIRONMENTAL REMEDATION BRANCH PFAS PROGRAM

Jennifer Zorinsky
Air Force Program Manager

2021 SAME - Omaha
October 6, 2021

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PRESENTATION OUTLINE

- AFFF / PFAS Overview
- DoD Customers
- USACE HQ Work Assignment and Acceptance Policies
- ER Contracting Toolbox
- Summary of PFAS Projects
- CASE Studies
- Outlook and Challenges
- CENWO PDT Recognition

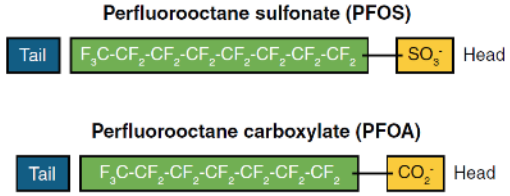
PFAS HIGH LEVEL OVERVIEW

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a large family (1,000+ compounds) of fluorinated chemicals that are used for their unique physical and chemical properties to impart oil and water repellency, temperature resistance, and friction reduction to a wide range of products used by consumers and industry.

DoD began using in aqueous film forming foam (AFFF), a.k.a. firefighting foam late 1960's. It is VERY effective in AFFF.

Since ~2014, 2 primary constituents of PFAS that are of particular concern to DoD. PFOS and PFOA



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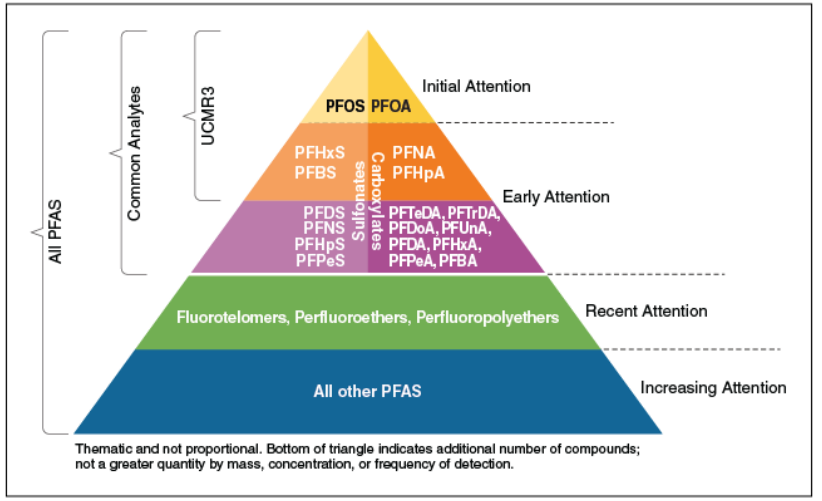
Engineered Carbon – Fluorine bond is one of the strongest single bonds in organic chemistry.

In May 2016 US EPA established a lifetime health advisory (LHA) of 70 ng/L for PFOA and PFOS in drinking water



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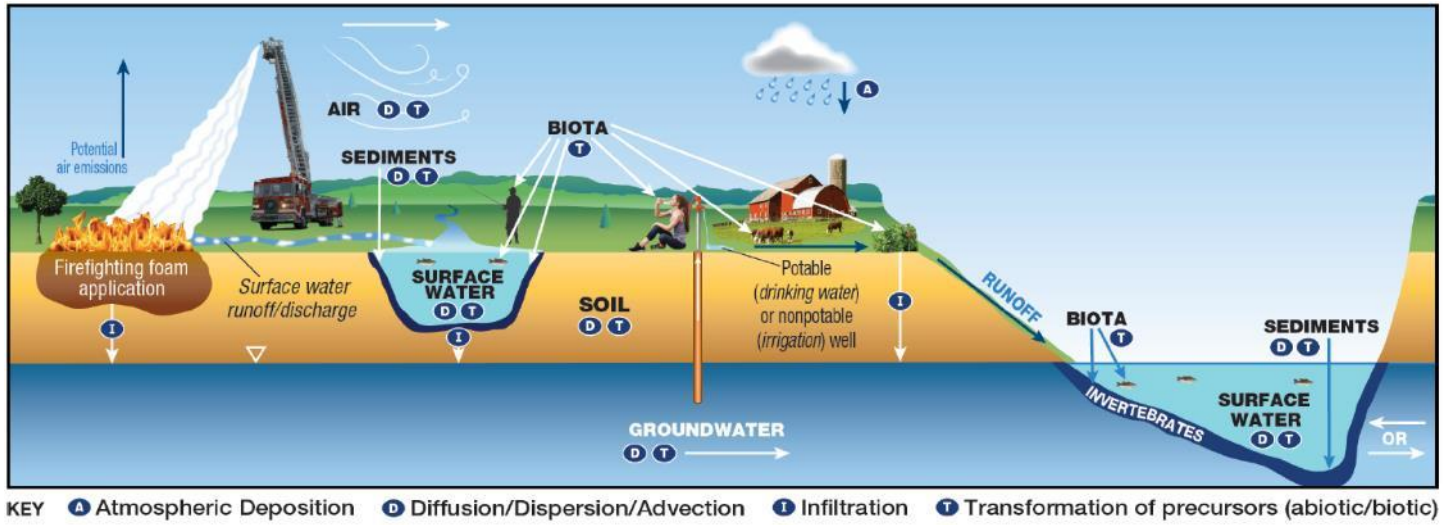
Conceptual Site Model for AFFF Use/Release



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DoD CUSTOMERS

Contracting Options
- 772nd
- USACE - Contracted through Area of Responsibility

Contracting Options
- U.S. Army Mission and Installation Contracting Command (MICC)
- USACE - Contracted and Managed through 7 Lead CE Districts

Contracting Options
- NGB/AQE (GSA-Oasis)
- USACE - Contracted through Area of Responsibility

Contracting Options
- NGB/AQE (GSA-Oasis)
- USACE - Contracted and Managed through Baltimore District

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AIR FORCE AND AIR NATIONAL GUARD

(current as of 31-AUG-2021)

Investigations to Date

Preliminary Assessments (203 Installations Total)
- BRAC = 39
- Active/Reserve = 89
- ANG = 75

Site Inspections (190 Installations Total)
- BRAC = 30
- Active/Reserve = 85
- ANG = 75

Remedial Investigations
- BRAC = 7 RI's initiated to date
- Active/Reserve = 31 RI's initiated to date
- ANG = 12 RI's initiated to date

Response Actions to Date

35 Installations
- Bottled Water
- Point-of-use filtration
- Whole-house filtration
- Municipal Water Supply Hookup
- Municipal Water Treatment
- New well drilling

For more info:

Air Force Installation and Mission Support Center (af.mil)

Use "PFAS" in search bar for articles

Current snapshot not available online yet

For previous "snapshots", google "afcec.af.mil PFAS snapshot"

Air Force Active and ANG Installations

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ARMY and ARMY NATIONAL GUARD

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- Centralized and Decentralized AEP (see table for Lead District) 7 work assignment areas
- Each Lead district has a designated program manager
- Responsible for contract procurement and oversight for PFAS investigation and/or response.
- Lead Districts:
  - Coordinate and lead periodic progress meetings between the respective Army sponsor, KTR, and supporting geographic Districts
  - Arrange technical support from local geographic Districts based on USACE AOR
  - Participate in PFAS workgroup or other relevant meetings.

ARNG

- Baltimore District (NAB) is the Lead District
  - Contracting District for ARNG
  - Omaha provides technical support to NAB for project in NWO AOR

Lead Districts for Army

Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7
POA	NWK	LRL	NAB	SAS	SPL	RPEC
• AK • HI • Kwajalein (Marshall Islands)	• MT • CO • WY • NE • KS • ND • SD • MO • WA • OR • ID	• MI • IL • IN • OH • WI • MN • IA • WV • KY	• DC • DE • ME • VT • NH • NY • PA • MA • RI • NJ • CT • VA • MD	• TN • MS • AL • FL • GA • NC • SC • Honduras • PR • Virgin Islands	• NM • UT • CA • NV • AZ	• TX • OK • LA • AR

CEMP-CE MFR (6-NOV-2020): Work Assignments for PFAS Investigation and Response for Army Environmental Programs

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USACE PFAS WORK ACCEPTANCE AND ASSIGNMENT POLICIES

CECG (40-8B1-01) dated 9-APR-2021

USACE PFAS Work Acceptance Requirements

POLICY:
Prior to accepting or beginning any PFAS-related work, each Commander will obtain work approval from the aligned Directorate (MP, CW, or ERDC).

PROJECT IMPACTS:

1. If/when PFAS issues on Military Programs (FUDS, AF ENV, Army ENV, MILCON, etc.) or Civil Works (Env Compliance, Navigation, Regulatory, Planning, etc.) will require notification and coordination with the business line/Program POC for work approval.
2. Will require EM CX review/technical support

Table 1 – PFAS Activities POCs

DIRECTORATE	FUNCTIONAL DIVISION	BUSINESS LINE / PROGRAM	POC
Counsel	Office of Counsel	All	Mr. Chris Carey
CW	Directorate of Contingency Operations (DCO)	DCO	Mr. Mark Roupas
CW	Engineering & Construction (E&C)	AFFF redesign – Fire Protection	Mr. John Wilkus
CW	E&C	All other E&C	Mr. Marty Goff
CW	Operations & Regulatory (OPS & REG)	Environmental Compliance	Mr. Mike Riegert
CW	OPS & REG	Navigation	Mr. Joe Wilson
CW	OPS & REG	Regulatory	Mr. Tunis McElwain
CW	Planning	Planning	Ms. Mindy Simmons
ERDC	All	All	Dr. David Moore
MP	Environmental (ENV)	Air Force ENV	Ms. Sherry Rone
MP	ENV	Army ENV	Ms. Jim Moore
MP	ENV	ENV & Munitions Center of Expertise (EM CX)	Ms. Molly Maxwell
MP	ENV	Formerly Used Defense Sites	Ms. Vanessa Hinkle
MP	ENV	Other DOD Agencies ENV	Ms. Arlene Weiner
MP	ENV	Other Non-DOD Agencies ENV	Ms. Arlene Weiner
MP	ENV	U.S. EPA Superfund	Mr. Glen Shonkwiler
MP	Installation Readiness Division (IRD)	IRD	Mr. Michael Grizer
MP	interagency & International Services (IIS)	IIS	Mr. Scott English
MP	Military Construction (MILCON)	MILCON	Mr. Carl Penski

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ER PFAS Contract Toolbox

Program Execution Summary (2015 to Present):

2015: ~$7.5M
2016: ~$10.2M
2017: ~$31.5M
2018: ~$53.6M
2019: ~$43.4M
2020: ~25.7M
2021: Projecting $7.8M
<<<multiple reasons for downward trend…**it will go back up**>>>

Acquisition Strategies:

- SATOCs typically used for lower dollar value projects
- MATOCs typically used for larger dollar value projects that require competition either via LPTA or Best Value

Currently used ER Contract Toolbox for PFAS (subject to change)

- Multiple 8(a) SB SATOCs with varying remaining capacity and ordering periods
- $60M SDVOSB MATOC
- $200M SB MEGA ERS MATOC
- $60M 8(a) ERS MATOC
- WOSB Analytical Lab Services
- $120M MEGA ERS
- $176.25M SB PRAC MATOC
- $400M LB MEGA

5 Year Program Execution:

- **$249M Acquisition Strategy ECS/ERS/MMRP SATOC Suite – 8 SATOCSs (FY21 –FY25)**
  Various Set-Asides for SB, 8(a), SDVOSB, WOSB
  - $49M ERS SB SATOC, first of 8 SATOC's
    - Awarded 28 May 2021 to HGL-APTIM Applied Science and Tech JV.
  - $47M ERS 8(a) SATOC; Second of 8 SATOCs; Draft RFP posted 5 May 2021; advertise 13 September 2021; award in 1QFY22
  - $20M ECS 8(a) SATOC; third of 8 SATOCs; Finalizing solicitation; Advertise in 1QFY22; award in 3QFY22
- **$60M SB ECS MEGA (NWD) MATOC – Target award 1QFY22**
- **$60M 8(a) ECS MEGA (NWD) MATOC – Target Award 1QFY22**
- **$240M UR ERS MEGA (NWD) MATOC - Target award of 1QFY22**

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SUMMARY OF PFAS PROJECTS

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OFF-BASE PRIVATE WELL SURVEYS and RESPONSE ACTIONS

EA (2019 to Present)
HGL (2019 to Present)
BersWeston (2016 to 2021)
CAPE (2018 to Present)
Koman (2018 to Present)

Performance Objectives and Requirements

Conduct Off-Base surveying and sampling using a 3-phase process:

- **Phase 1 (Desktop Well Inventories)**
- **Phase 2 (Stakeholder Engagement)**
- **Phase 3 (Off-base Drinking Water Well Sampling)**
- **PFOS/PFOA exceedances of the EPA Lifetime HA**
  - **TCRA – Typically short-term solution to provide bottled within 48hrs of sample results, followed by the design/installation of point-of-entry or point-of-use treatment systems. Permanent solution under TCRA may be a hot tap hookup to municipal line.**
  - **NTCRA – Typically long-term/permanent solution if response action cannot be completed under TCRA. Typically for larger municipal systems**

Challenges and Lessons Learned

- **Coordination and planning with stakeholders to include AF Installation, AFCEC, State, County, City/Municipality, community and homeowners**
- **Many installations lacking a base wide CSM or needs substantial refinement to evaluate off-base migration**
- **Most effective method to identify all wells in the Off-Base Focus Area is to map parcel locations versus water meter locations to determine which parcels are not connected to public water and may have unregistered wells.**
- **Often requires multiple mobilizations and extensive coordination for initial private well sampling and**
- **Water quality issues (sometimes high TDS). Sometimes requires pre-treatment/conditioning**
- **POET/POUT systems need monitoring with local emergency response capabilities**
- **No one size fits all type solution**

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REMEDIAL INVESTIGATIONS

FY20 – AF RI's (HGL)

- **Conduct RI at 4 AF installations in CENWO AOR**

FY20 – ANG RI's (EA)

- **Conduct RI at 4 ANG installations in CENWO AOR**

FY21 – AF RI's (HGL)

- **Conduct RI at 4 AF Installations in CENWO AOR**

Performance Objectives and Requirements

- **Delineate the horizontal and vertical extent of PFAS contamination in soil, groundwater, surface water, and sediment.**
- **Determine the source strength of PFAS contamination in soil within the unsaturated source zone.**
- **Identify potential exposure pathways.**
- **Update or develop robust CSMs.**

Challenges and Lessons Learned

- **The project requires consensus of dynamic approaches from multiple stakeholders.**
- **The evolving PFAS regulatory and client policy landscape required frequent revisions to the investigation derived waste (IDW) management approach.**

Status

- **FY20 AF RI's – all planning docs approved and fieldwork has started at all 4 installations**
- **FY20 ANG RI's – Fieldwork to begin in FY21**
- **FY21 AF RI's – Recently awarded**

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TREATABILITY STUDIES

Treatability Study (OTIE/Arcadis):

- **Horizontal Reactive Media Treatment Well (HRX well®) for in-situ removal of PFAS in a high-velocity paleochannel.**
  - **FY22-23 – HRX well will be converted to use a sonolytic reactor for a SERDP/ESTCP project**

Treatability Study (OTIE/Arcadis):

- **Flocculation of PFAS in ponded surface water and stabilizing PFAS in pond sediments to mitigate sediment-surface water interaction.**

Treatability Study (OTIE/Arcadis):

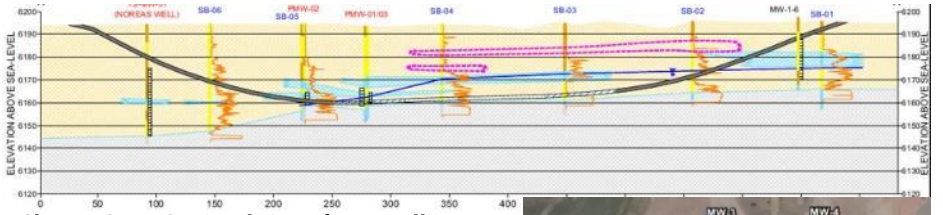
- **Stabilization of PFAS in soil to mitigate leaching to groundwater.**

Treatability Study: (NOREAS)

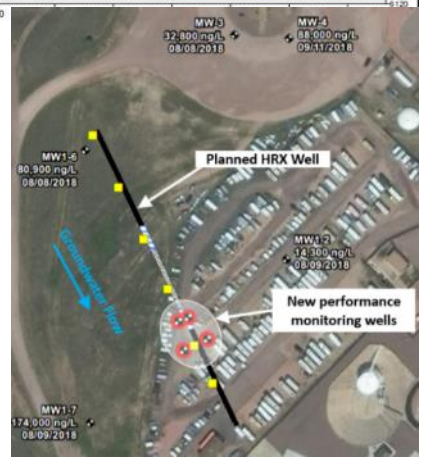
- **Pump-Treat-Reinject (PTR)**
  - **Evaluate plume capture in paleo channel and use of Organic Clay Media as primary treatment with GAC as second-stage**

Treatability Study: (NOREAS)

- **Permeable Reactive Barrier (PRB)**
  - **Evaluate PlumeStop® (liquid activate carbon [Regenesis]) as a reactive barrier**

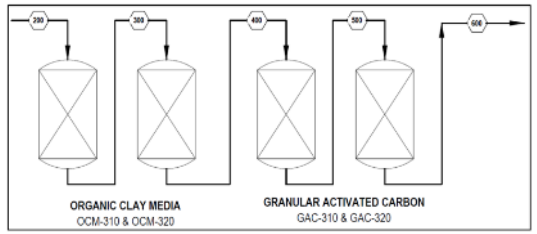


Above: Cross-Sectional view of HRX well



Above: HRX well alignment.

Example of in situ mixing using an excavator and conventional bucket/soil mixing attachment.



Above: PTR treatment media and configuration

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TREATABILITY STUDIES

Treatability Study (Tanaq):

- **Evaluate use of GAC and IX to remove PFAS from stormwater surface runoff in pond to mitigate off-base release.**
  - **Important for DoD to be able to manage PFAS in stormwater runoff**

Treatability Study (NorthWind CDM):

- **Soil washing of impacted soil beneath a pond liner followed by foam fractionation of wash water.**
  - **Important because there are potentially hundreds of impacted stormwater ponds at DoD installations that will require source removal**

Treatability Study (NuGlobal):

- **Potentially Responsible Party (PRP) study with PFAS forensic analysis for fingerprinting source release areas.**
  - **Important for DoD to be able to identify non-DoD PRPs**

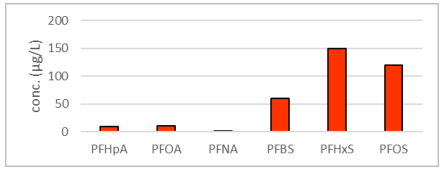
Treatability Study (OTIE/Arcadis):

- **Reactive Core Mat to mitigate PFAS in groundwater from seeping into surface water runoff.**
  - **Important to be able to limit groundwater interaction with surface water runoff**

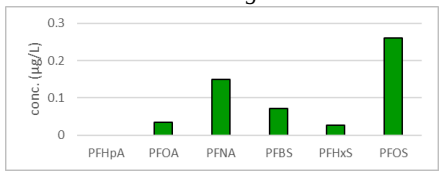
Treatability Study (Brice):

- **Soil segregation and washing of impacted soils and sediments in stormwater retention pond.**
  - **Important for DoD to be able to do on-site treatment of impacted soils to remove impacted soils from source areas and limit further leaching to groundwater.**

Above: GAC/IX treatment system for pond water



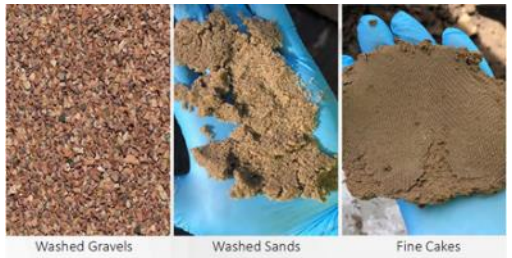
Above: On-base PFAS signature



Above: Off-base PFAS signature

Above: PTR treatment media and configuration

Above: Soil washing system setup



Above: Segregated and washed soil by grain size

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CASE STUDIES

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CASE STUDY
TCRA AND NON-TCRA FOR SECURITY, WIDEFIELD AND FOUNTAIN WATER DISTRICTS, CO

Fountain Water District

- TCRA – 2017, USACE and BERS-Weston installed two 500 gallon per minute (gpm) granular activated carbon (GAC) systems to treat two impacted PWS wells #2 and 3.

- NTCRA – Install a centralized 1,500 gpm Ion Exchange (IX) system to treat four drinking water wells with approximately 1 mile of underground pipeline.
    - Currently under construction and scheduled to be on-line December 2021.

Security and Widefield Water Districts

- Security – 6,800 gpm IX system to treat 23 impacted wells, over 6 miles of underground piping, 12 railroad crossings, eight 1,700 gpm Calgon tanks, a 245K gallon above ground storage, SCADA system and an emergency generator.

- Widefield – 3,300 gpm IX system to treat 3 impacted wells, over 1 mile of underground piping, 2 CDOT crossings, six 1,500 gpm Calgon tanks, an underground clear well, SCADA system and an emergency generator.

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CASE STUDY
TCRA – Luke AFB, AZ

Luke AFB – Valley Utilities Water Company Temporary Treatment System (EA & HGL)

Issue: 3 water supply wells at a distribution system contaminated with PFOS/PFOA above the LHA

- **EA - Provide 1,200 GPM "temporary" Ion Exchange PFAS Treatment System for PFAS-impacted wells at VUWCO Bethany Hills West.**
- **HGL – Provide bottled/alternate potable water to impacted residences and businesses**

Performance Objectives and Requirements

- **Provide bottled water pickup for impacted residences and reach out to impacted businesses to develop an alternative plan for potable water**
- **Design, install, and bring temporary treatment system online in less than six months**
- **Met all substantive regulatory permit requirements, becoming the first such large-scale ion exchange system to receive approval in Maricopa County.**
- **Selected a buffered resin (see backup slide for details) to alleviate corrosivity/ contaminant leaching concerns due to elevated chloride to sulfate mass ratio (CSMR) of the influent water.**
- **Implemented extensive performance monitoring program to meet regulatory requirements.**
- **Telemetry/remote system access and automation to minimize impacts to facility operations.**
- **Backup booster pump and VFD to ensure redundancy of critical system components.**

Challenges and Lessons Learned

- **Coordination, planning, and timing with stakeholders to include Luke AFB, AFCEC, State, County, community**
- **IX vs. GAC**
- **Unanticipated high volume of fines entering the system from water supply wells**
  - **Added sand filtration component due to reduce bag filter change-out frequency.**

Status

- **Completed**
- **Restored potable water use to 1,700 service connections.**

Traffic control plan for delivering bottled water to impacted VUWCO customers

IX Treatment System at BHW Yard

IX Vessels

Sand Filtration System

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CASE STUDY
TCRA/NTCRA – JBMDL, NJ

LBMDL – Lakehurst, NJ (Tanaq, CAPE)

Issue: Lakehurst shallow backup water supply wells contaminated with PFOS/PFOA above LHA

Performance Objectives and Requirements

- **(Tanaq) - Provide modular 350-gpm IX-resin unit that could be relocated to other facilities following installation of new water supply wells. Components needed to meet NSF-61 water supply standards. Booster pump needed to recharge base water tower.**
- **(CAPE) - New deep well 1,000 + feet deep, triple cased to 910 ft bgs through 3 confining units and 3 aquifers**
- **(CAPE) – design/build 300 gpm water treatment system**

Challenges and Lessons Learned

- **IX vs. GAC for modular design**
- **Temp treatment system startup and shakedown (what to do with purge water).**
- **Coordination and planning with stakeholders to include JBMDL, AFCEC, State, County (permitting)**
- **Deep well drilling required 24/7 drilling for 3 weeks**
- **Deep well drill cuttings and disposal**
- **Design requirements**
  - **State Historical Preservation Office**
  - **Bldg. location**

Status

- **Temp treatment system began operation in April 2019**
- **Deep well completed, drill cuttings stored onsite until final disposition can be determined**
- **Treatment bldg. under construction**

Mobile (40’ CONEX) IX Treatment System. Connected to existing backup supply wells and water tower

Inside Mobile (Conex) IX Treatment System

Drilling new 1,002 feet deep water supply well

Completed Wellhead and Building Foundation

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CASE STUDY
PFAS SOIL WASHING Peterson AFB, CO

Peterson AFB (Brice)

Issues:

- **PFOS/PFOA contaminated soil from spray testing at active fire station leaching into paleo channel**

Performance Objectives and Requirements

- **Full-scale pilot demonstration of PFAS removal from upland source area soils (500 cy), IDW soils, and sediments.**
  - **Data to be used for an on-base EE/CA for AFFF sites with impacted media**
- **Treat PFAS-contaminated soil from AFFF nozzle spray test area**
- **Treat PFAS-contaminated drilling IDW and sediments from stormwater sediment pond**
- **Achieve > EPA RSLs for PFAS compounds**

Challenges and Lessons Learned

- **Bulk soils = 3,200 µg/kg PFOS**
  Fines 12,000 µg/kg PFOS
- **Managing high levels of MSW debris and decomposed organics in stormwater**
- **Soil washing is able to successfully treat PFAS in a wide range of soil conditions and PFAS concentrations**
  - **99.7% PFOS removal efficiency in coarse fractions,**
  - **83% PFOS removal efficiency in fine fractions**
  - **99% mass balance recovery**
- **Able to sustain high rates of production without affecting removal efficiencies**

Status

Source area soils successfully treated in October 2020
Sediments treated in September 2021, analytical pending

Soil washing system setup at site

Soil fractions by grain size after segregating and washing

Water treatment system

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FINGER ON THE PULSE

SIGNS OF WHAT IS TO COME

H.R.2467 - "PFAS Action Act of 2021" – Bill Passed House
- Incentives to limit use of PFAS and remediate in the environment.
- Directs EPA to designate PFOS/PFOA as hazardous substances under CERCLA.
- Within 5 years, EPA must determine whether the remaining PFAS should be designated as hazardous substances.

HEY21651 - "Filthy Fifty Act" – Introduced Bill
- Testing, removal, and remediation of PFAS for 50 DoD Installations (mix of AF, Army, ANG/ARNG-NGB, Navy)
  - Testing no later than 2 years after date of the enactment of this Act
  - Removal no later than 60-days following detection of PFAS at military installations, FUDS, State-owned facility of NGB
  - Remediation no later than 10 years after the date of the enactment of this act

HEY21687 - "Clean Water For Military Families Act" – Introduced Bill
- Investigations into releases of PFAS, including testing for the presence of PFAS in groundwater, surface and drinking water, soil, and soil vapor, at or surrounding DoD installations including FUDS, State-owned facility of NGB
- Authorization of Appropriations – Appropriated for fiscal year 2022 to the DOD $10 Billion to remain available until expended to carry out this section

EPA Research
- Assessing PFAS Human Toxicity - Ongoing
- Assessing PFAS Ecological Toxicity - Ongoing
- Cleaning Up and Managing PFAS Contamination - Ongoing
  - https://www.epa.gov/chemical-research/status-epa-research-and-development-pfas#contamination

AF Funding Projections (annual spend plan pending)
- FY22 Baseline $350M USACE Enterprise Wide (for IRP and MMRP)
  - Potential for plus up

https://map.serdp-estcp.org/Featured-Initiatives/Per-and-Polyfluoroalkyl-Substances-PFASs/pfas_efforts.pdf

Will there be more PFAS in the future?

What will the program look like in FY22?

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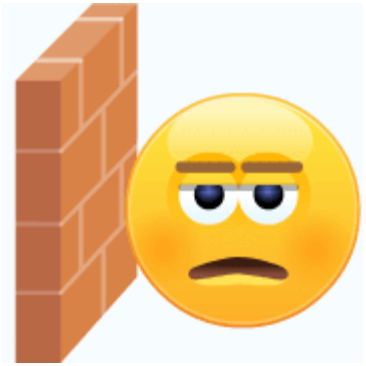
CHALLENGES

- US EPA
  - Ever evolving US EPA regulations
    - LHAs and RSLs
    - Human
    - Ecological
- States
  - Slow to promulgate
  - Requires OSD review for concurrence
  - Inconsistent regulations/policies



- DoD
  - RI/FS
    - Baseline Risk Assessments
  - AFFF waste management guidance/policies
    - AFGM (2019 and 2020) rescinded by OSD
    - Developing new guidance
  - TCRA's
    - Providing time sensitive solutions to impacted private wells and municipalities
    - Rights of Entry
  - NTCRA's
    - Coordination with City and privately owned impacted municipalities/water companies
    - Right of Way and Easements for major crossings
  - Civil Works
    - Potential PFAS impacts to watersheds and ecosystem restoration projects
  - MILCON
    - Management of impacted media at MILCON projects
    - On-site treatment options vs. off-base disposal?
      - Highlights importance for doing treatability studies
- USACE
  - Concerns with setting precedence
  - Contract vehicles and capacity
    - Available innovative technologies either as the prime or subs
  - Developing PWS scope on sometimes limited site information
    - in-out modifications
  - Forecasting and planning for TCRA's and NTCRA's
    - Cannot contract until there is a bonafide need
    - Bonafide need not known/verified until sampling and validation complete
- Contractors
  - Contract Solicitations
    - PFAS Specific Eval Criteria
  - Task Orders Proposals
    - LPTA or Best Value
    - Sometimes unspecified parameters to meet objectives
    - Sometimes limited site information
    - Innovative solutions
    - Clear and precise strategies to meet objectives
  - Changed conditions and evolving regulations during Task Order execution
  - Performance based Task Orders
  - Cost plus based Task Orders

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PDT ACKNOWLEDGEMENTS

ER Project Management	Geology	Environmental Science	Engineering Support	Real Estate	Contracting
Mike Riggle	Jennifer Grimm	Steve Gragert	Larry Woscyna	Jesse Otterson	Lisa Sirois
Jessica Frehse	Nick Geibel	Paul Gedbaw	Jessica Frehse	Shaun McLain	Stephanie Rostermundt
Jennifer Zorinsky	Eric Fritzch	Andrea Sansom	Stephen Kitt		John Tucker
Brian Hesford	Rachel Carson	Marc Anderson	Corina Zhang		Shanna Comparato
Mark Mercier	Brian Boccellato	Tony Sedlacek	Delma Stoner		Julie Siderewicz
Tony Briganti	Jessica Bozell	Nate Hoffman	Bob Collupy		Michelle Butler
Jon Firkins		Jessica Hoppman	Ryan Fessler		Melanie Caines
McCullough Wells			Devin Long		Tim Howland
Rich Anderson			Michael Moore		Maj Brandon Wagner
Matt Allen			Matt Masten		

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U.S.ARMY

END

POC Info:
CENWO PFAS Program Manager
Mike Riggle
Michael.a.riggle@usace.army.mil
402-995-2269

US Army Corps of Engineers ®

U.S.ARMY