

Air Force Civil Engineer Center



PFAS: AFCEC's Programmatic Response and Technical Challenges

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RemPlex Conference
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AFCEC Restoration Program's Programmatic Response



➤ **Preliminary Assessments (PA)**

- Status: 100% complete
- Objective: Identify all potential AFFF releases

➤ **Site Inspections (SI)**

- Status: 100% complete
- Objective: Confirm AFFF releases (i.e., source-zone sampling)

➤ **Expanded SIs (ESI)**

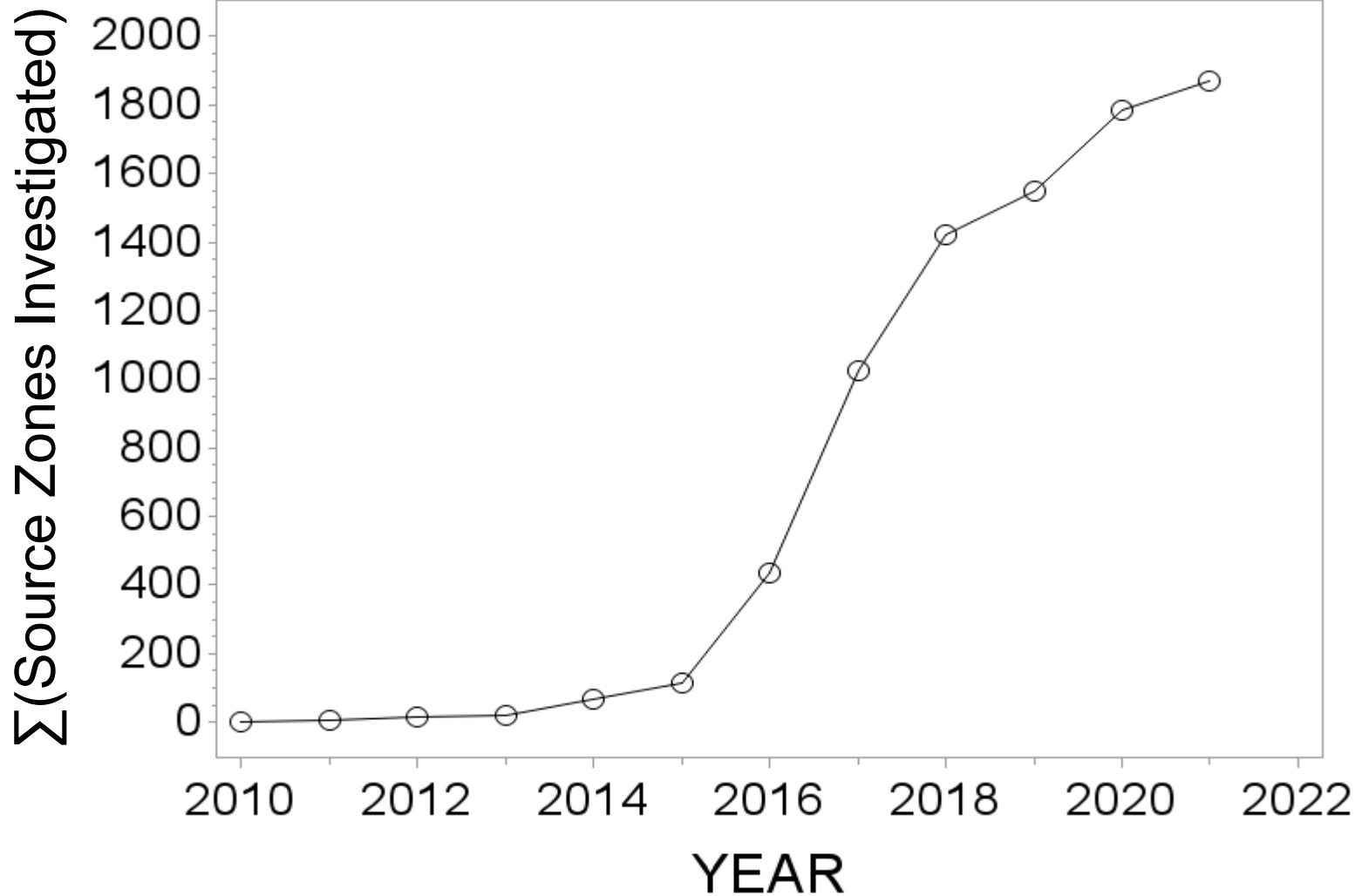
- Status: In progress (select installations)
- Objective: Eliminate off-base drinking water exposure pathways

➤ **Remedial Investigations (RI)**

- Status: In progress (select installations)
- Objective: Delineation, source-strength determination, and baseline risk assessments

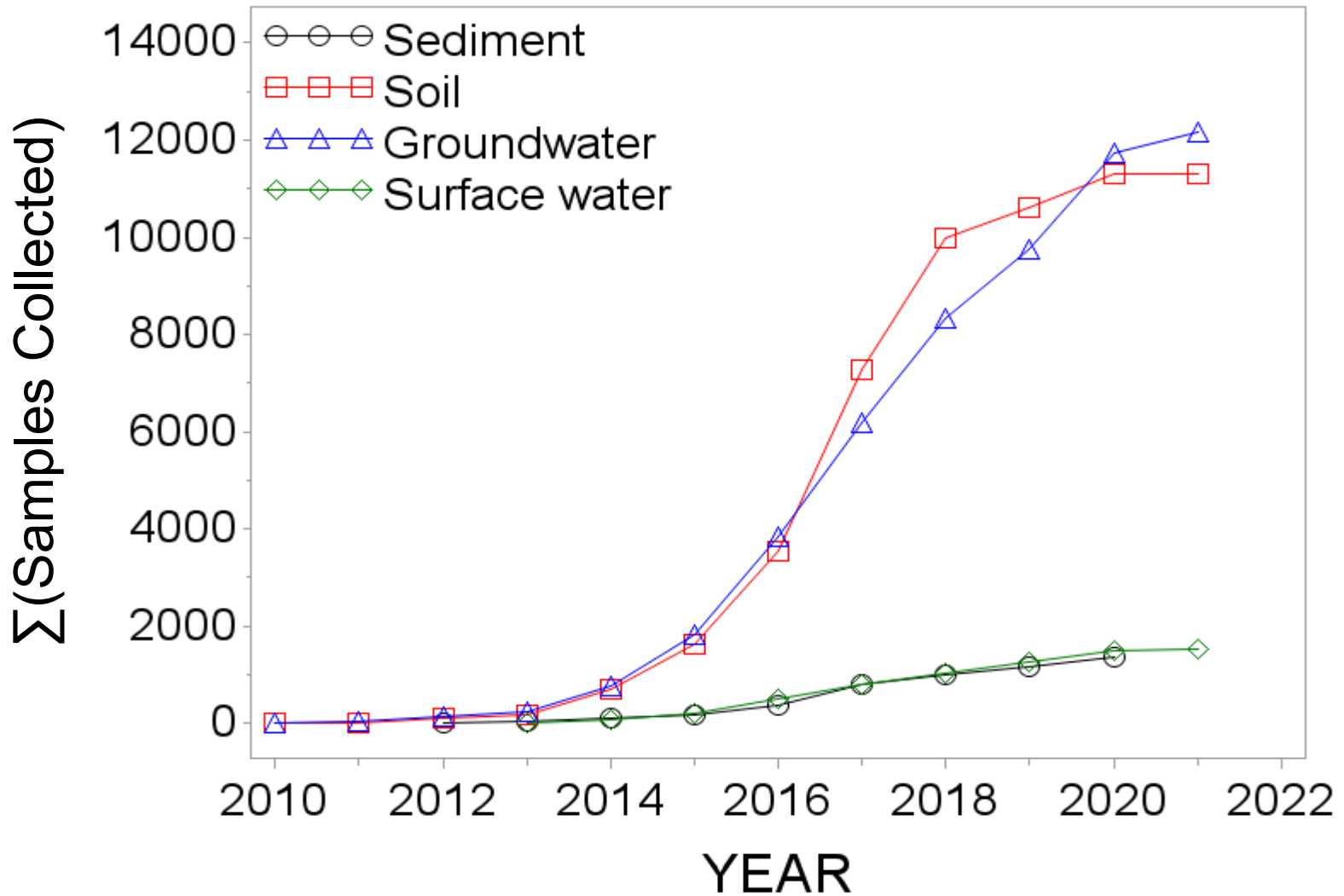


Available Data to Date

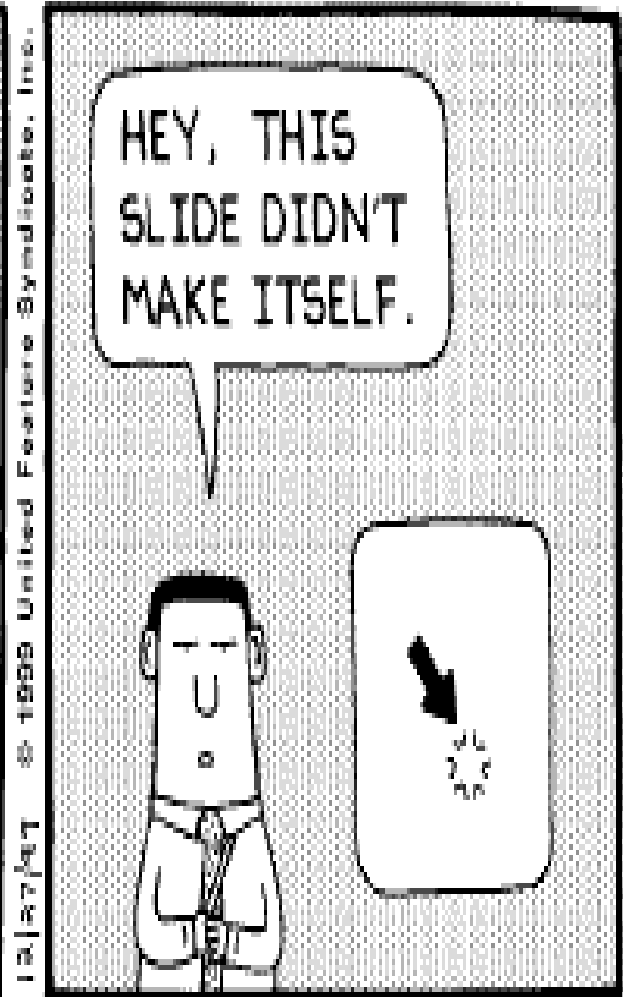
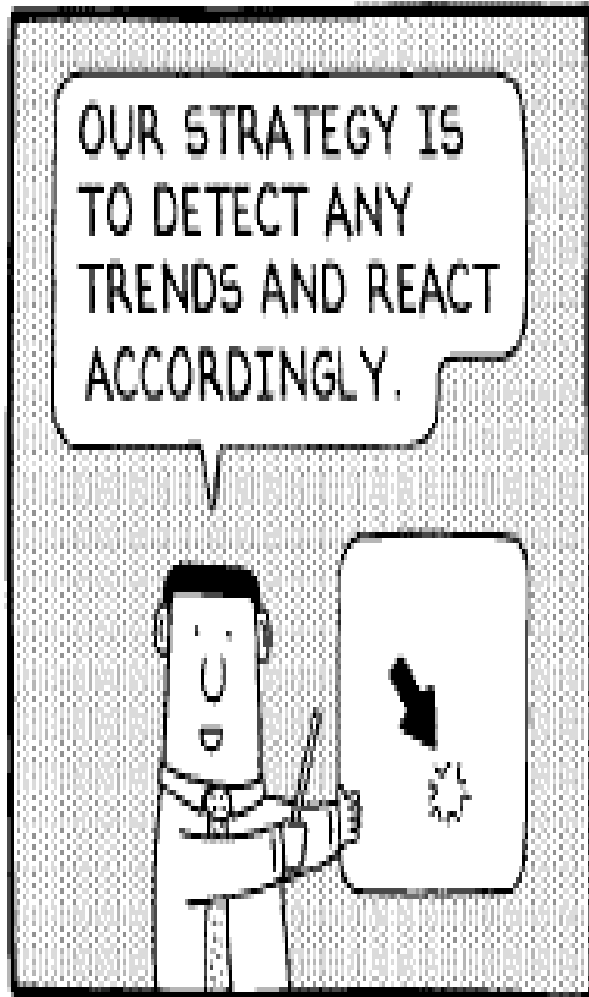




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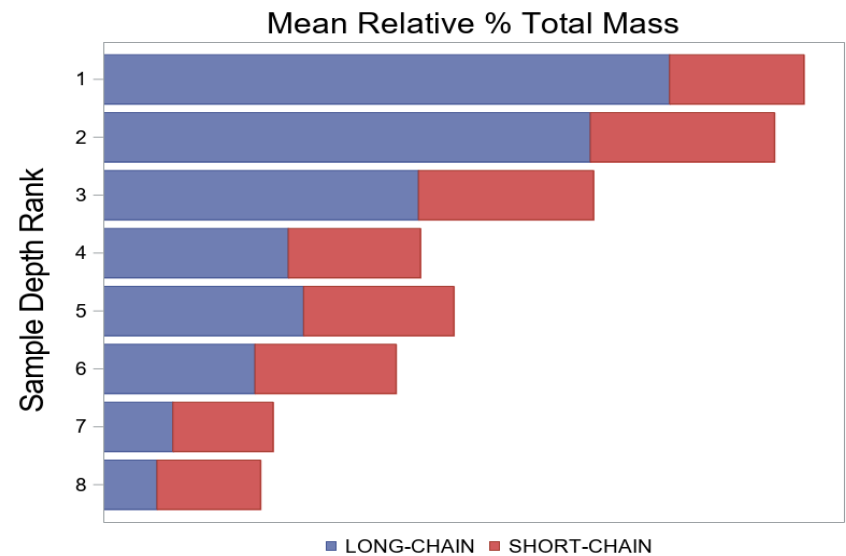
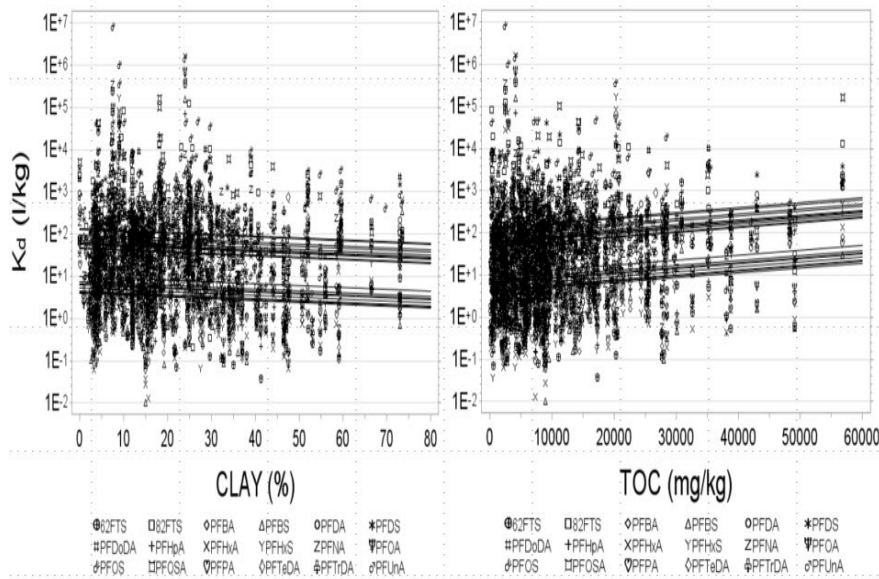
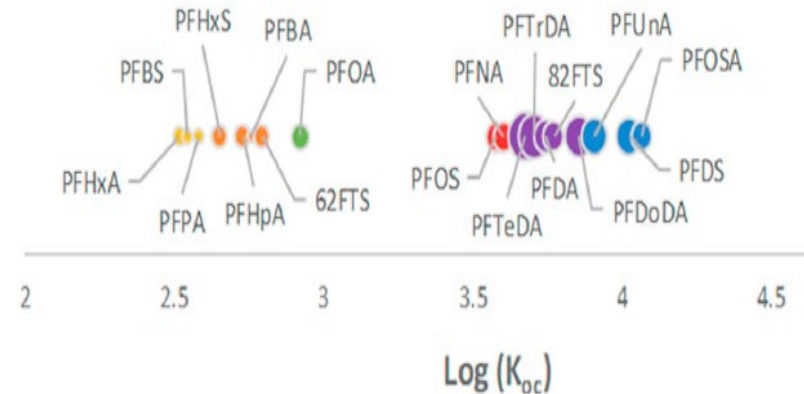
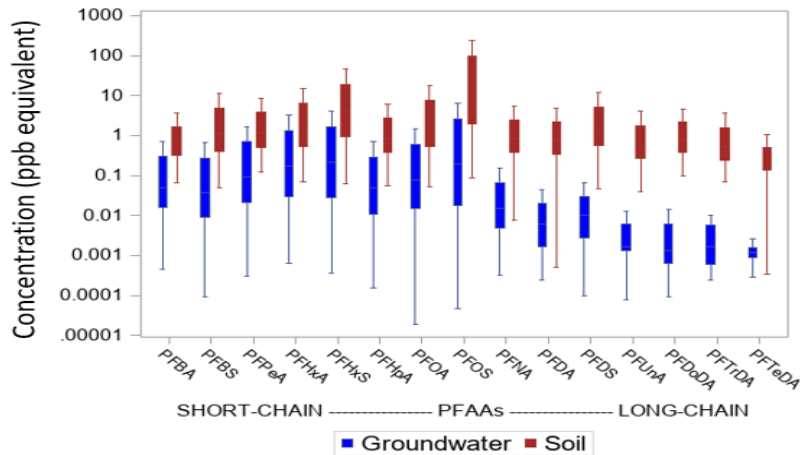


Programmatic Challenges Informed by Big Data Inference





Inference to Date (1): Soil Retention is Significant!





Technical Challenge: Characterizing Source Zones

ENVIRONMENTAL
Science & Technology

pubs.acs.org/est

Perspective

The Case for Direct Measures of Soil-to-Groundwater Contaminant Mass Discharge at AFFF-Impacted Sites

Richard H. Anderson*



Cite This: <https://doi.org/10.1021/acs.est.1c01543>

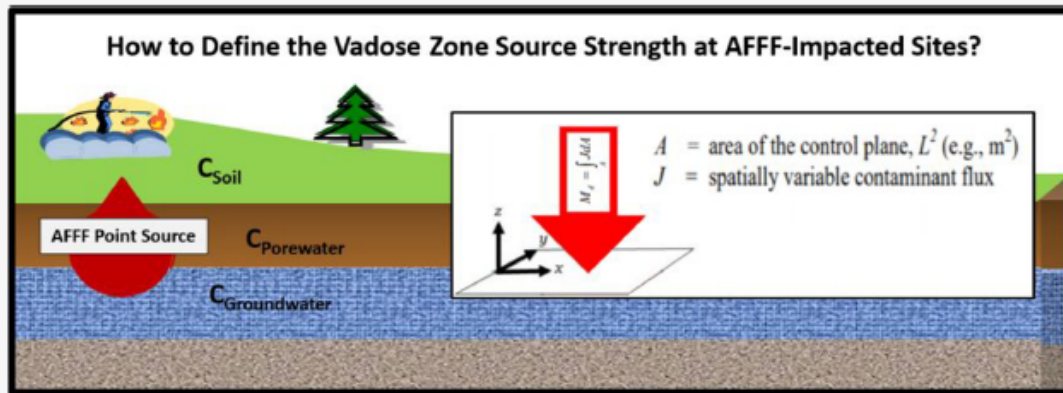


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Technical Challenge: Remediating Source Zones



Eielson AFB Case Study



Soil Washing Pilot: Arcadis/CleanEarth



ESTCP: ER20-5258

Thermal Desorption Pilot: Paragon/TRS



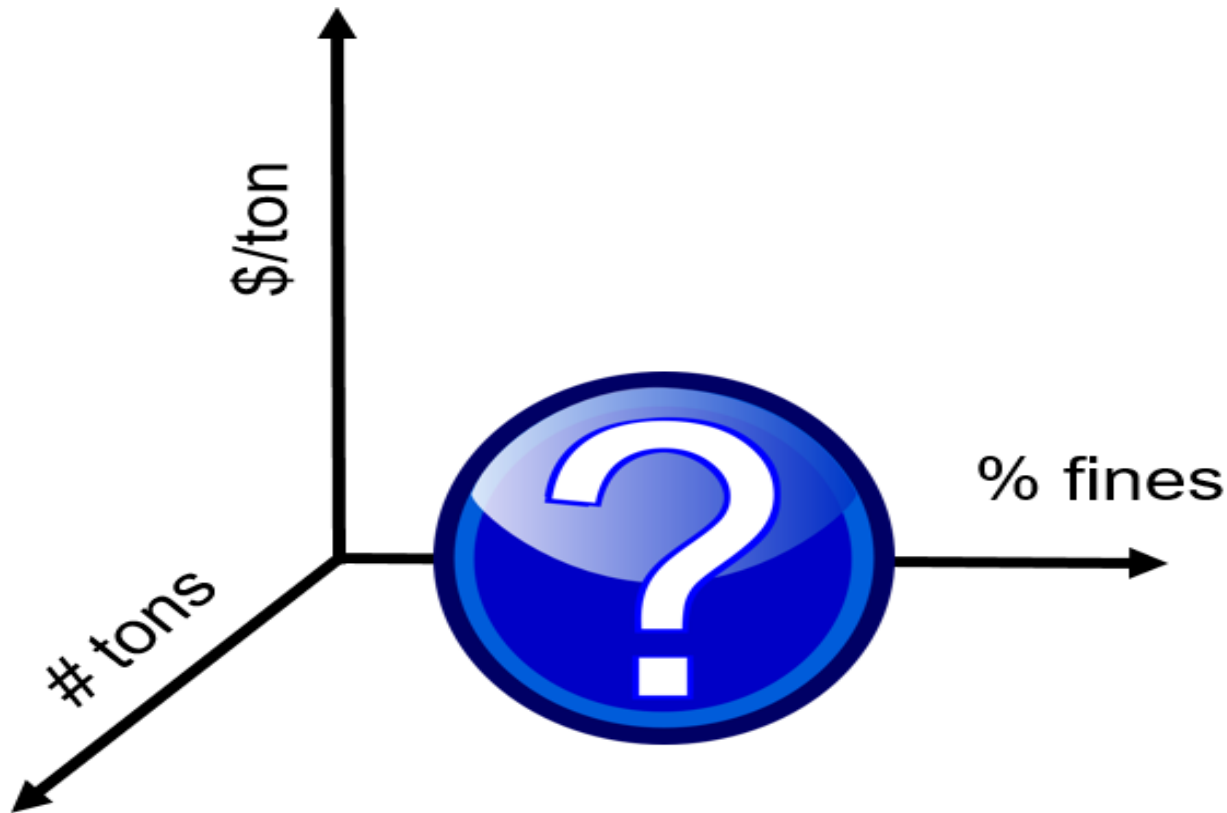
ESTCP: ER20-5198



Technical Challenge: Remediating Source Zones



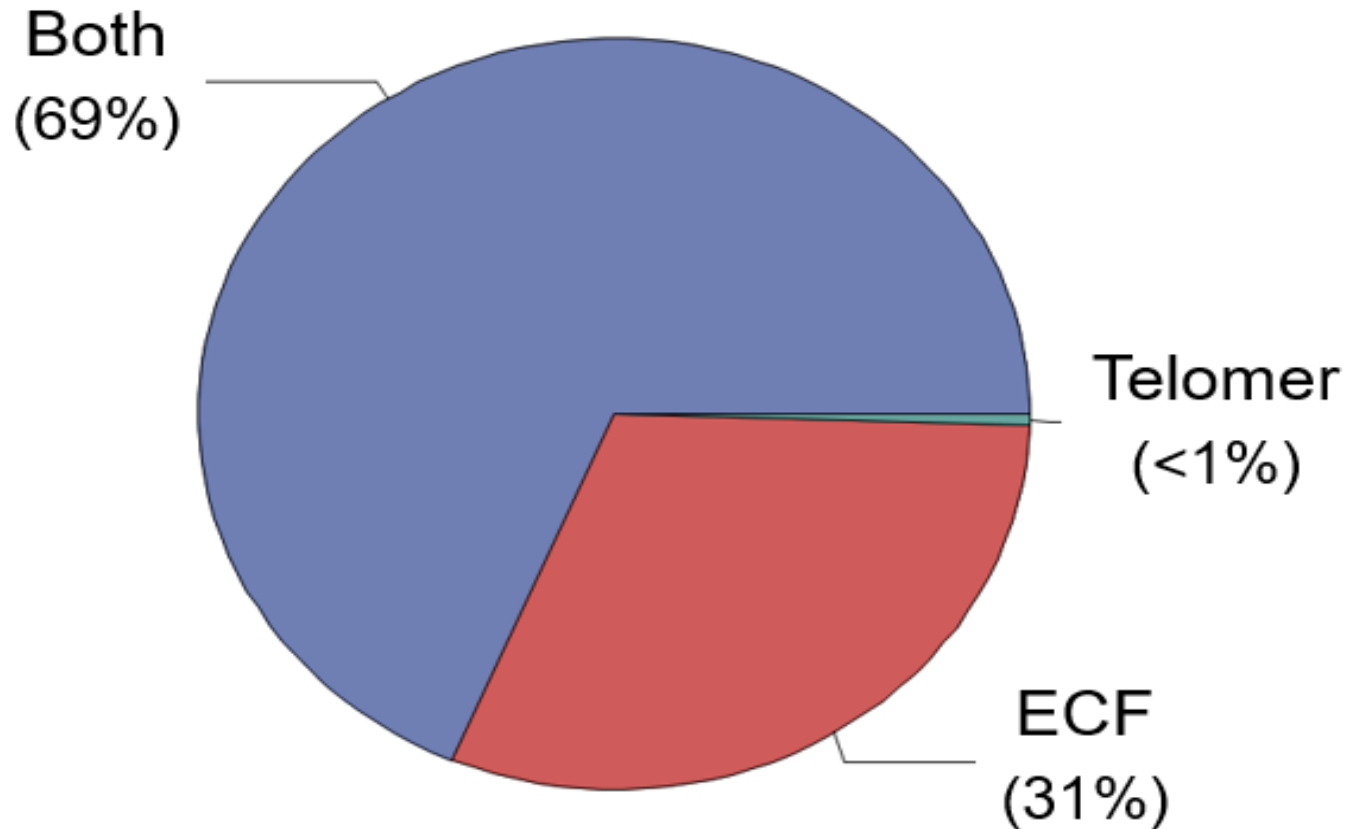
- Unique capital and O&M costs
- Site-specific factors (e.g., % fines)





Inference to Date (2): All Sites are Complex Mixtures

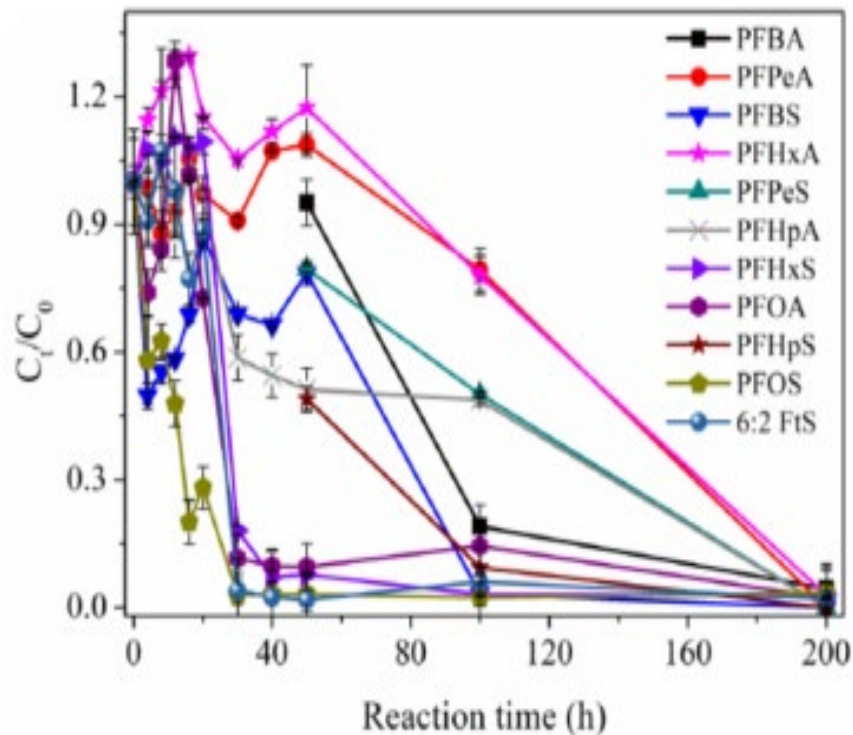
- Long-chain PFSA's from legacy ECF-based AFFF are universally present at impacted sites



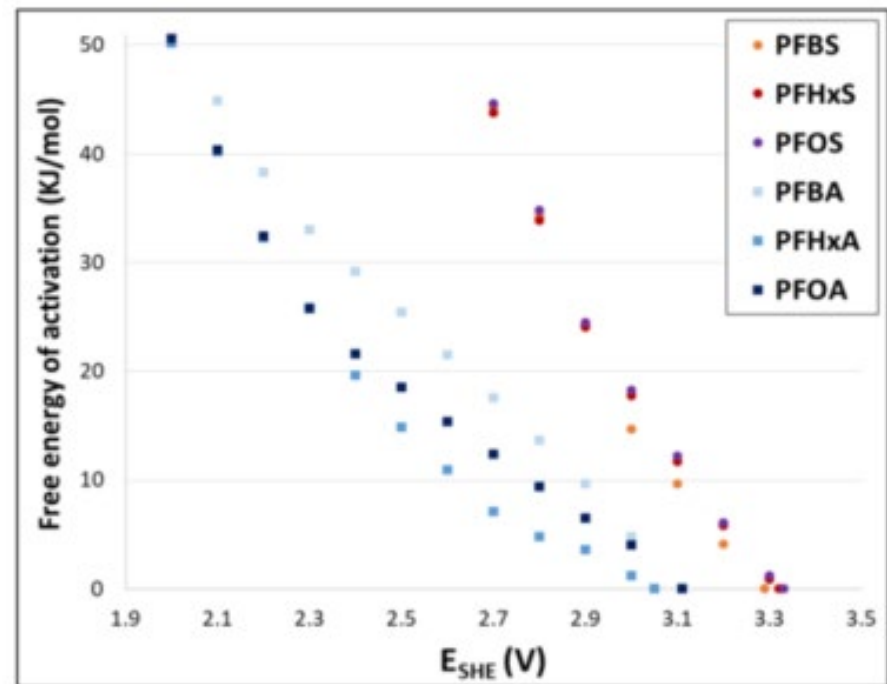
Technical Challenge: Differing Treatment Kinetics

- PFSA (PFOS) decomposition kinetics are often rate-limiting
 - Mediated by direct electron transfer or solvated electron (e_{aq})

SERDP ER18-C2-1320

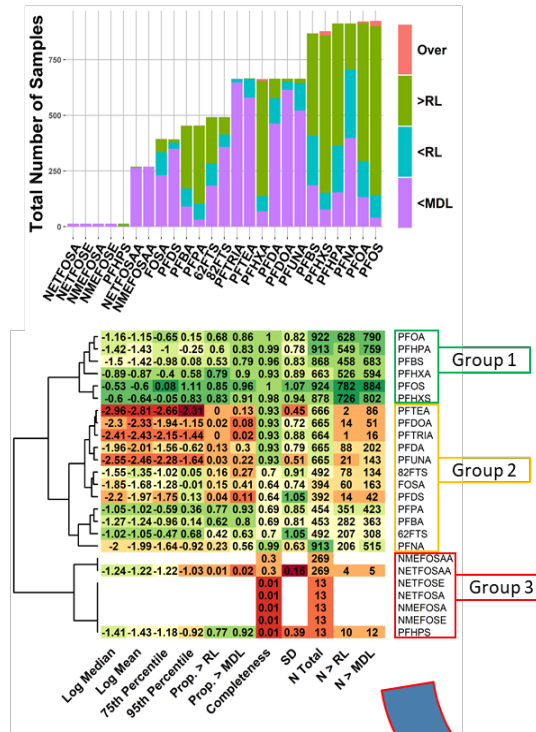
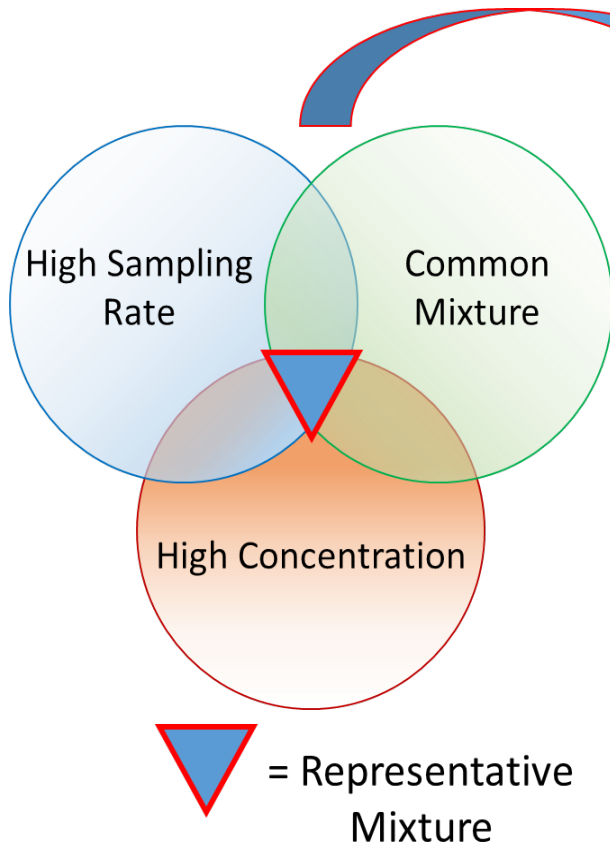


SERDP ER-2718

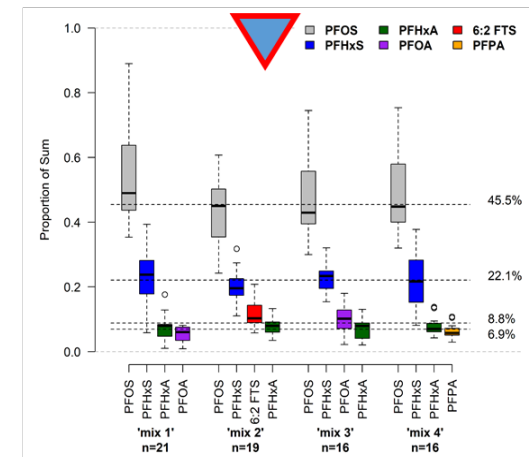


Technical Challenge: Conducting Risk Assessments

- Potential for antagonism, additivity, or synergism



PRIORITY PFAS MIXTURE





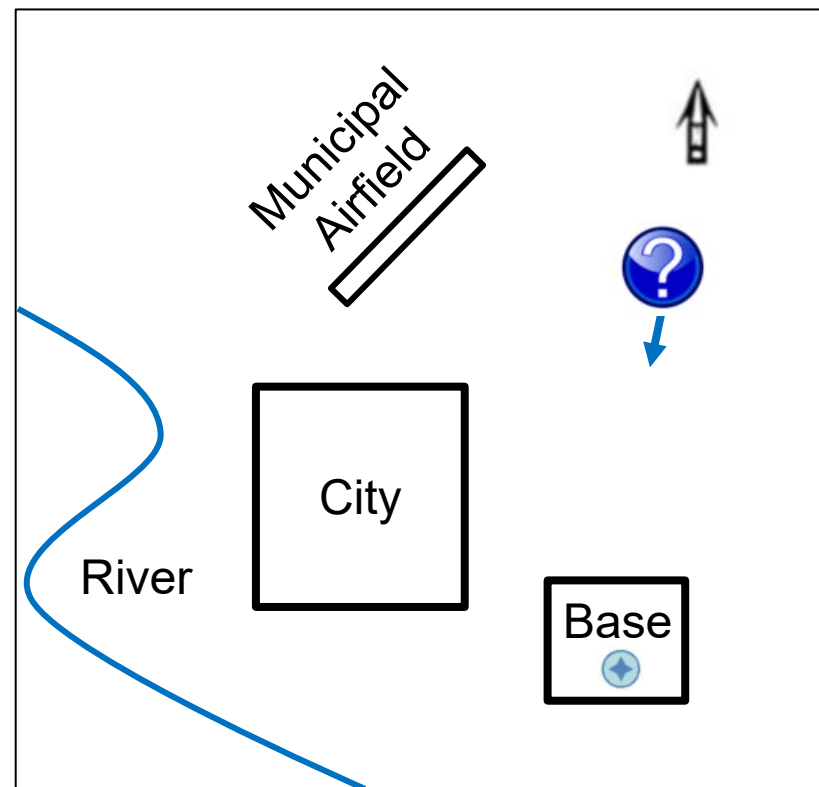
Technical Challenge: Allocating Point Sources



On-Base Drinking Water Well

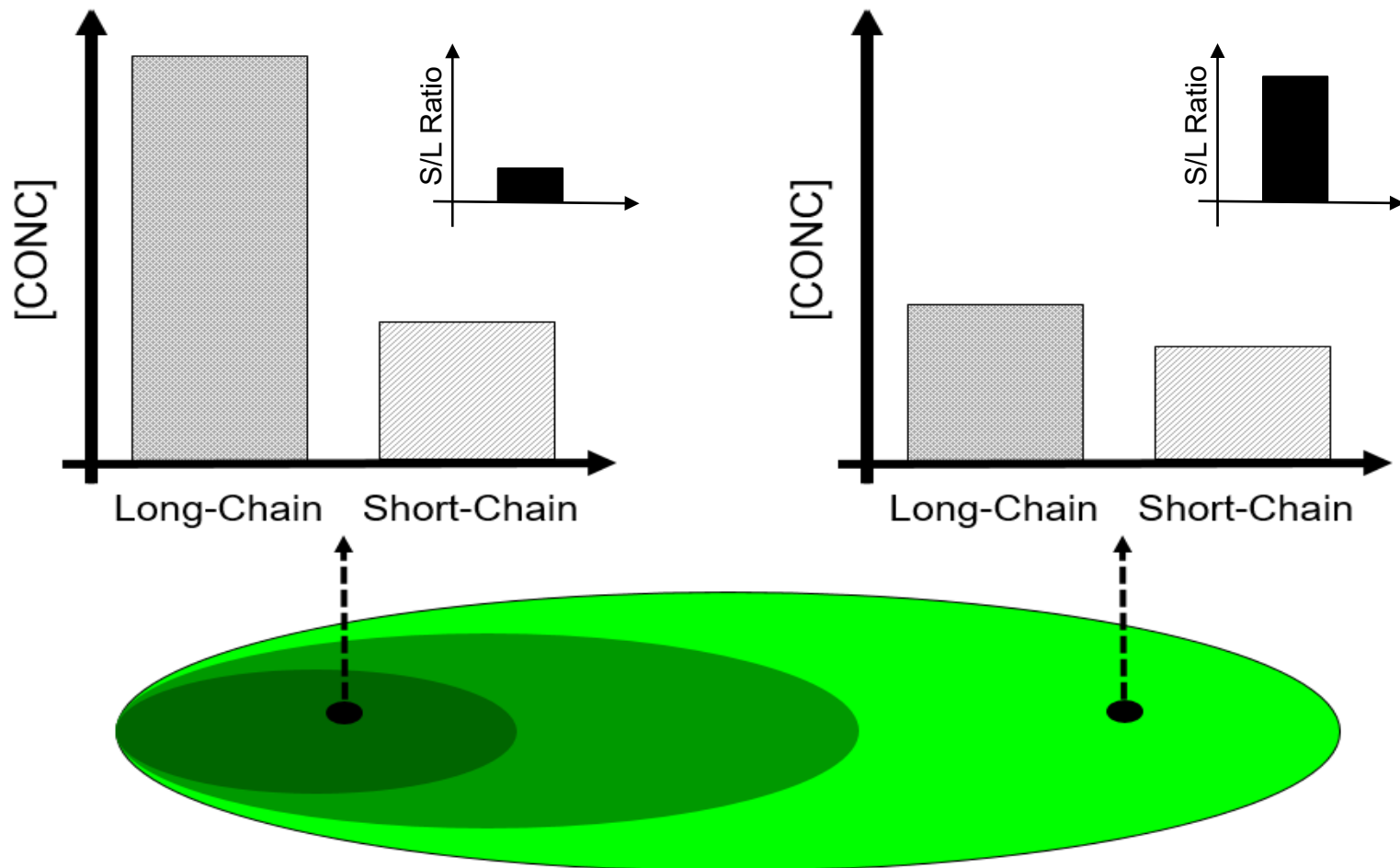
PFAS	Conc (ng/L)
HFPO-DA	U
NMeFOSA	U
NMeFOSE	U
PFBS	340
PFDA	U
PFDoA	U
PFHpA	110
PFHxS	800
PFHxA	1,000
PFNA	U
PFOS	3.5
PFOA	700
PFTeA	U
PFTnA	U
PFUnA	U
11CI-PF3OUdS	U
DONA	U

Example Case Study



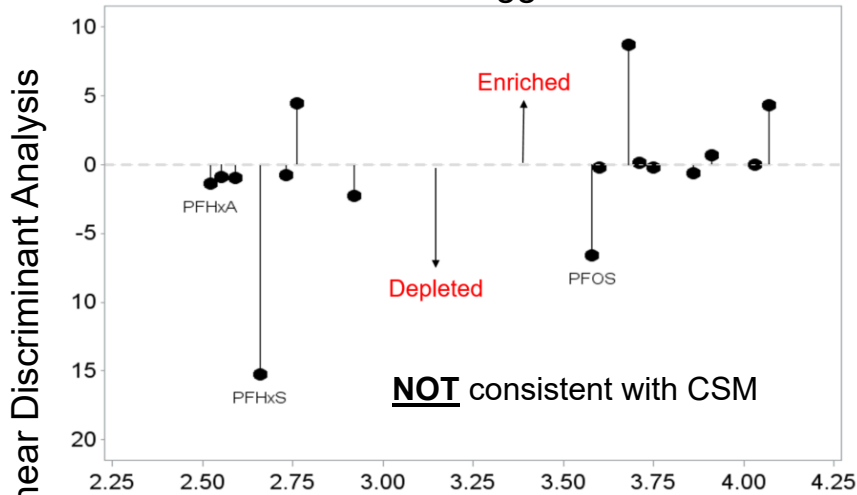
Inference to Date (3): Plume Conceptual Site Model

- Downgradient fractionation depends on relative retardation and source-zone concentration

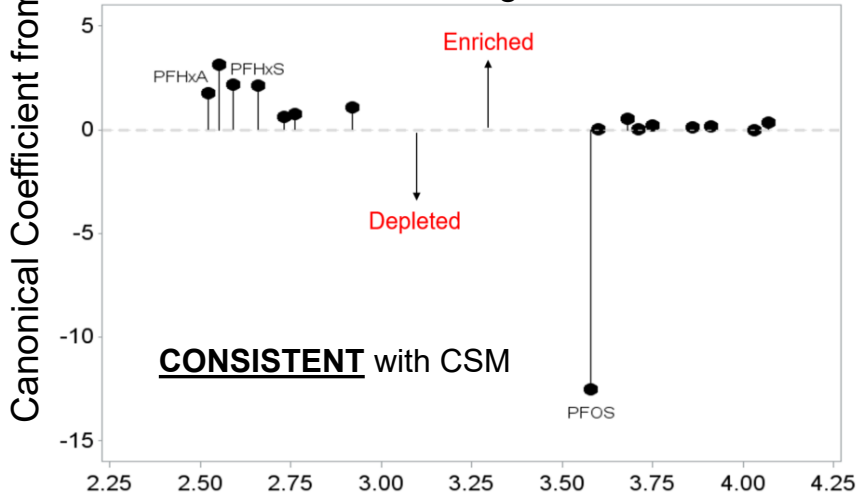


Technical Challenge: Allocating Non-Point Sources

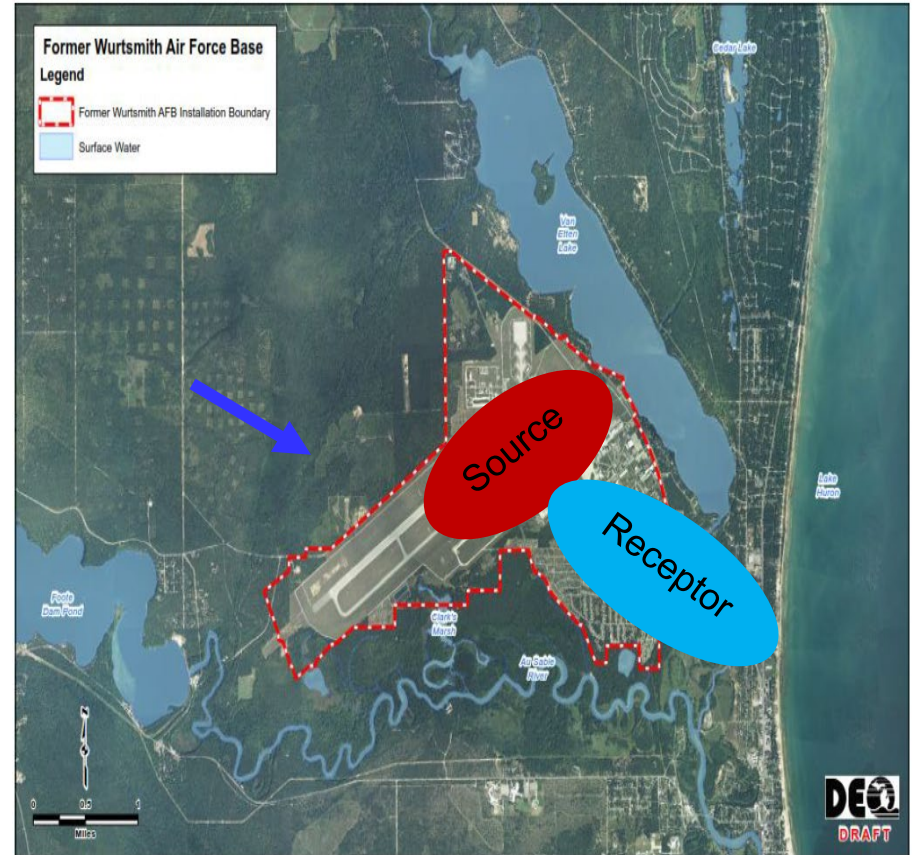
All Non U Flagged Data



> 70 ng/L



Example Case Study





Summary



- **AFCEC forging ahead with programmatic response actions despite numerous technical and political challenges**
 - **Characterization and remediation of source zones**
 - Vadose zone soils are a top priority for RTD&E
 - **Management of complex mixtures**
 - Remediation technology selection
 - Risk assessment
 - Forensics
 - **Non-AFFF sources of PFAS**
 - Point and non-point



Questions



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Air Force Civil Engineer Center
Technical Support Division
Restoration Branch