



# Field Application of Innovative In-Situ PFAS Remediation via In-Well Groundwater Recirculation & Foam Fractionation

October 21-22, 2024

AEHS East Conference,

Workshop/Session 2: PFAS Remediation

University of Massachusetts, Amherst, MA

**TRC**

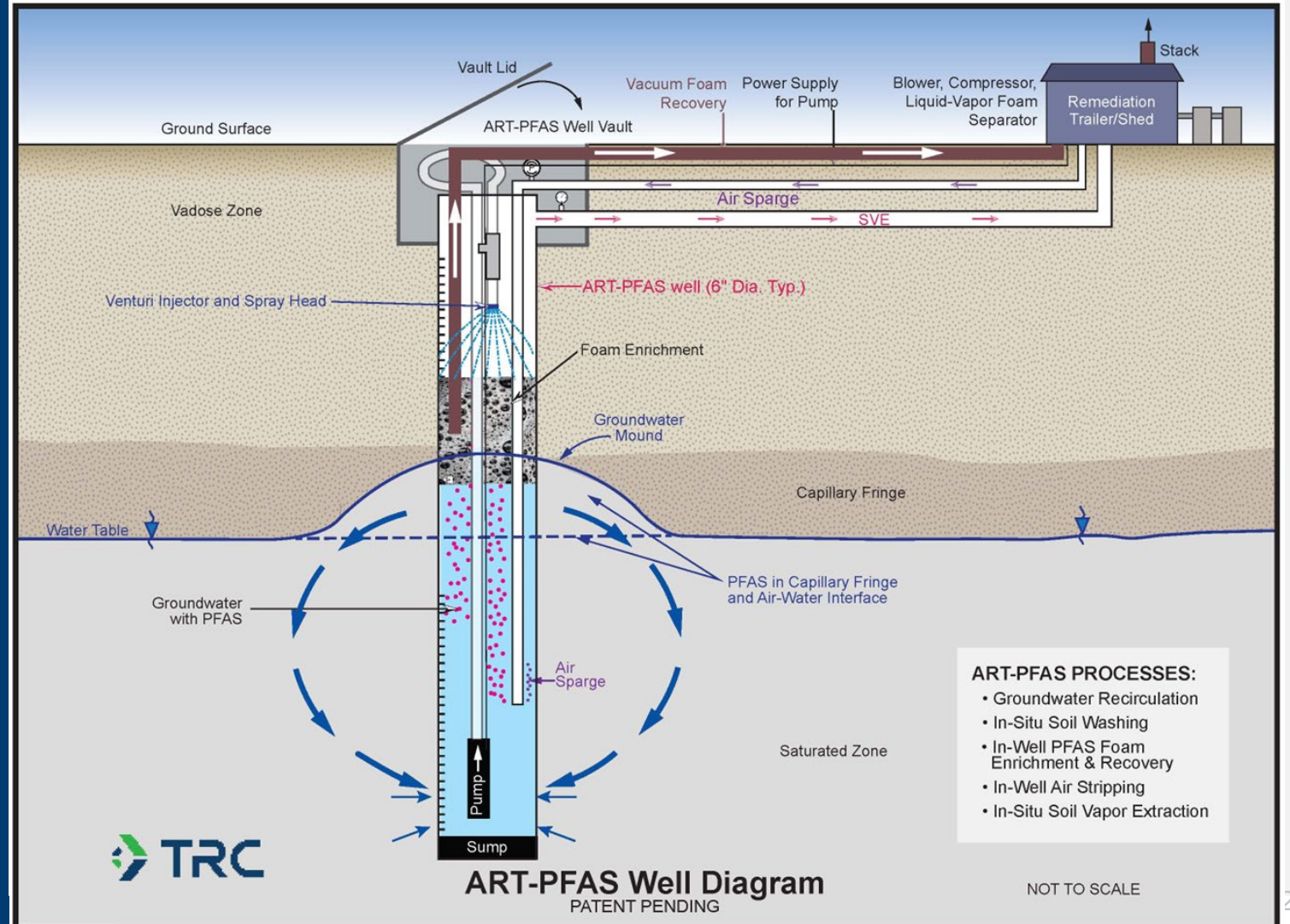
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Co-Author: Brendan Lazar, PE

**PRODUCE** [**PURPOSE**] **PIONEER**

# Presentation Overview

- Site Overview & Background
- ART-PFAS Overview
- Field Application
  1. Foaming
  2. Foam Fractionation/Enrichment
  3. PFAS Foam/Liquid Recovery
  4. GW PFAS remediation
  5. Conclusions
  6. Next steps



# Site Overview



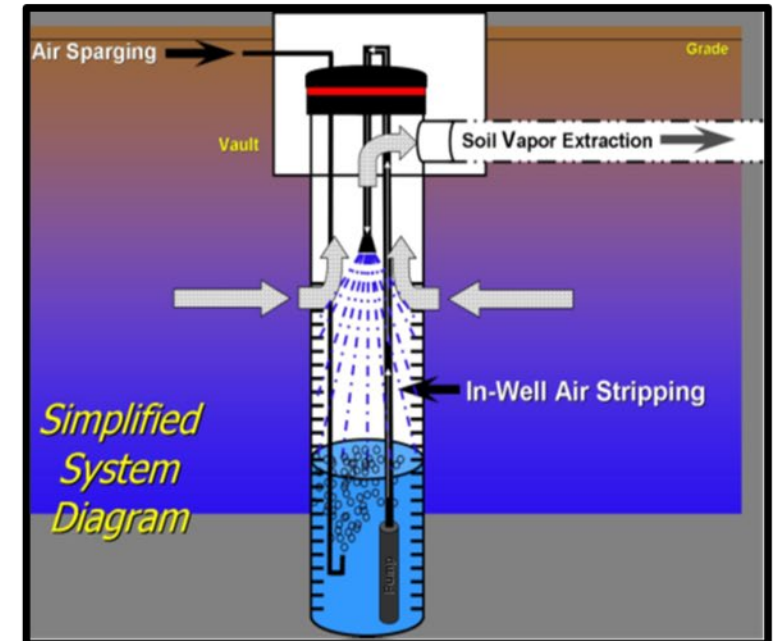
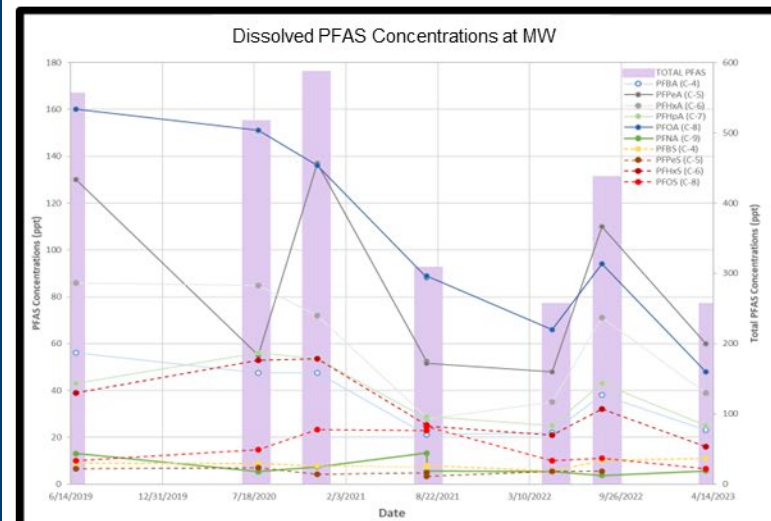
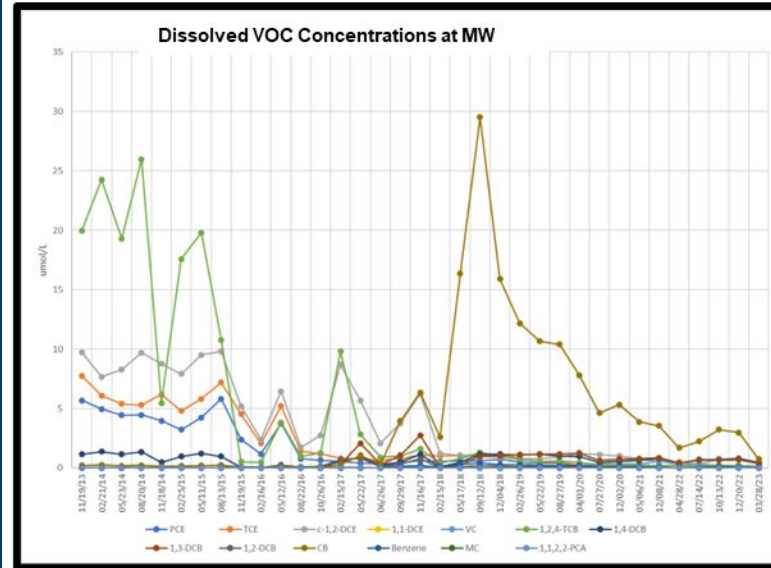
## 1. SVE/AS System (2004)

- Soil/GW COCs: CVOC, DNAPL, Petroleum LNAPL, *etc.*
- Significant mass & concentration reduction/removal
- Recalcitrant CVOC hotspots

## 2. Targeted EISB (2016 – 2020)

## 3. Emerging COC: PFAS

## 4. ART & ART-PFAS Field Applications for CVOC & PFAS hotspots (2019-Ongoing)





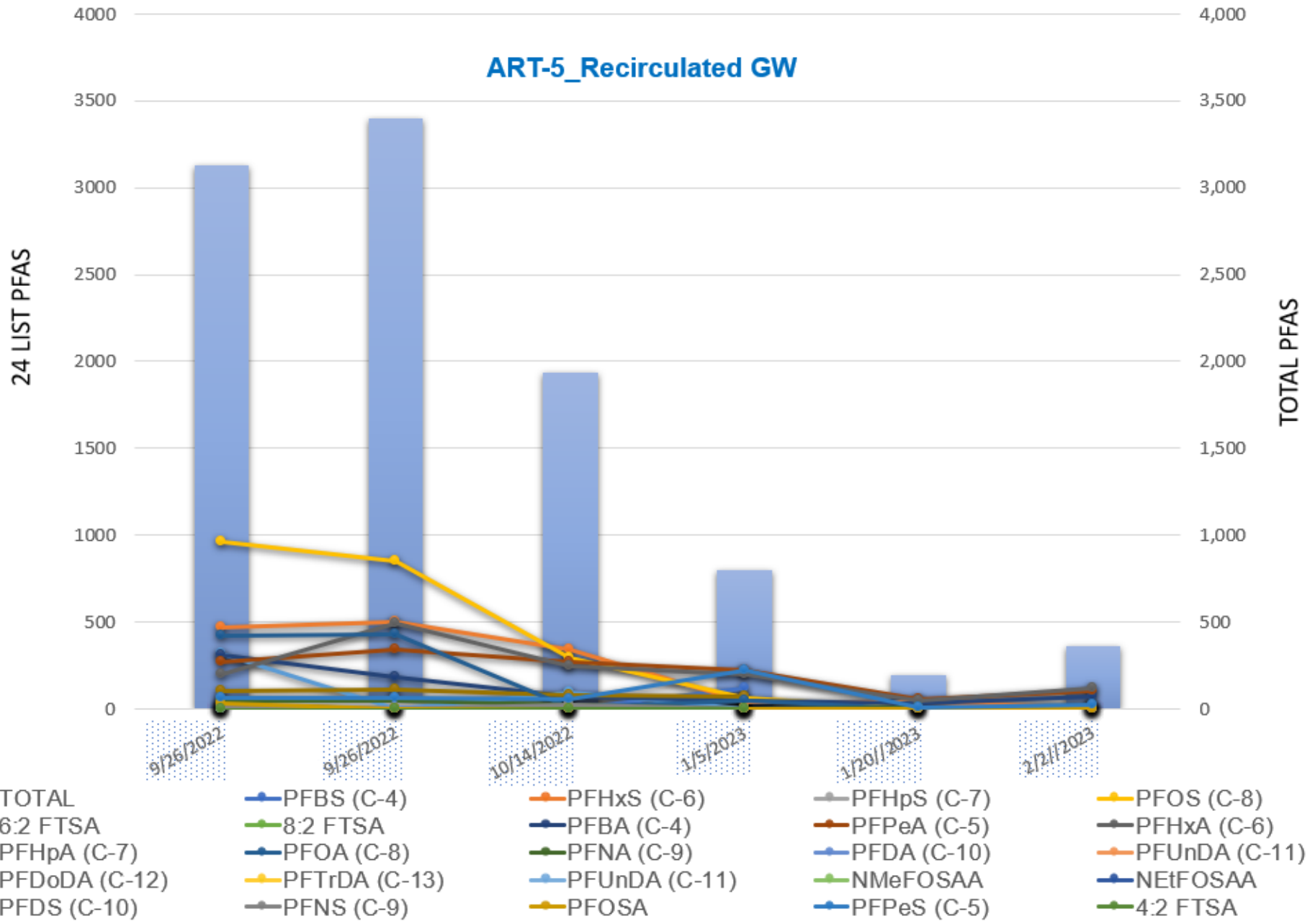
Field-Scale  
Application:  
ART-PFAS  
Above-Ground  
System  
Components/  
Connections



# Foam Fractionation & Recovery



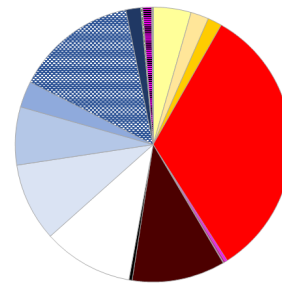
### ART-5\_Recirculated GW



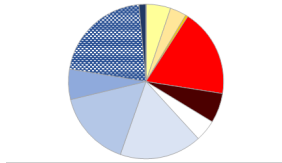
GW PFAS  
Concentration  
Reduction  
>90-99%

# Speciation of Recirculated GW at ART-5

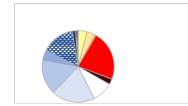
**GW Baseline (9/26/2022):**  
2930 ng/L



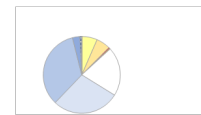
**Initial Foam Enrichment / Day 1: (10/14/2022):**  
1,575 ng/L



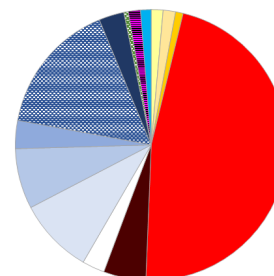
**Week 3 (1/20/2023):**  
297 ng/L



**Week 5 (2/2/2023):**  
353 ng/L

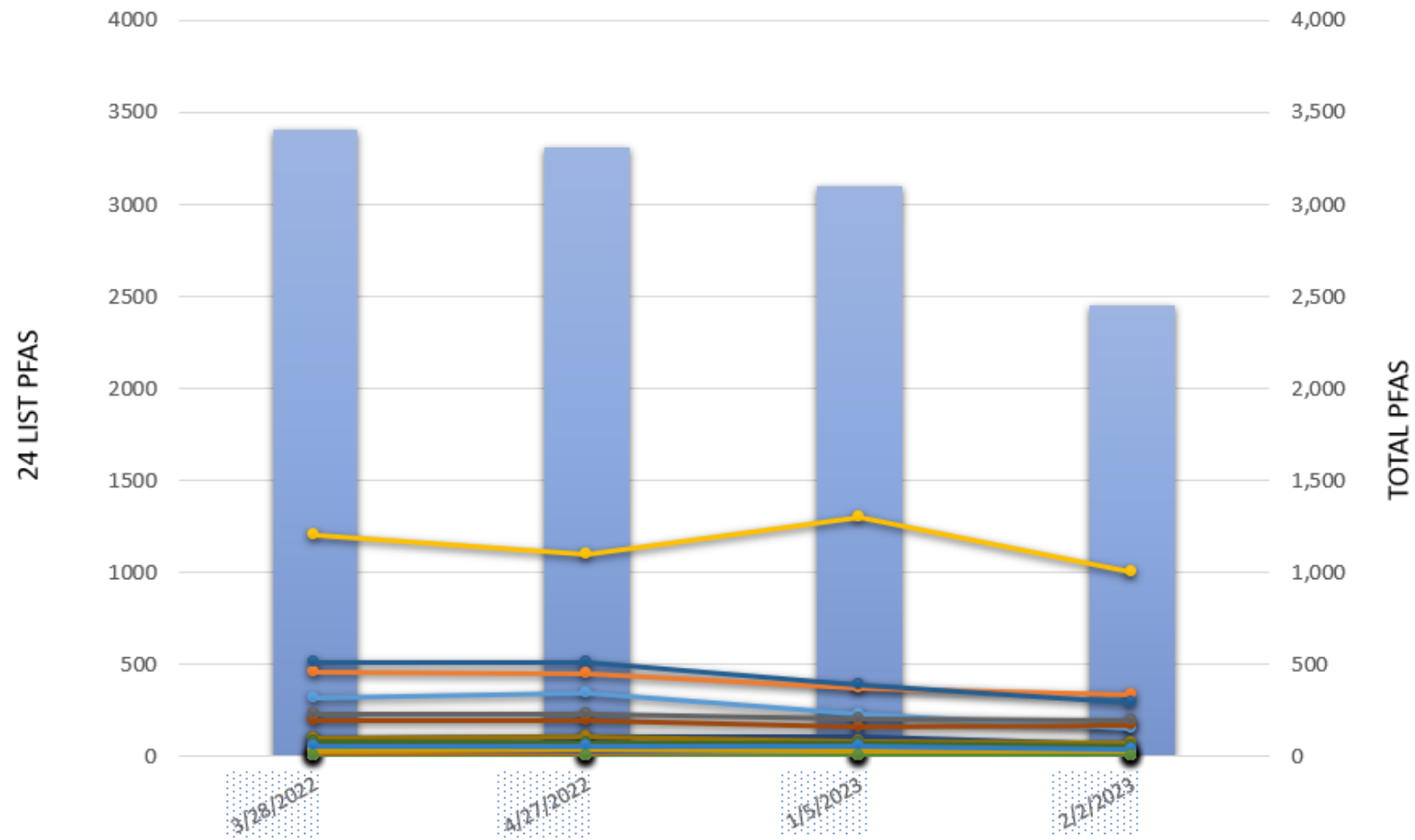


**Rebound (6 weeks post shut down):**  
2,775 ng/L



PFBS	PFPeS
PFHxS	PFHpS
PFOS	PFNS
PFDS	PFDoS
4:2FTS	6:2FTS
8:2FTS	PFBA
PFPeA	PFHxA
PFHpA	PFOA
PFNA	PFDA
PFUnA	PFDoA
PFTTrDA	PFTeDA
3:3 FTCA	5:3 FTCA
7:3 FTCA	PFOSA
NMeFOSA	NEtFOSA
NMeFOSAA	NEtFOSAA
NMeFOSE	NEtFOSE
HFPO-DA	ADONA
PFMPA	PFMBA
NFDHA	PFEESA
11Cl- PF3OUdS	9Cl-PF3ONS

### MW-10SR Performance MW (~10 ft from ART-5)

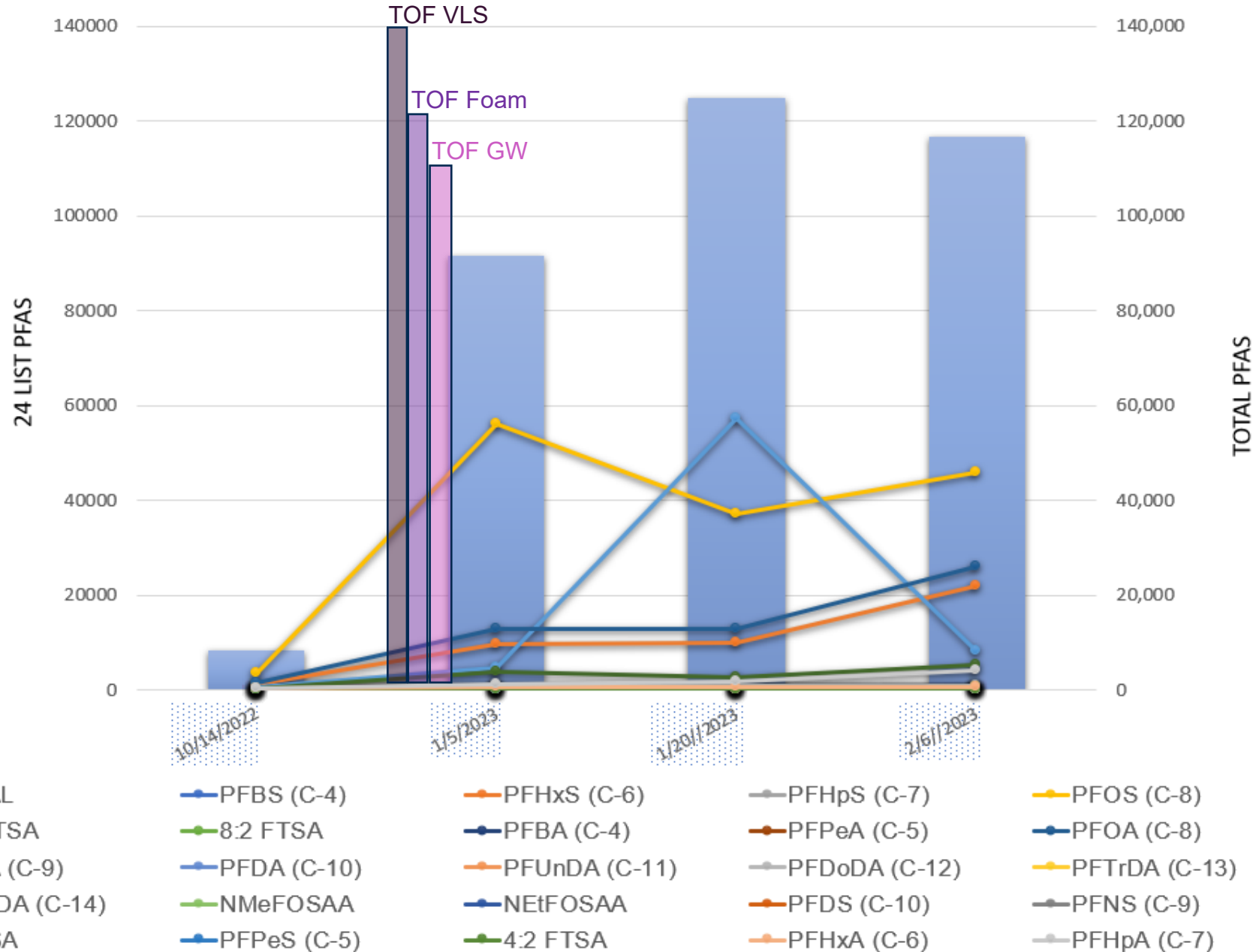


GW PFAS  
Concentration  
Reduction  
~25-40%  
(2 months of  
operation)

- TOTAL
- PFBS (C-4)
- PFHxS (C-6)
- PFHpS (C-7)
- PFOS (C-8)
- 6:2 FTSA
- 8:2 FTSA
- PFBA (C-4)
- PFPeA (C-5)
- PFHxA (C-6)
- PFHpA (C-7)
- PFOA (C-8)
- PFNA (C-9)
- PFDA (C-10)
- PFUnDA (C-11)
- PFDoDA (C-12)
- PFTTrDA (C-13)
- PFTeDA (C-14)
- NMeFOsAA
- NETFOsAA
- PFDS (C-10)
- PFNS (C-9)
- PFOSA
- PFPeS (C-5)
- 4:2 FTSA



### ART-5\_VLS Tank Foam Knock Out Pot



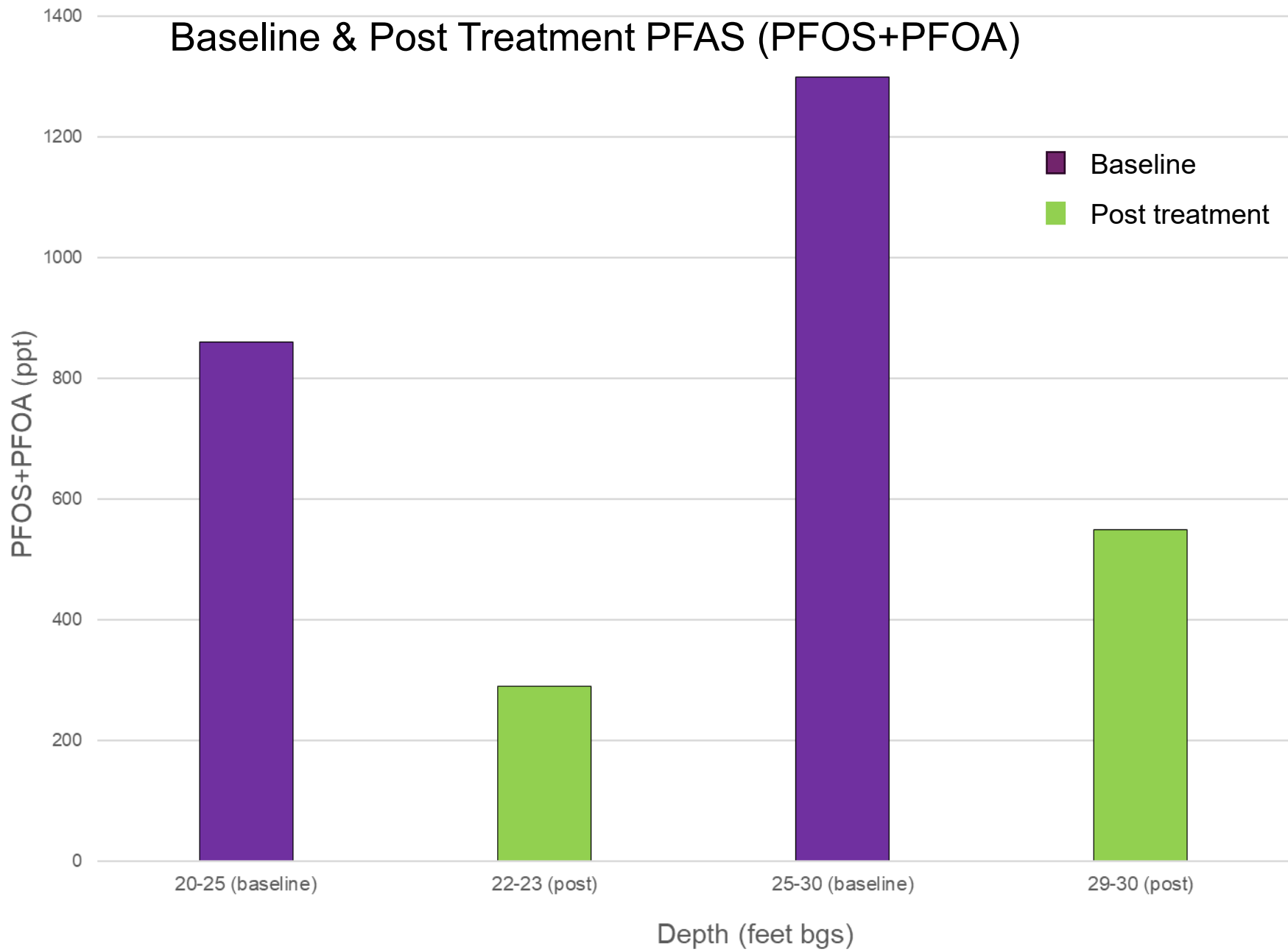
VLS Foam  
PFAS Concentration  
Enrichment  
>40-300 x's

Recovered  
Foam/Condensate  
Volume ~50 Gallons

Total Recirculated GW  
Volume > 500K Gallons

Recovered GW Volume  
Reduction (vs. P&T)  
~10,000 x's

# Baseline & Post Treatment PFAS (PFOS+PFOA)



## Soil PFAS Concentrations

- Active in-situ remediation for VOCs & PFAS
  - *Proven & well-established synergistic processes*
  - *Readily integrated into existing systems*
- Effective source & plume control/mass flux reduction
- Green
- Cost effective

Concluding  
Remarks

# A C K N O W L E D G E M E N T S

- **Accelerated Remediation Technologies, Inc.:** Mohamed Odah, Ph.D., P.E.
- **Specialty Systems Integrators, Inc.:** Samir Bouzrara
- **TRC:** Connor Luther, P.E.

***Thank You***

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