

PFAS DESTRUCTION CASE STUDY

PAIRING PHOTO-ACTIVATED REDUCTIVE DEFLUORINATION
WITH FOAM FRACTIONATION AT AN INDUSTRIAL FACILITY

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Technology Introduction



Pilot Study Site Overview and Results



Lessons Learned



Summary and Conclusions

Current methods leave lingering PFAS



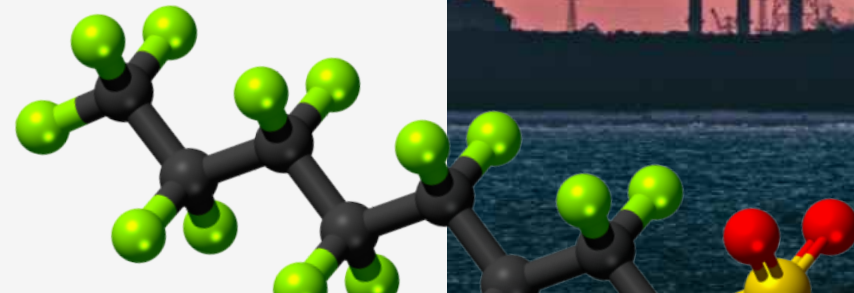
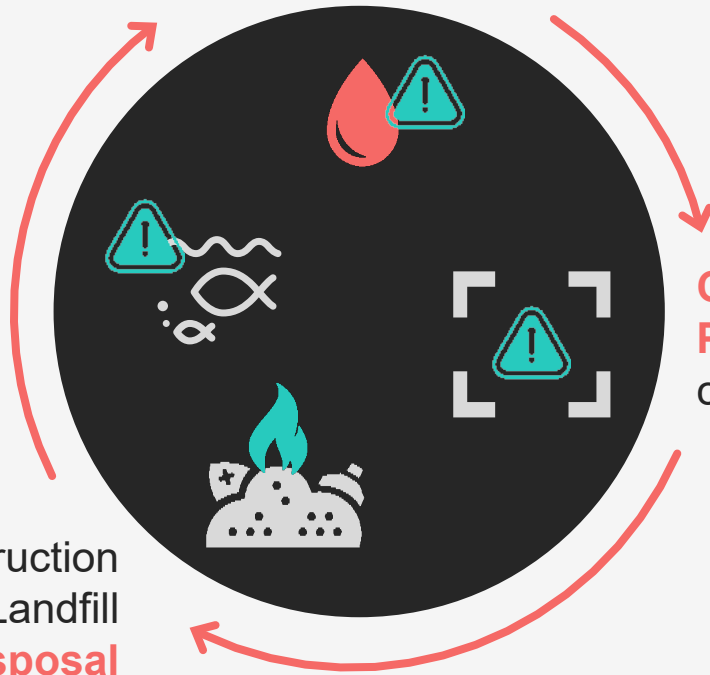
CURRENT METHODS

PFAS in water

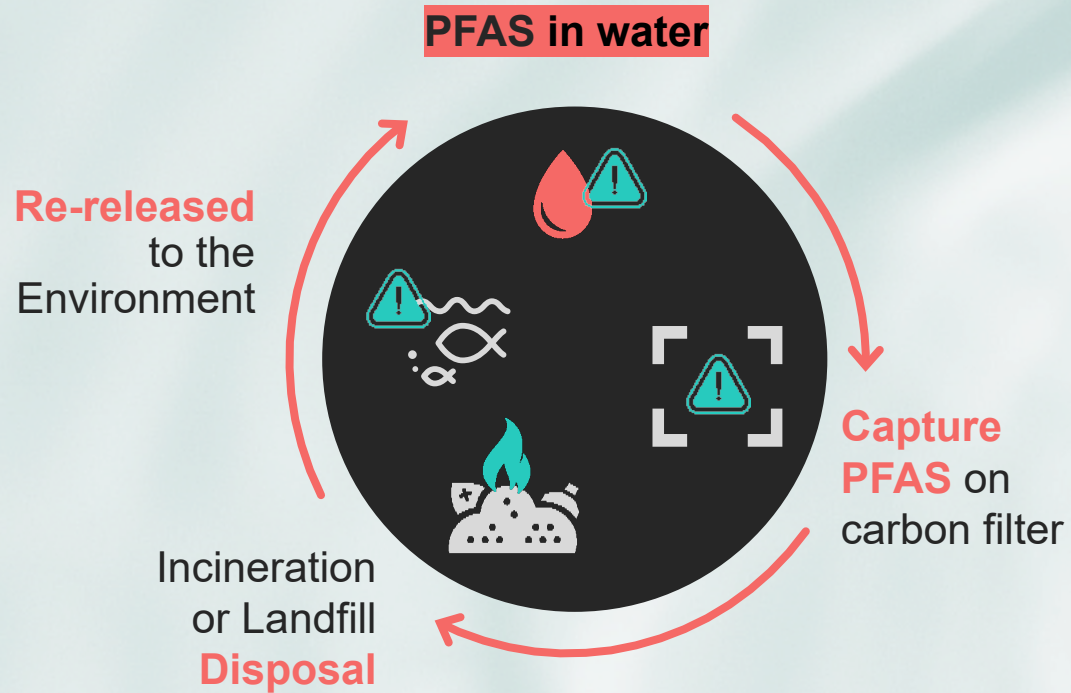
Re-released
to the
Environment

Capture
PFAS on
carbon filter

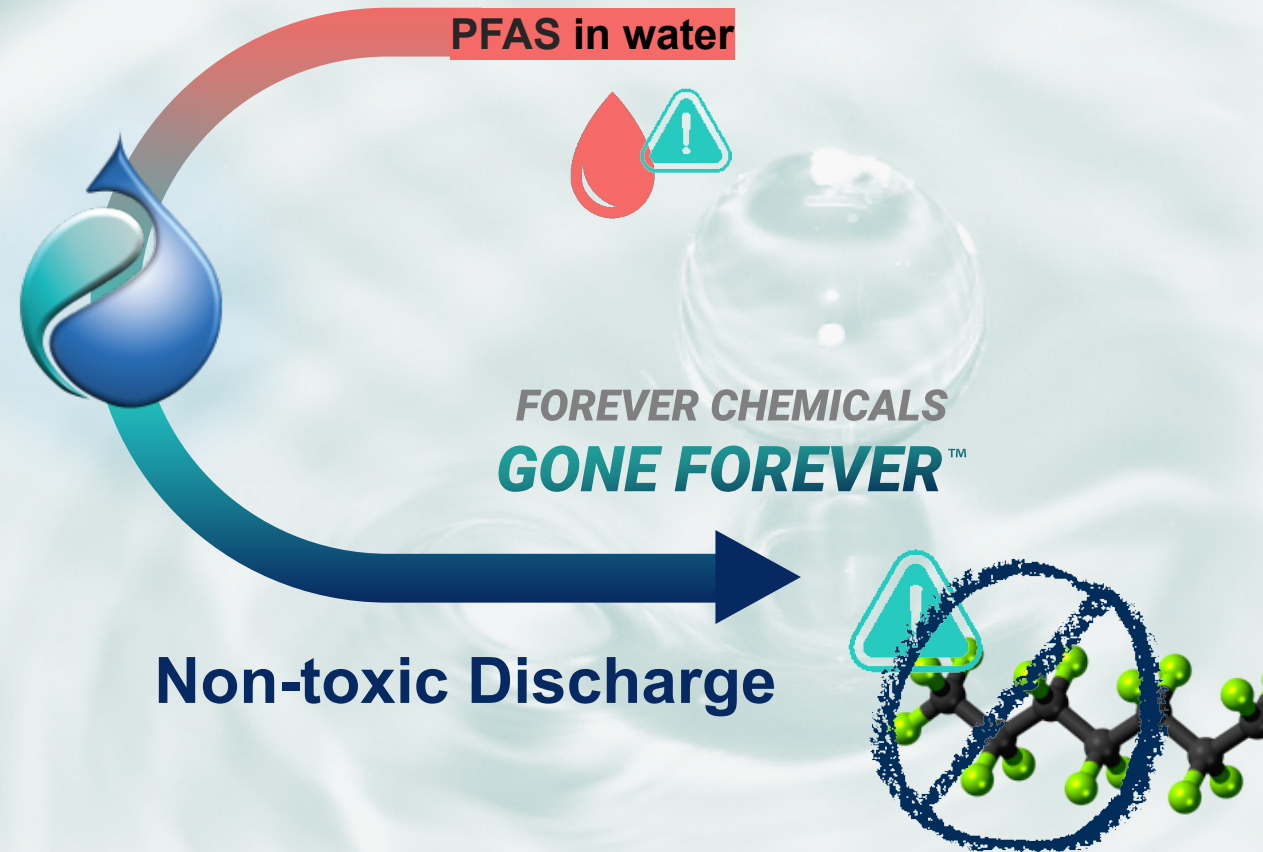
Thermal destruction
or Landfill
Disposal



CURRENT METHODS



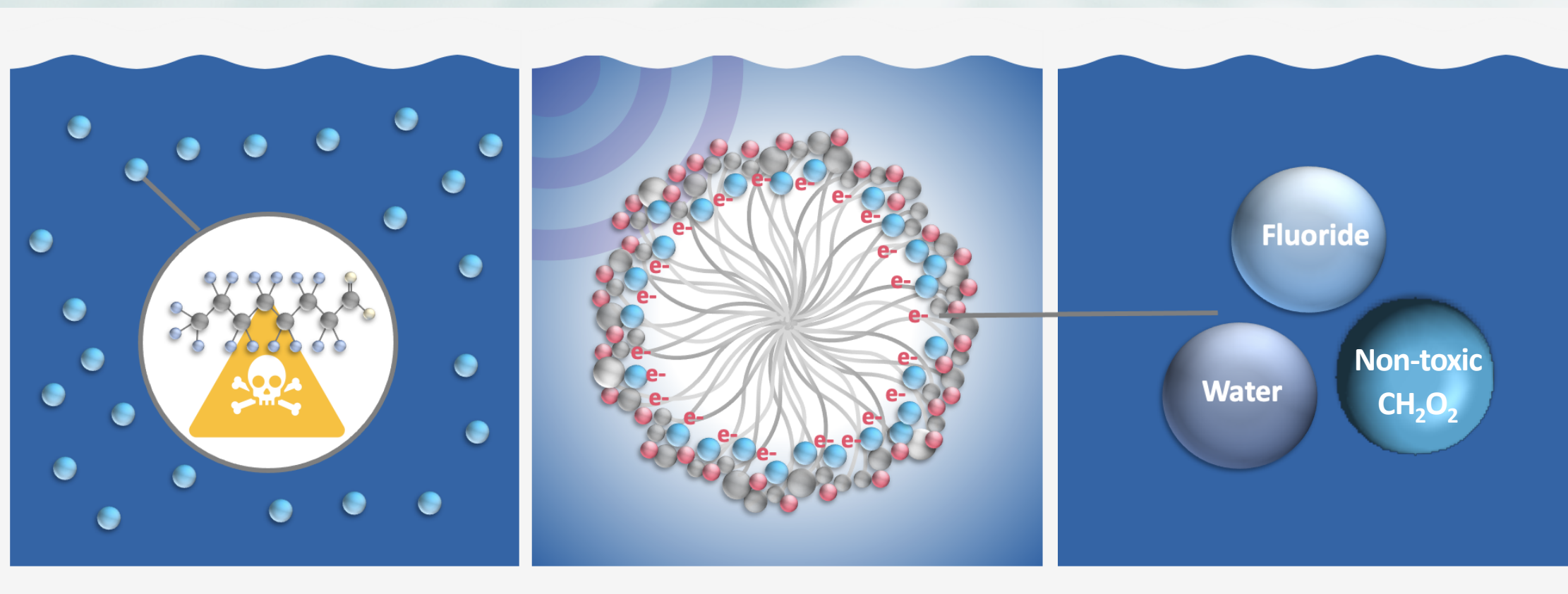
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Our Process – Photoactivated Reductive Defluorination

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Differentiators

EXCLUSIVE LICENSE

**2 Australian and 2 US patents on
PFAS destruction chemistry**



U.S. Department of Defense

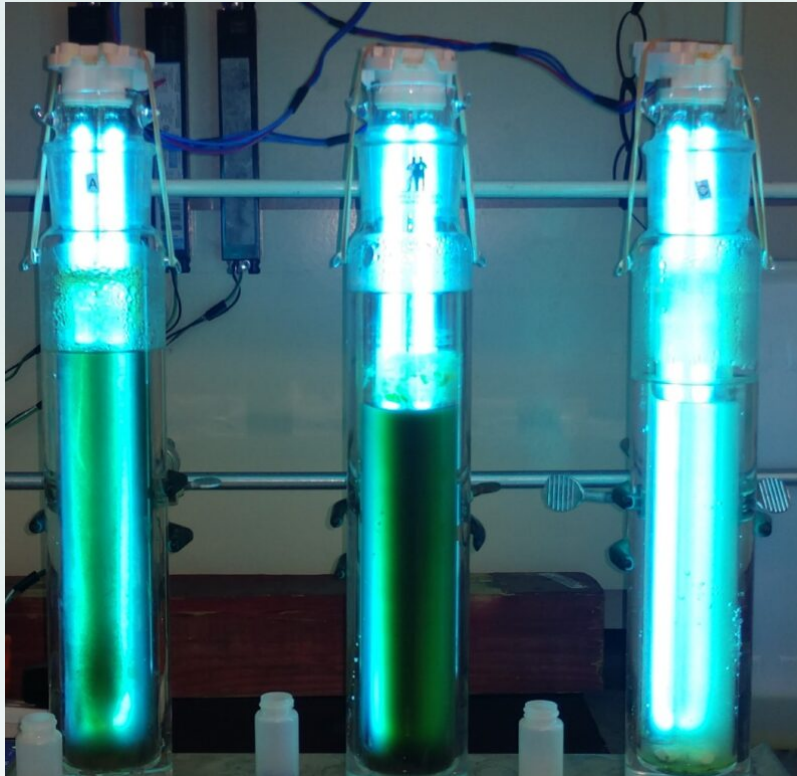
AWARD-WINNING CHEMISTRY

PFAS
Destruction

Energy
Efficiency

- **Fully Automated:** Does not require dedicated staff
- **Ambient Temperatures and Pressures:** Operable by owner personnel
- **Fabricated with “off-the shelf” water treatment equipment:** proven equipment, assembled to optimize proprietary chemistry
- **Reductive Defluorination:** No oxidative byproducts and no PFAS formation from precursors
- **Suitable for Continuous and Intermittent Operations**
- **Real-time monitoring of PFAS destruction:** Fluoride ISE

PFASigator™
By Enspired Solutions™



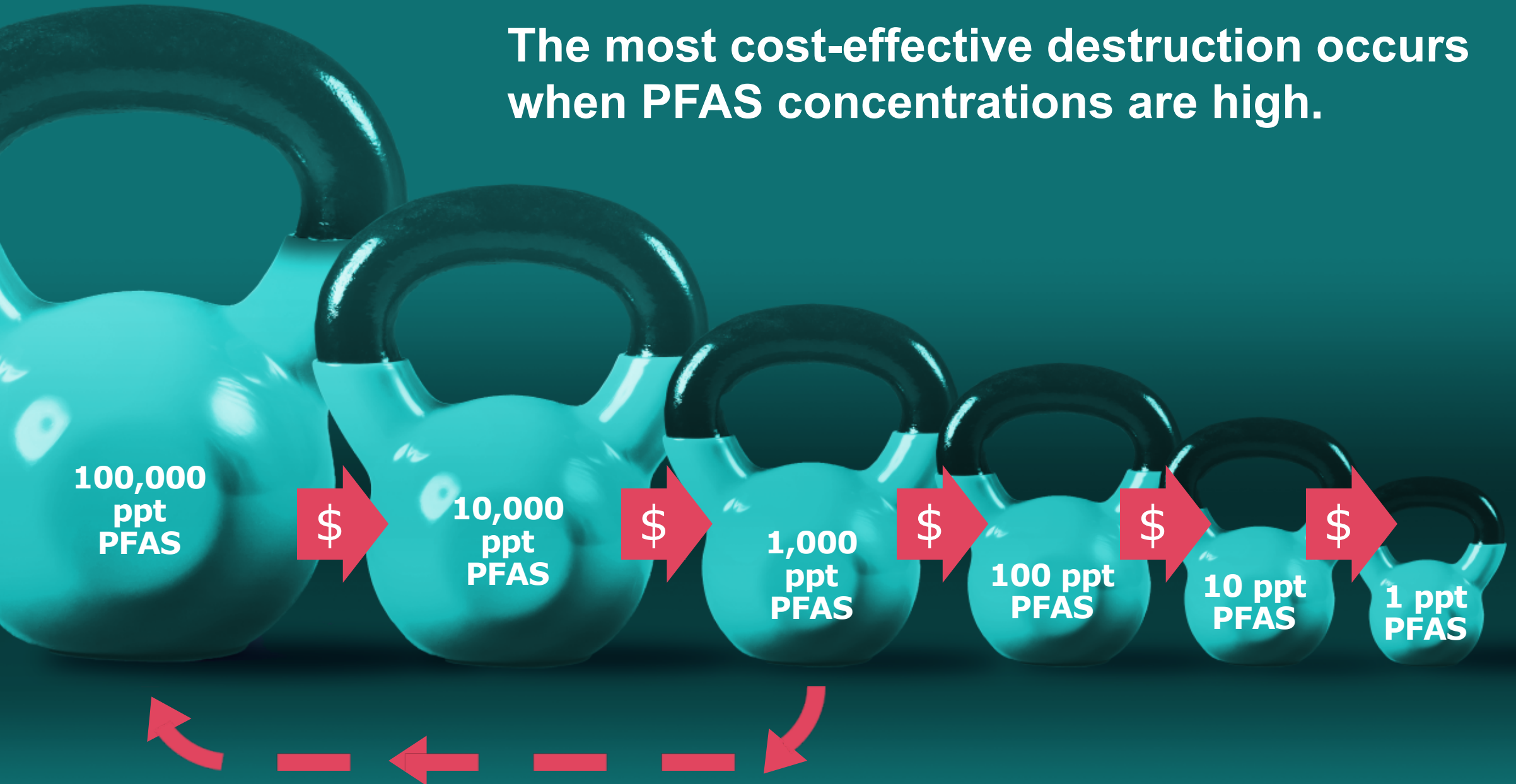
Bench Scale Testing



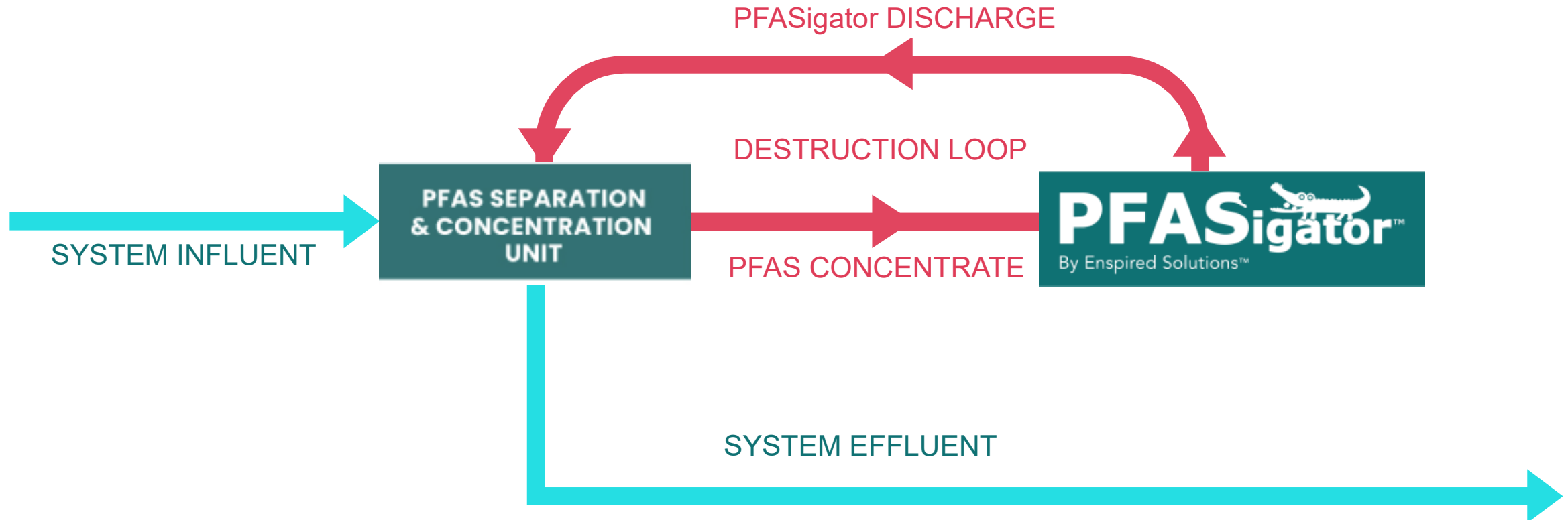
Full Scale – Version 1



The most cost-effective destruction occurs when PFAS concentrations are high.



Closed-circuit Process Flow for Highly Efficient PFAS Destruction



PILOT STUDY OVERVIEW AND RESULTS

Site Description

- **Industrial Facility** with inadvertent release of PFAS-affected process water
- Resulting groundwater plume requires **~20 GPM extraction system** to prevent offsite migration.
- Groundwater currently is discharged into water treatment system which treats a **combination of process water and groundwater**

Pilot Study Conditions and Objectives

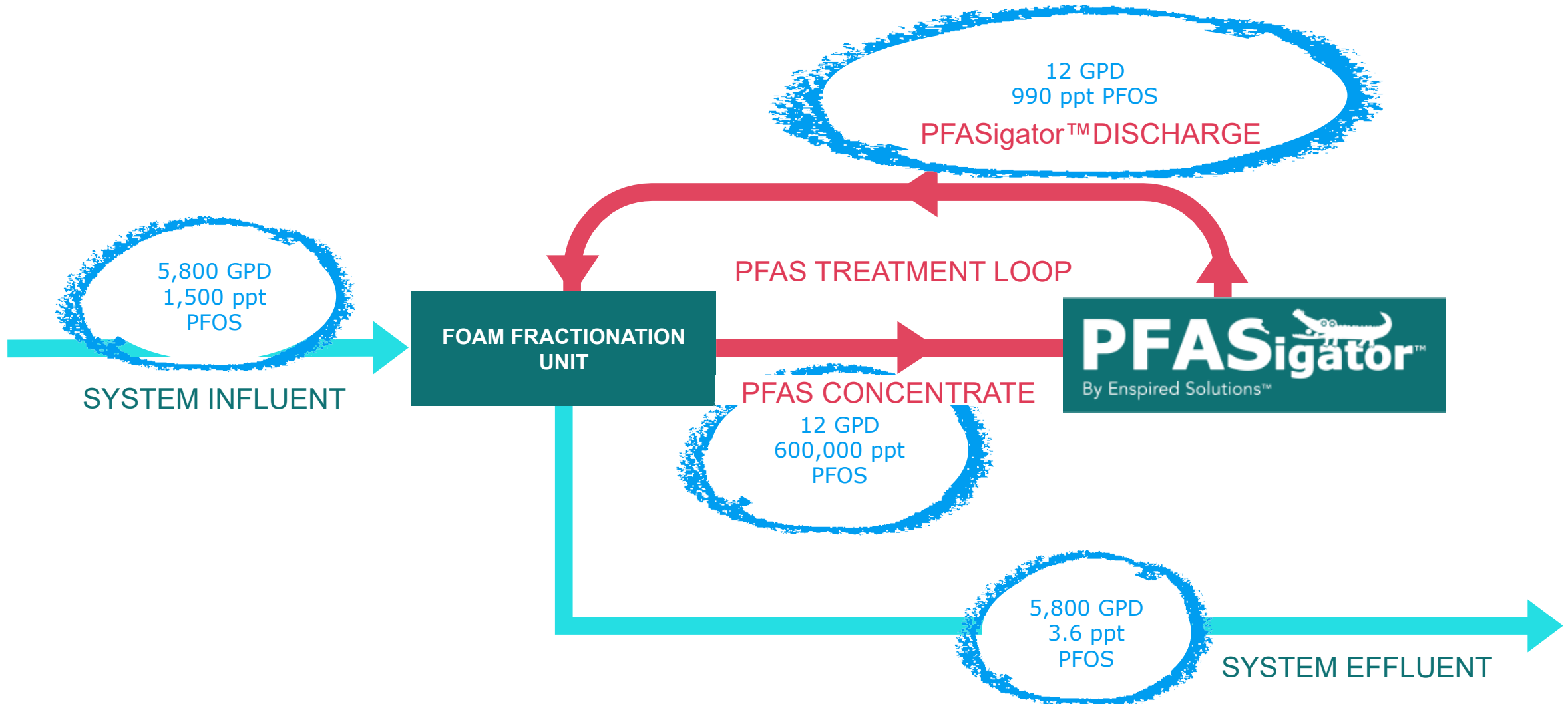
- **Target Flow:** 5 GPM
- **Target Technologies:**
 - ***ECT2*** – FOAM-X™ - Foam fractionation – PFAS Removal/Concentration
 - ***Enspired Solutions*** – PFASigator™ – PFAS Destruction
- **Influent water quality:** ~1,500 ppt PFOS, ~4,000 ppt total PFAS.
- **Discharge Requirements:** 28 ppt PFOS
- **Waste Disposal:** No offsite disposal
- **Duration:** 1 Month

Influent &
Effluent
Tanks



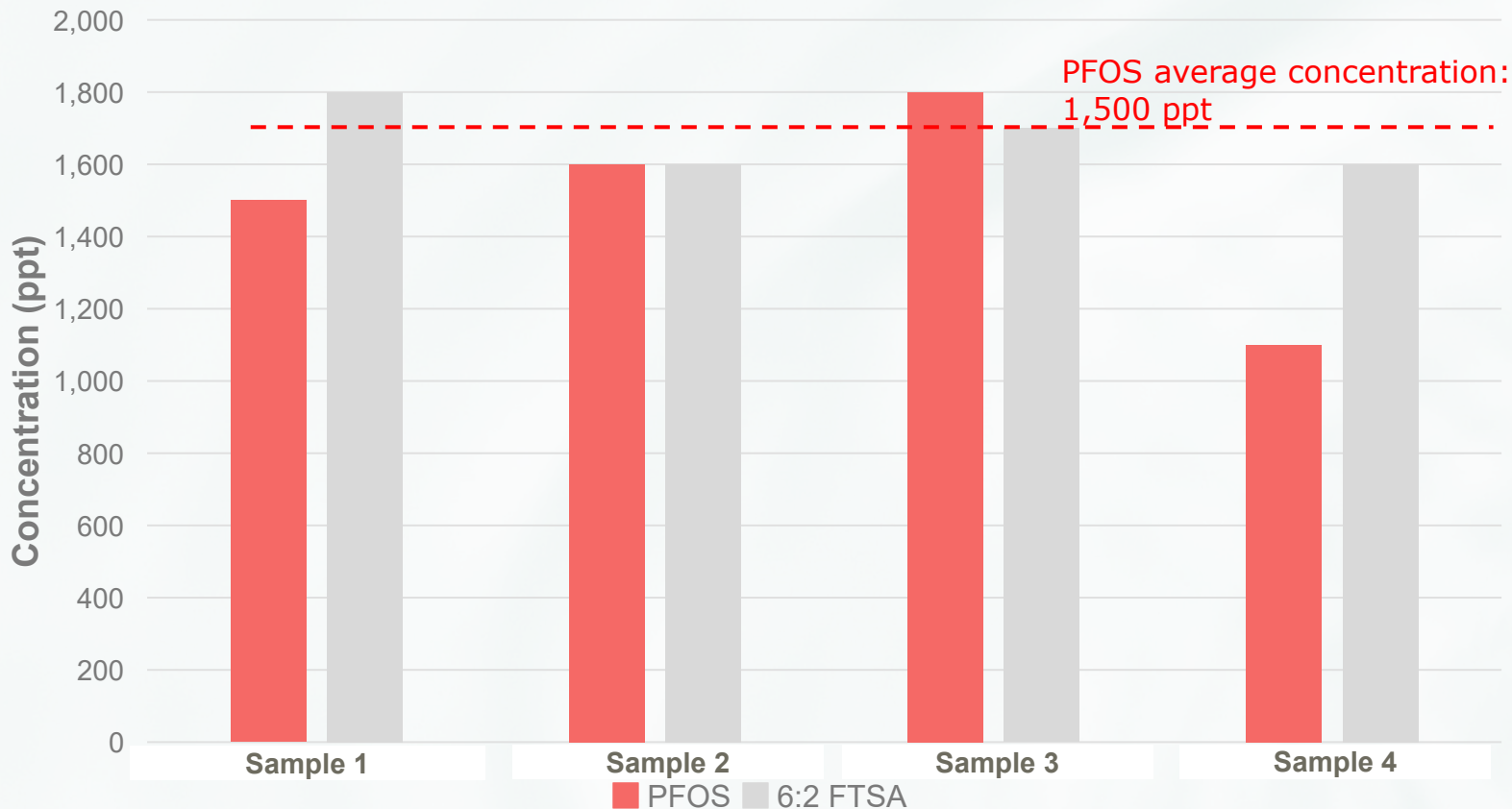
PFASigator™

Pilot Test Results



FOAM FRACTIONATION INFLUENT SAMPLING

Influent Groundwater PFAS Concentrations

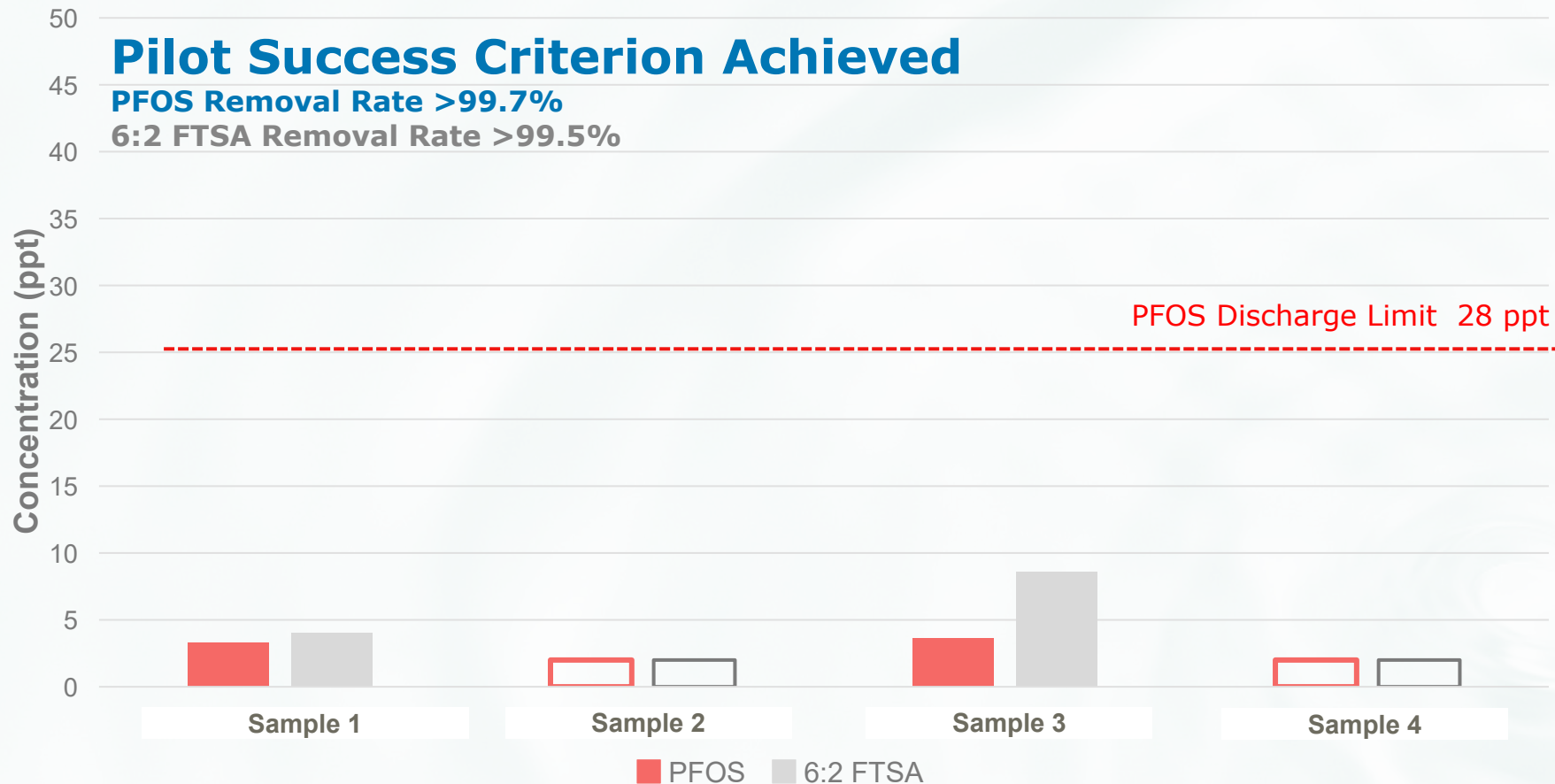


- **PFOS** concentration of **(1,500 +/- 290) ppt**
- Total PFAS concentration of **(3,600 +/- 360) ppt**

Foam Fractionation Effluent (Raffinate)

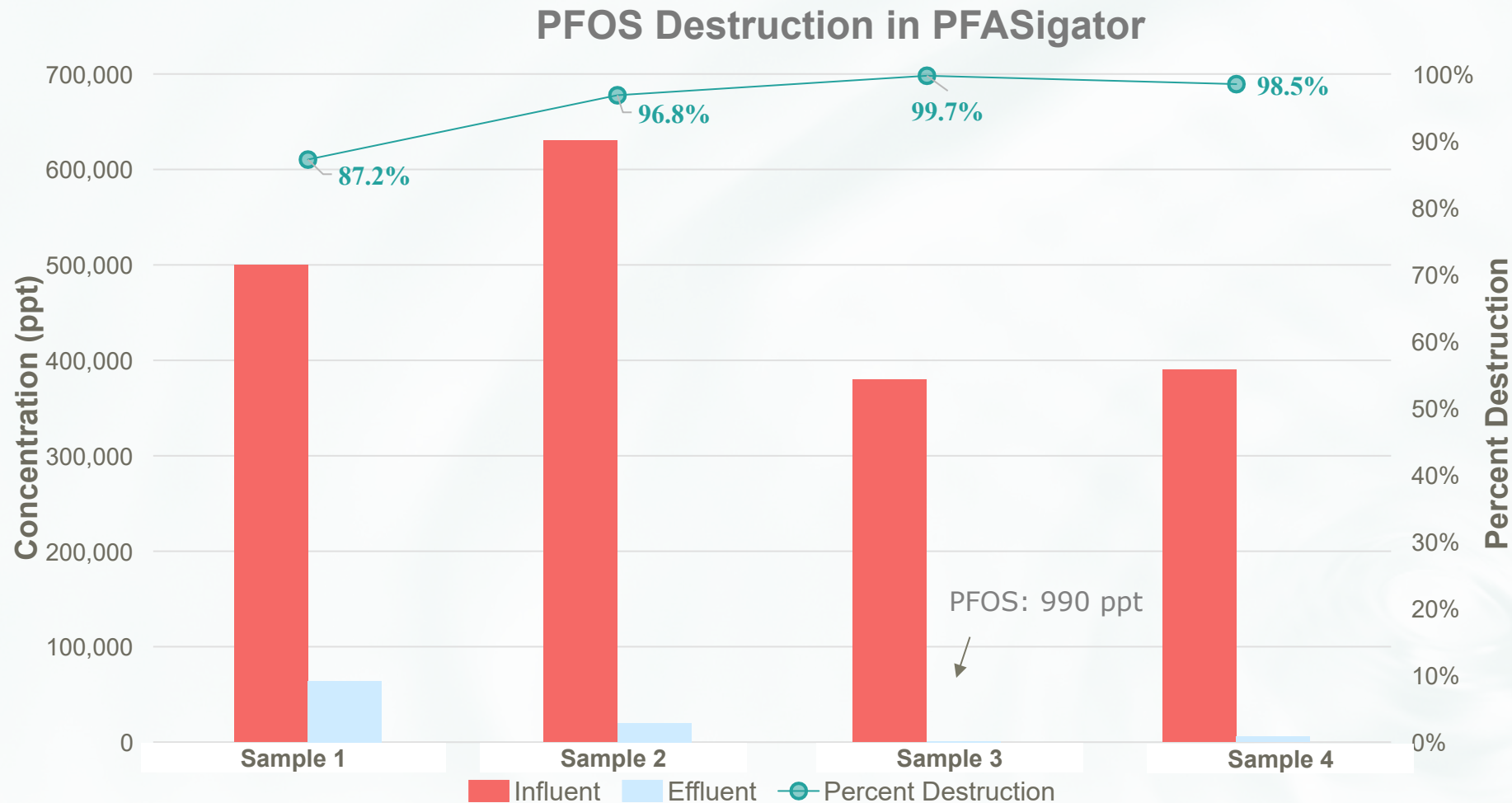


Effluent Raffinate PFAS Concentrations

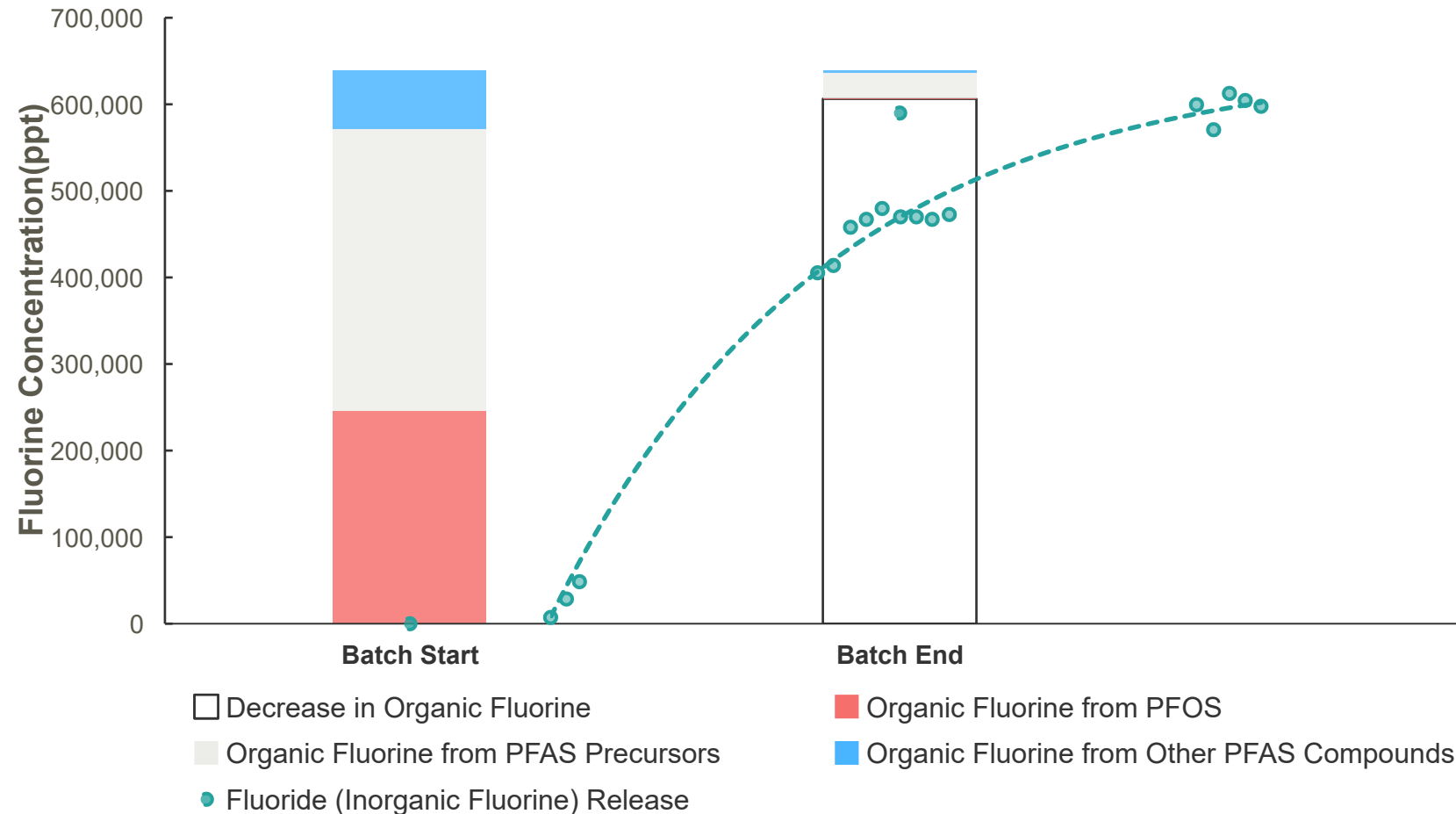


Note: Hollow bars represent non-detects that the height represents reporting limits.

PFAS Destruction By PFASigator



Fluorine/Fluoride Mass Balance



Fluorine/Fluoride Mass Balance

Fluorine - Start:	638,847 ppt
Fluorine - End:	32,517 ppt
Fluorine Decrease:	606,330 ppt
Fluoride Detected:	580,600 ppt (97%)

LESSONS LEARNED

Lessons Learned



- **Quick TAT Sampling:** Essential to optimizing system in a short timeline.
- **Real-time Fluoride ISE :** Allowed for real-time insights and allowed for reaction optimization
- **Quartz Sleeve Cleaning:** Ultrasonic cleaners insufficient. Modified reactor to include mechanical wipers.

SUMMARY AND CONCLUSIONS

Performance Summary

- **PFASigator™ + Foam Fractionation is Economical and Feasible**
- **Effective PFAS Destruction**
- **Fluorine/Fluoride Mass Balance Demonstrates PFAS Destruction**
- **Compliant PFAS Discharge**
- **Zero Off-site Waste Disposal**



— BUREAU OF —
RECLAMATION



Merit
Laboratories Inc



mect₂

Montrose Environmental Group



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