



Foam Fractionation - Leveraging the Physiochemistry of PFAS Against Itself



Nicole Bolea, PE

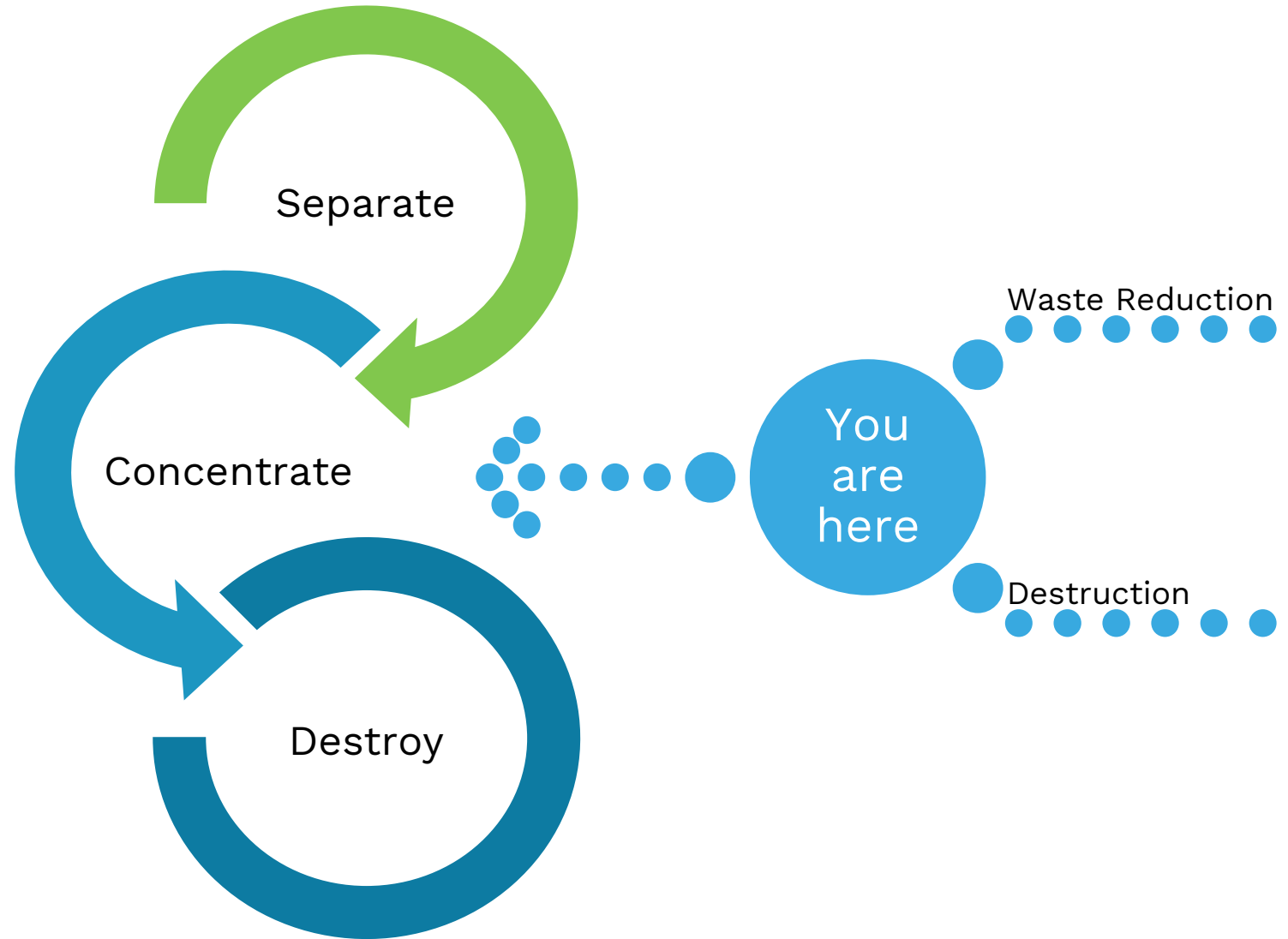


Agenda

- Foam Fractionation Fundamentals
 - Bench
 - Pilot
 - Application
- Landfill A
- Landfill B
- Summary
- Questions



PFAS Lifespan



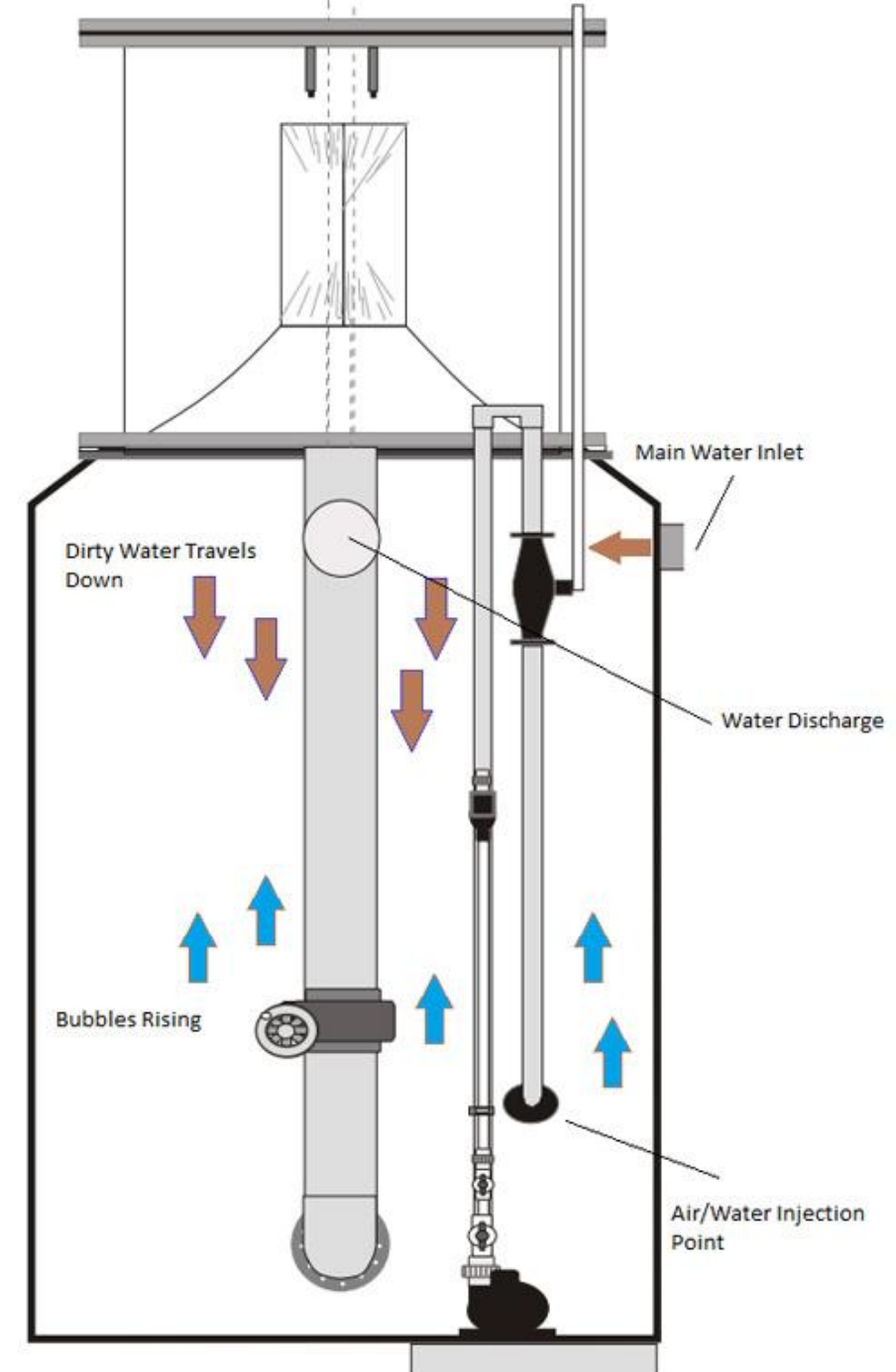
Foam Fractionation Fundamentals

Water Flow Path

- Wastewater enters at the main water inlet at the top
- Wastewater flows down through the foam, PFAS is captured in the foam and floats to the top
- Clean water exits at the bottom, with 99%+ of PFAS removed

Air Flow Path

- Air enters the bottom of the water column at the air/water injection point
- Air floats to the top and exits the top as foam, capturing PFAS along the way
- The foam that flows out of the top of the vessel is collected for final media treatment or direct destruction



Bench Foam Fractionator

- Treatability
- Chemical Addition

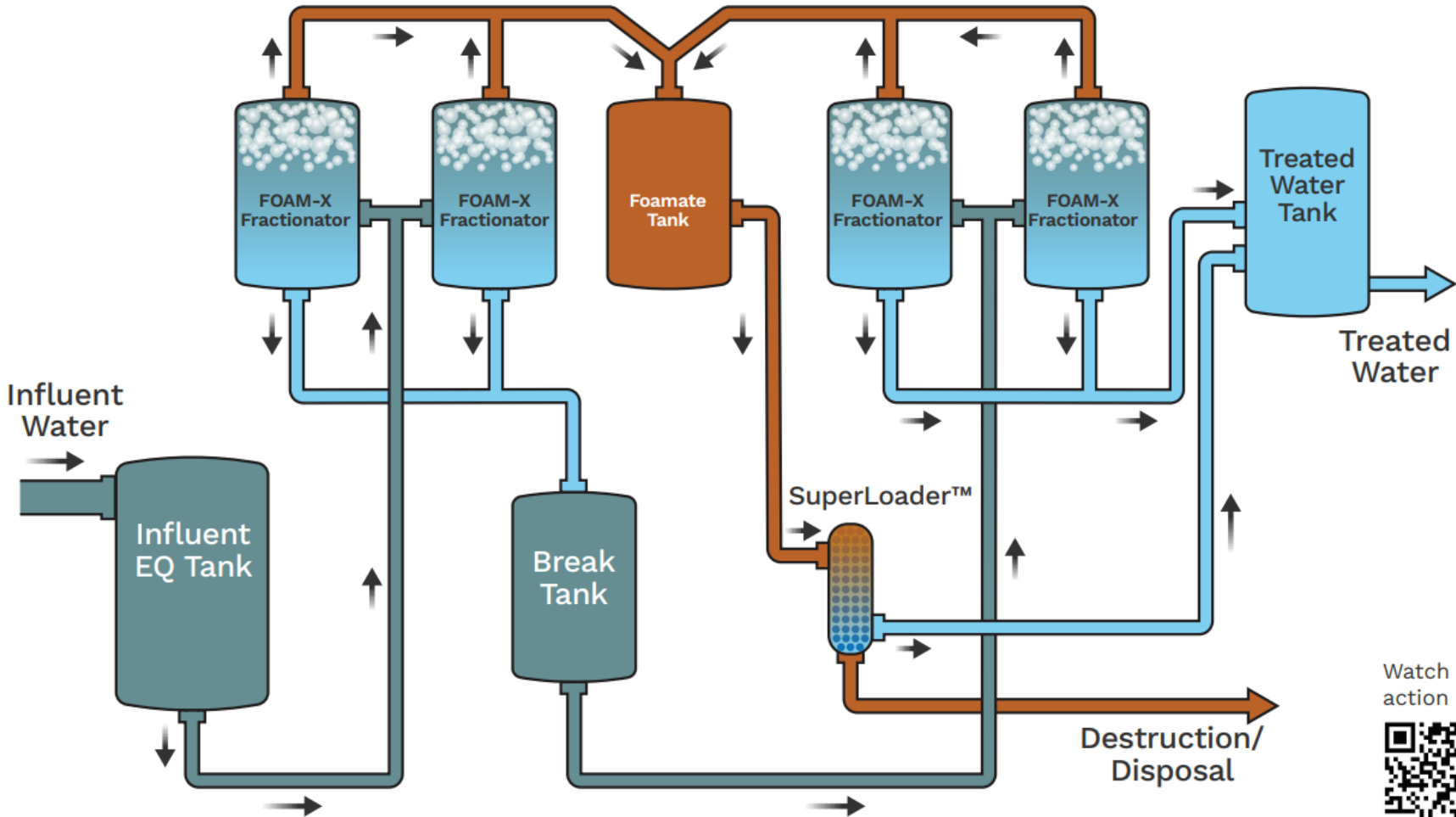
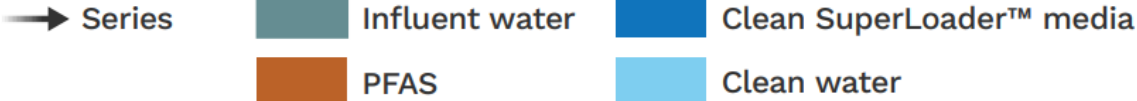


Pilot Foam Fractionation

- Scalability
- 24/7 Operations
- Foamate loading or destruction



Mobile Pilot System



Watch it in action here!



Mobile Pilot System in Action

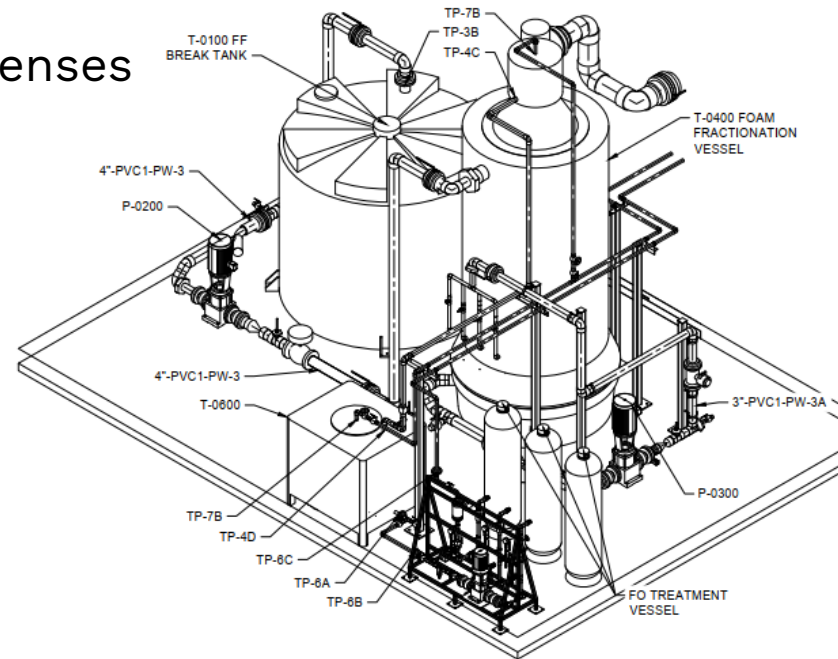


Christopher Hutchins



Foam Fractionation Applications

- Simple Operation
- Low energy, low pressure
- Concentration step improves efficiency of media treatment
- Low operation expenses





Pilot Data

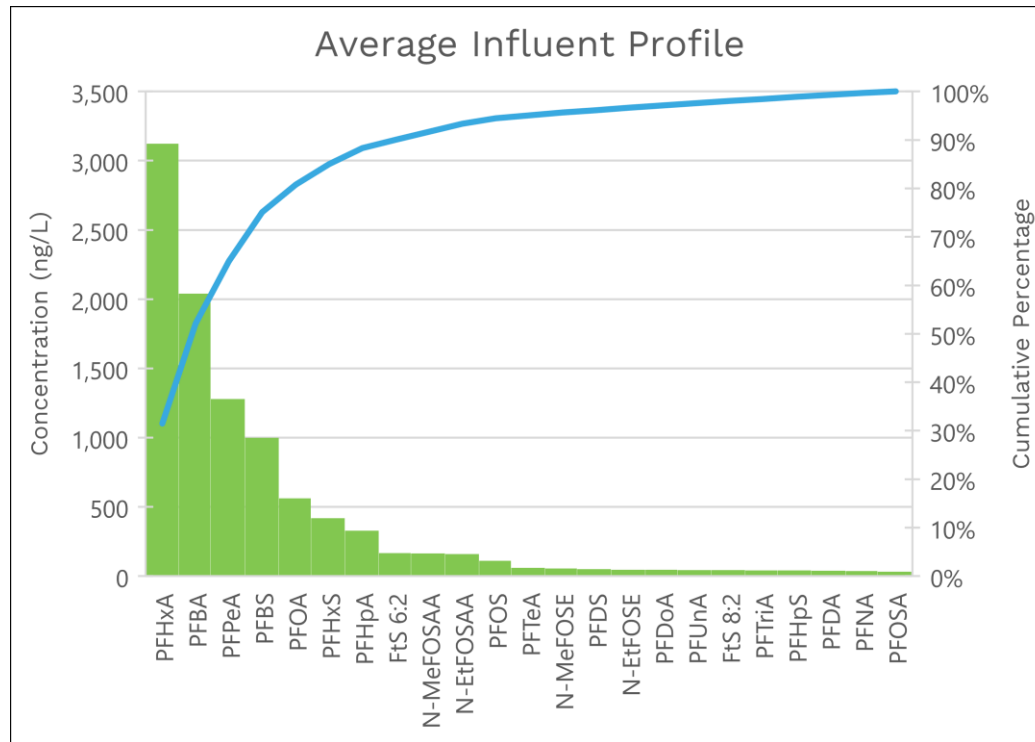


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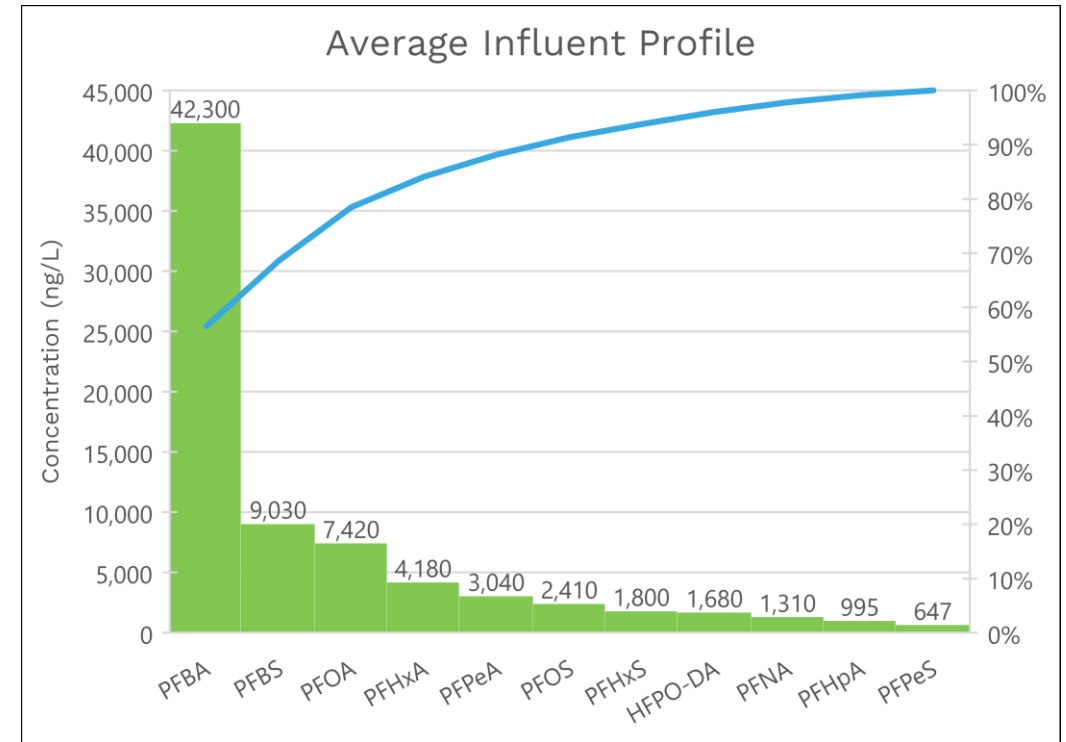
A Tale of Two Landfills

Leachate Influent Profiles

Landfill A



Landfill B



Leachate Influent Profiles

Landfill A

- Municipal Landfill
- Untreated Leachate
- Foams excessively

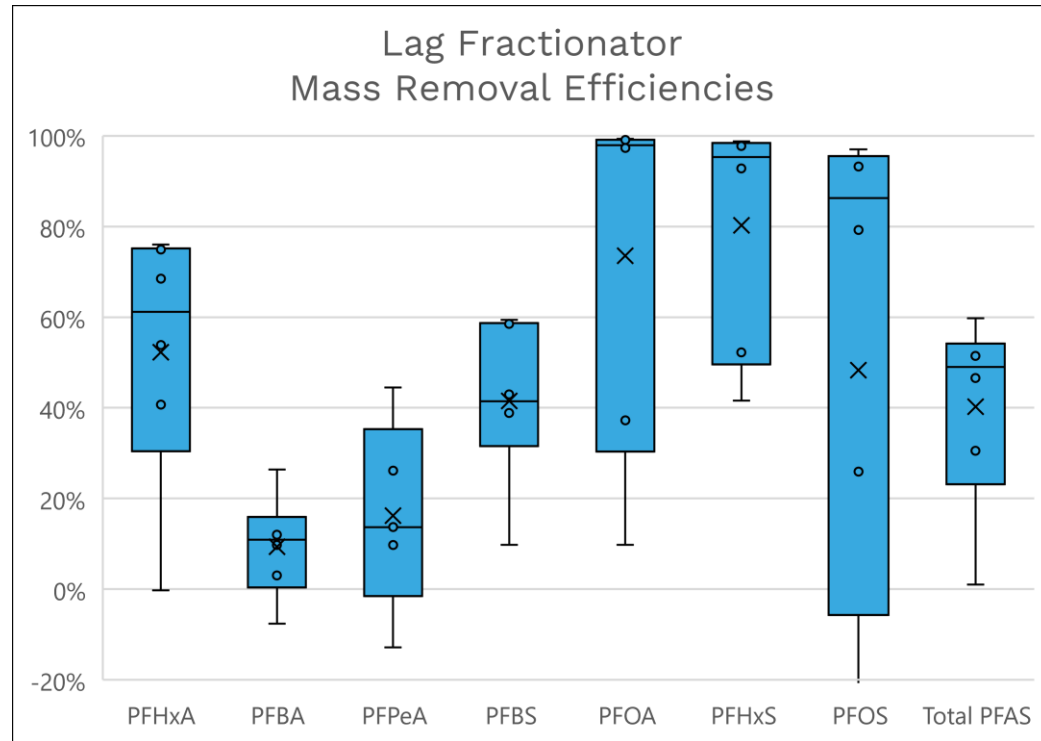
Landfill B

- Accepts Industrial Waste
- Membrane Bioreactor (MBR)
Pre-Treated Leachate
- Foams well

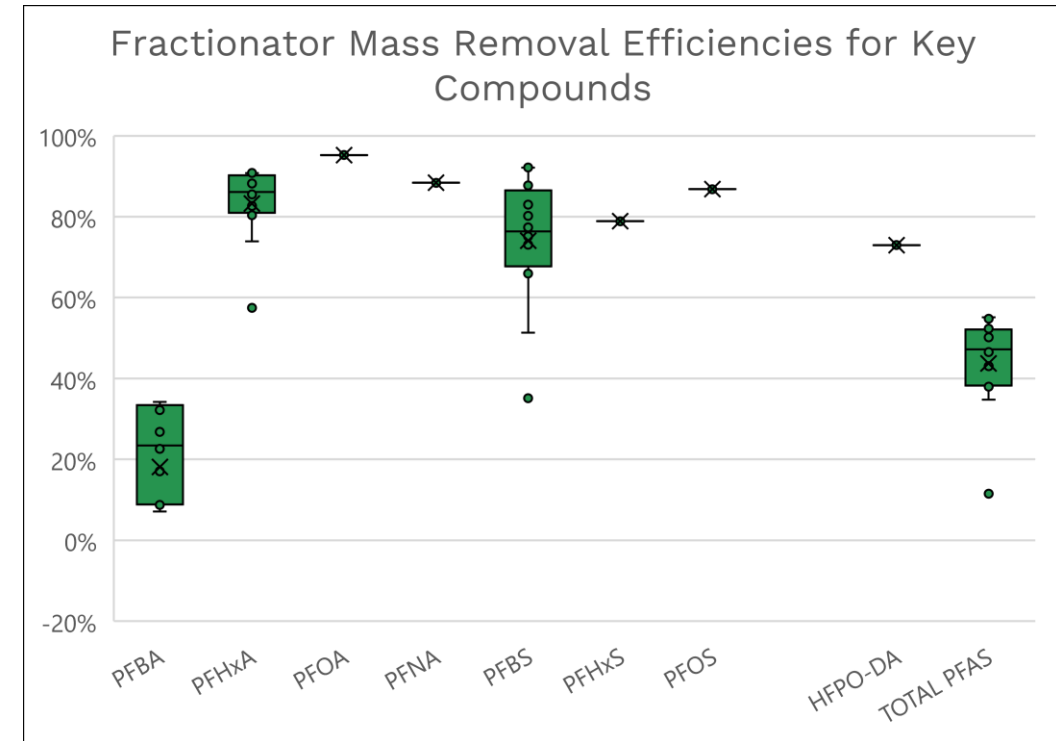


Foam Fractionation Removal by Analyte

Landfill A

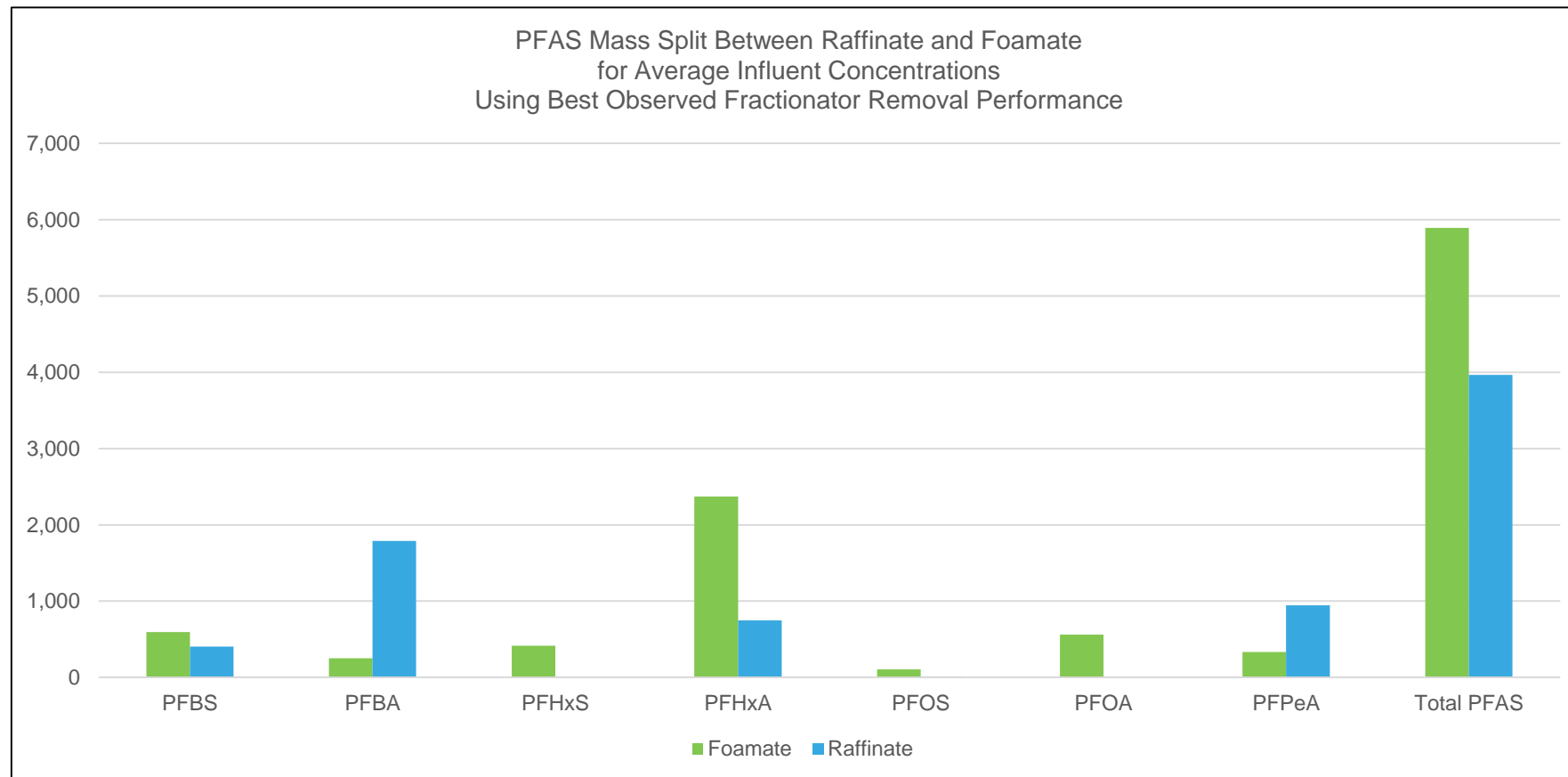


Landfill B



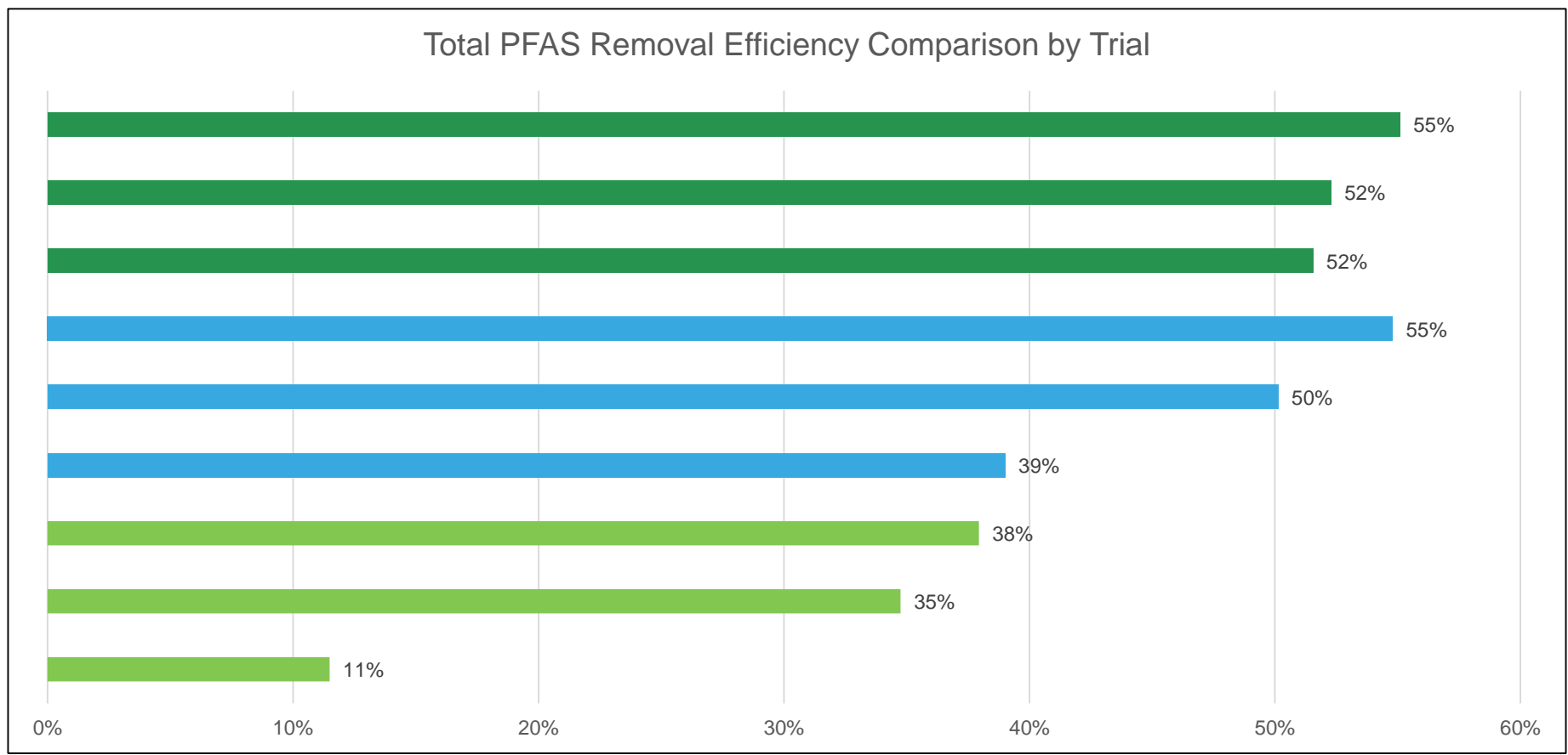
Removal Optimized

Landfill A



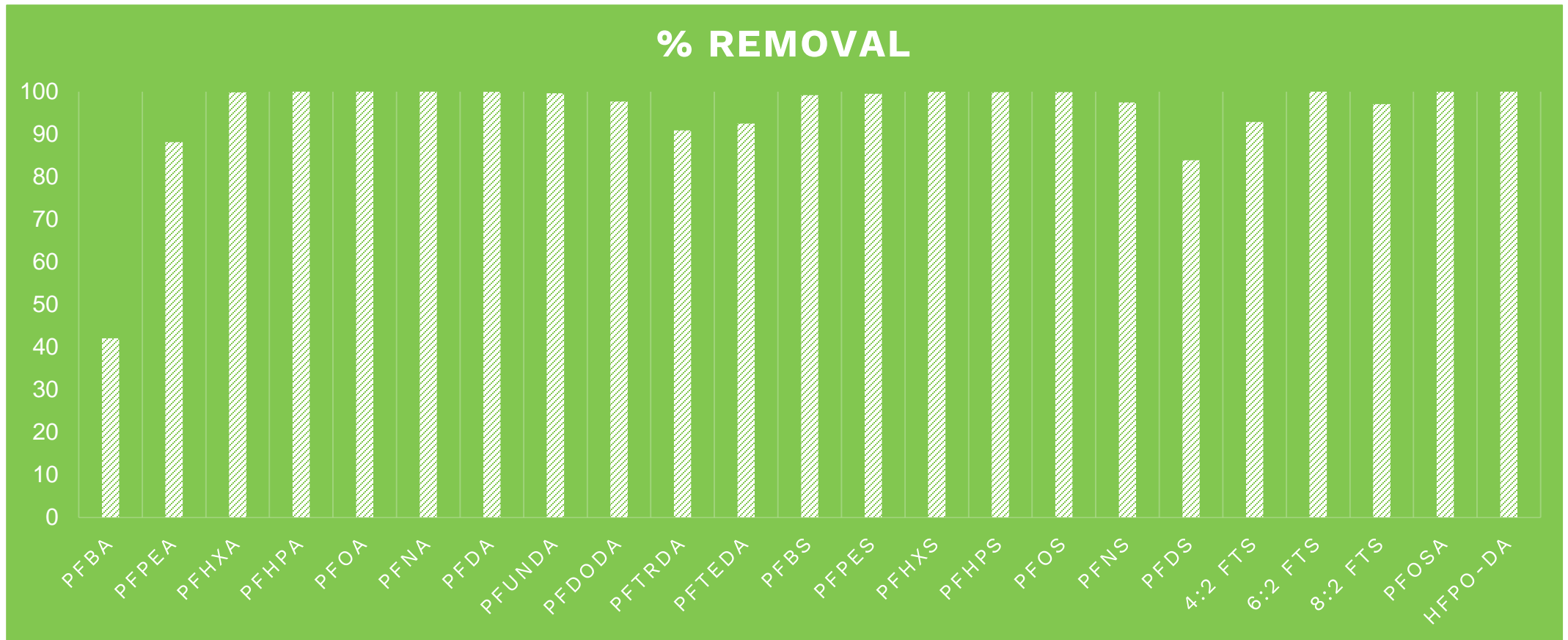
Foam Fractionation Removal by Trial

Landfill B



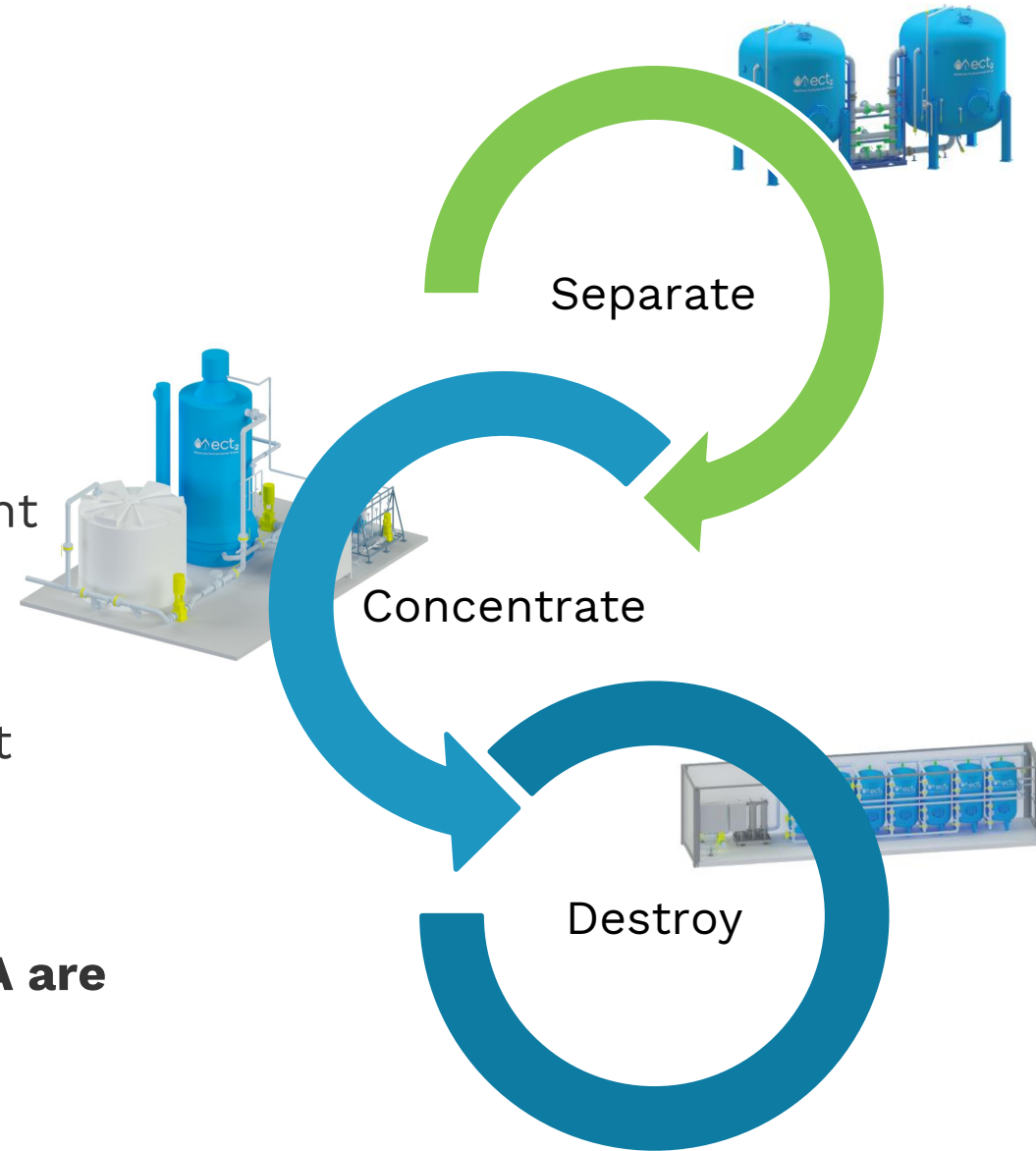
Spiked Leachate Trial

Landfill B



Conclusion

- Foam Fractionation benefits and limitations
- Not a straightforward exercise to pick the right technology
- Homework should be done to select the most cost effective one
- **Waste Reduction is critical as PFOS and PFOA are proposed to be designated Hazardous under CERCLA**





Thank you!



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