You've Got PFAS. Now What?

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STINSON

Agenda

1. Federal PFAS Update
2. Impact in Missouri
3. Considerations for investigation and remediation of PFAS
4. Questions

Federal PFAS Update

Finalized Federal Regulations

STATUTE	CURRENT REGULATION	REPORTING DEADLINE
TSCA **10 U.S.C. § 2607(a)(7) ("Reporting Rule")** **40 CFR Part 705**	**<u>Effective 11/13/2023:</u>** **Who must comply**: Companies that manufactured or imported a PFAS substance or PFAS-containing article at any time since **January 1, 2011** EPA has published a (non-exhaustive) list of 1,462 PFAS chemicals that trigger reporting requirements **What must be reported**: Information related to PFAS chemical identity and structure, production, use, by-products, exposure, disposal, and any known health or environmental effects the substance may cause	Manufacturers/ Importers: **May 8, 2025** Small Manufacturers/ Importers: **November 10, 2025**

Finalized Federal Regulations

STATUTE	CURRENT REGULATION	REPORTING DEADLINE
EPCRA (Toxics Release Inventory) **42 U.S.C. § 11023** **40 CFR Part 372**	**Reporting Year 2023**: 189 PFAS compounds must be reported **Reporting Year 2024**: PFAS now "chemicals of special concern." Reporting triggered at 100-lbs. Can no longer use *de minimis* threshold for reporting. **Going Forward**: Expect EPA to continue to add specific PFAS chemicals to list of chemicals covered by TRI	Reporting Year 2023: **July 1, 2024** Reporting Year 2024: **July 1, 2025**

Impact of TSCA & EPCRA Rules

TSCA

- EPA will collect a significant amount of information about how PFAS is used in commerce
- Significant compliance costs

EPCRA:

- Downstream users of PFAS can expect to receive more information
- Significant compliance costs

Finalized Federal Regulations

SAFE DRINKING WATER ACT		
CHEMICAL	**MCLG (NON-ENFORCEABLE GOALS)**	**MCL (ENFORCEABLE LIMITS)**
PFOA	0	4 ppt
PFOS	0	4 ppt
PFNA	10 ppt	10 ppt
PFH_XS	10 ppt	10 ppt
HFPO-DA (GenX Chemicals)	10 ppt	10 ppt
Mixture of two or more of: PFNA, PFH_XS, HFPO-DA, and PFBS	Hazard Index of 1	Hazard Index of 1

“Almost” Finalized Federal Regulations

- CERCLA
  - Pre-publication version of final rule released on April 19, 2024
  - Designates PFOA and PFOS as “hazardous substances”
    - Phase I Environmental Site Assessments now must consider PFOA and PFOS under ASTM Standard E1527-21
  - Sets reportable quantity at 1-lb. over any 24-hr. period
    - But no requirement to report past releases
  - EPA simultaneously released an enforcement discretion memo

Proposed Federal Regulation

STATUTE	PROPOSED RULE	EXPECTED DATE OF FINAL ACTION
RCRA	**Published in Fed. Reg. on 02/08/2024**: Designate **PFOA**, **PFOS**, **PFBS**, **HFPO-DA (GenX)**, **PFNA**, **PHFxS**, **PFDA**, **PFHxA** and **PFBA** as "hazardous constituents" "Hazardous constituents" designation impacts corrective action at permitted TSD facilities PFAS-containing wastes not ***yet*** proposed to be treated as "hazardous wastes"	No timetable Public comment was due April 8, 2024

Impact of Finalizing Regulations

- **SDWA**: MCLs often used as default cleanup level at RCRA and CERCLA sites
- **CERCLA**: Increases EPA's authority to compel cleanups; changes in release notification and due diligence
- **RCRA**: Indicates EPA plans to designate PFAS as "hazardous waste," which would impact generators

So, What Does This Mean for Missouri?

What We Know

- EPA and MDNR have collected and will continue to collect a significant amount of data
  - The public has access to the data
  - Data will drive prioritization or support additional inquiry at sites already within regulated programs
- Agencies now have authority to compel investigations and cleanups

Inherent Risks in Investigating for PFAS

- PFAS is “everywhere”
- “Fingerprinting” the source of PFAS is still a challenge
- Potential obligations to disclose sampling results
- Next steps if it’s identified

Protecting Data from Disclosure

- Facts alone are not legal advice
- Environmental sampling undertaken at the express direction of outside counsel could be protected in some situations

Should you proactively investigate (and potentially remediate) or wait until government-mandated?

Differing PFAS Strategies

- Current Owner/Operator vs. Prospective Purchaser
- Protecting Data vs. Environmental Liability Protection
- Potentially Responsible Party vs. BFPP
- Ultimate Goal For Every PFAS Investigation Strategy: Acquire Data/Information, Understand Your Site and Improve Ability to Protect Your Interests

PFAS Considerations

- When will you realistically be required to do something?
  - Will the SDWA and CERCLA rules be challenged? Will *Chevron* deference apply?
- Are you buying/selling?
  - Consider contract provisions (R&Ws, knowledge, indemnities, etc.)
- How will MDNR and EPA prioritize sites?
  - Existing cleanup sites (what do you need for protectiveness determinations)
  - PFAS is a National Enforcement & Compliance Initiative
  - EPA PFAS Enforcement Discretion & Settlement Policy
  - EJ

PFAS Considerations

- If you decide to investigate, what should you be thinking about?
  - What is the impact on your conceptual site model?
  - MCLs will be cleanup levels at Superfund and VCP sites
    - Are near-detect levels realistic?
  - Should investigation and remediation be limited to the PFAS substances subject to federal regulation?
  - What remediation technologies are available and how do you dispose of or destroy remediation wastes?
  - What is the most efficient path to site closure?

Dawn of the New Era for PFAS Remediation (or is it?)

James Aiken, R.G.
Vice President and Senior Hydrogeologist
Barr Engineering Company

Takeaways

- New rules new limits
- Same playbook for investigation and remediation
- The nuance of PFAS
- Futurescape - examples of what PFAS remediation may look like
- Questions

New Rules -Some changes expected with MCL and CERCLA

- Phase I ESA – identify sources and processes associated with PFAS
- Regulatory – expect more hands-on involvement from MDNR
- MCL will have ripple effect through surface water and solid waste programs
- Receptor risk – not as much guessing on numbers, but still about pathway
- Investigation – same as, but lower! CSM needs to look hard at affected media, background, keep abreast of methods
- Art of the possible – goal is to protect HSW; expectations need to be focused on a journey toward mass reduction, not just strict limits

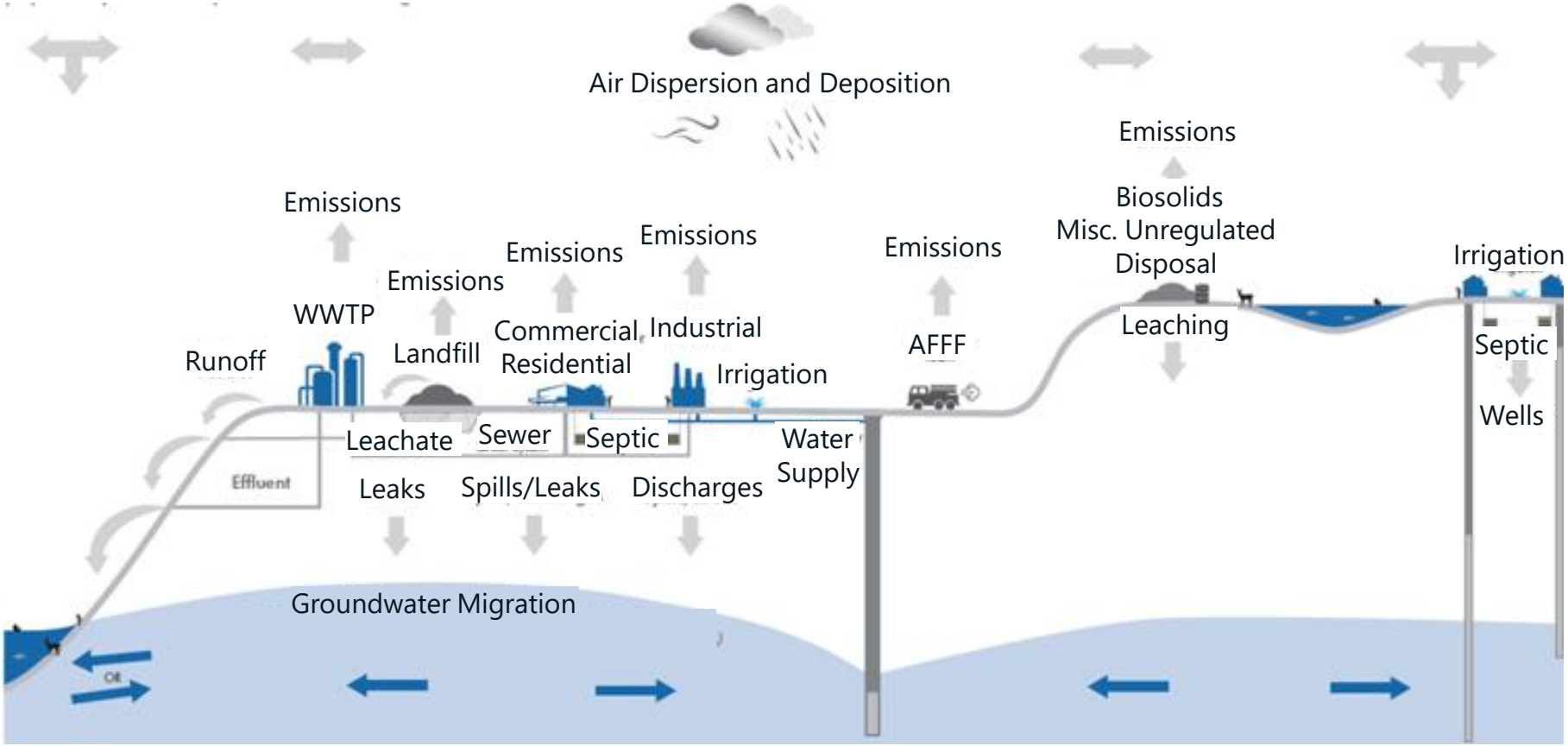
Same Playbook? What is different?.... (Is it that different?)

- Don't degrade? (PAH, PCBs, brine, metals)
- Really Mobile? (1,4-Dioxane, boron, lithium, chlorides)
- Really big analytical list? (Is your VOC list small?)
- Precursors (PCE→TCE → DCE → VC ??)
- Variable background? (Metals and PAHs?)
- Sample cross-contamination? ()
- Really low levels? (Federal MCL for Dioxin is 0.03 ppt, VC is 200 ppt)

Still the same in regard to remediation

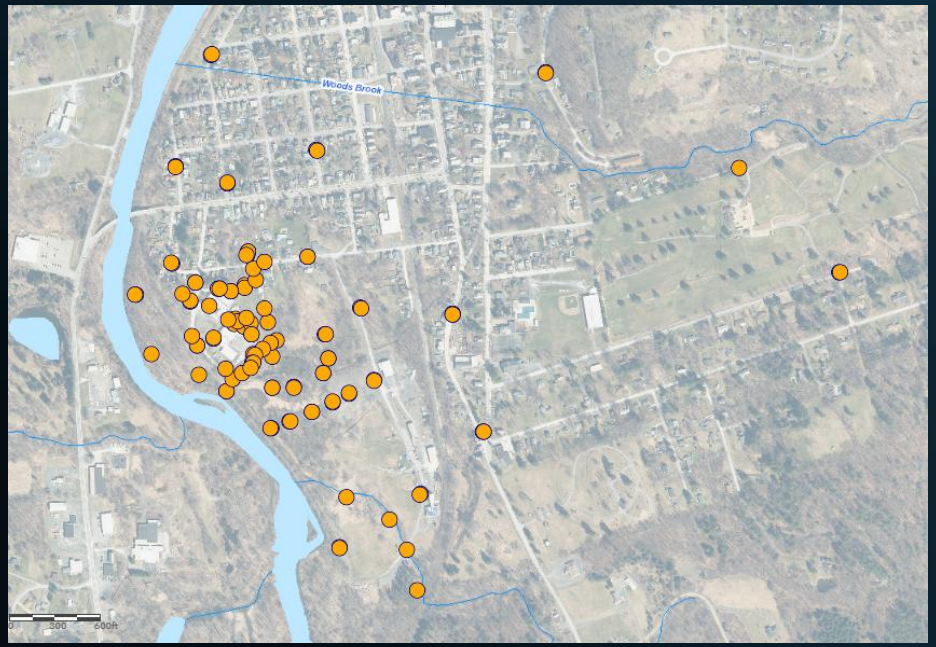
- Classic approaches still valid
- Regulatory – how best to engage MDNR?
- Conceptual Site Model is beginning, middle, and ending of the journey
- Receptor risk –still about pathway(s)
- Cost and efficacy – same decisions, much more expensive
- Destruction – still the holy grail of PFAS remediation

Conceptual Site Model (CSM) for PFAS has more pathways and media

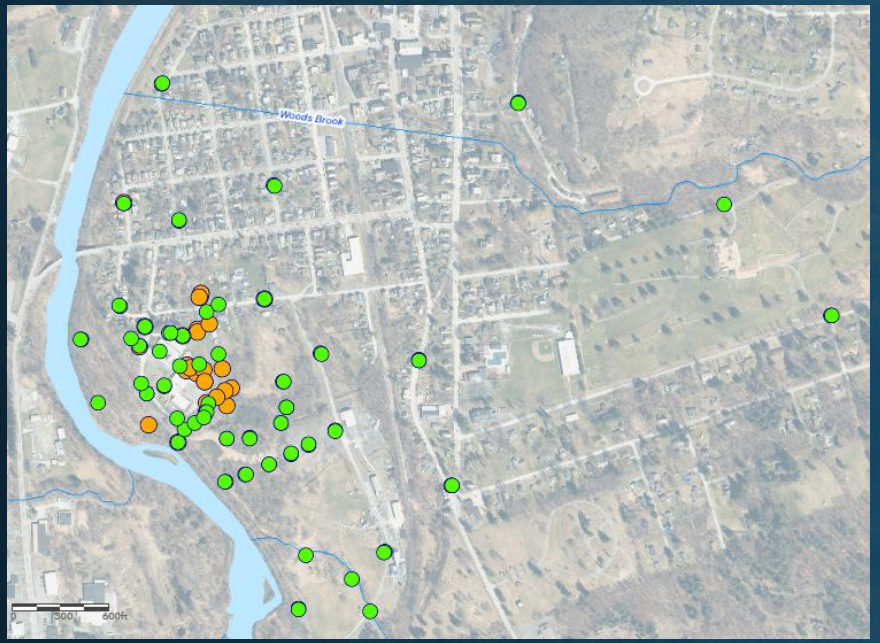


Nuances in evaluating PFAS

MCL: 4 **ppt**



Common MCL for VOCs: 5 **ppb**



A look at possible future of PFAS remediation in Missouri -Examples

Interim Response Action Plan

PFAS Firewater Release

Prepared for
CLIENT Site

December 2023

DRAFT Template Version 1.0 1/26/2022

As EPA cracks down on 'forever chemicals,' Missouri to start testing drinking water

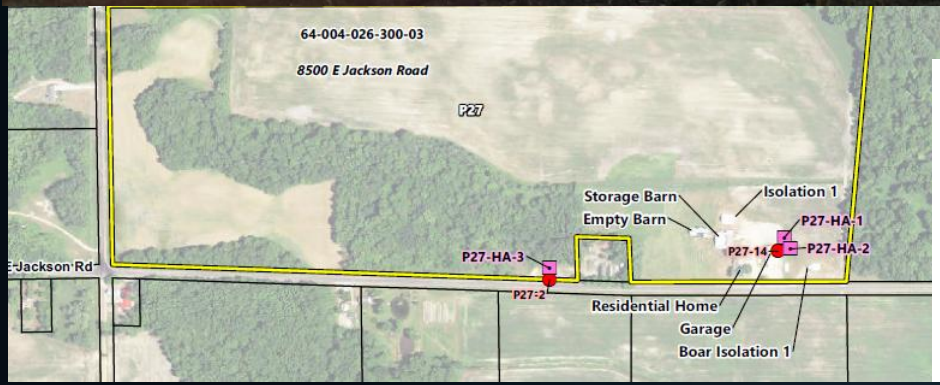
News release
June 6, 2023

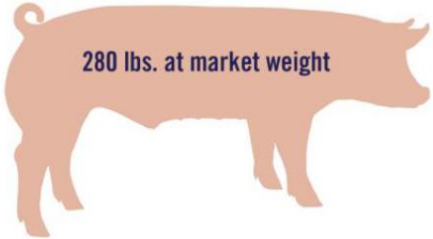
Contact
Adam Olson, 651-757-2041, adam.j.olson@state.mn.us

Groundbreaking study shows unaffordable costs of PFAS cleanup from wastewater

Findings underscore need to reduce use of "forever chemicals"

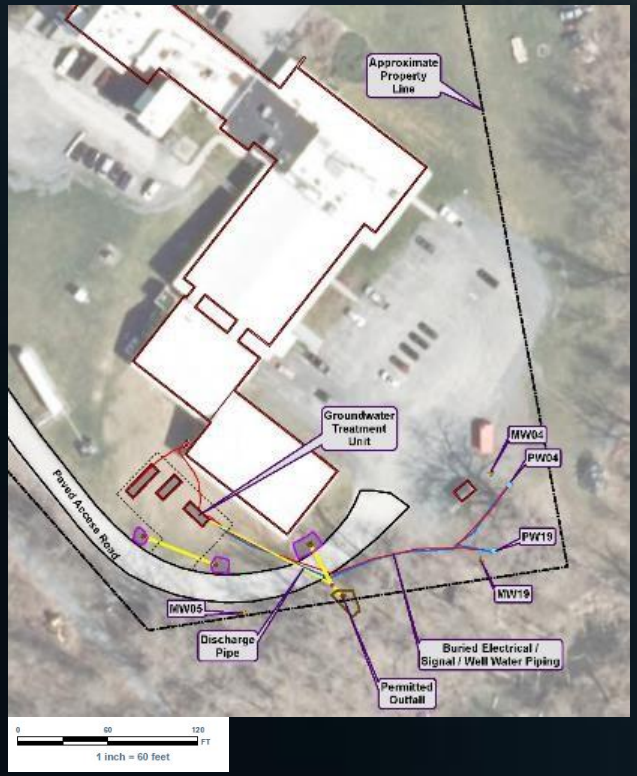
Pork, Biosolids, Corn, and POETs



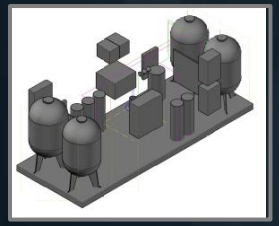


Growing and Finishing 115 to 120 days — (16 to 17 weeks)

Confidential Site
Interim Remedial Measure: Groundwater Capture and Treat



- Ongoing operation since August 2019
- Release to surface, releases to air, shallow and deep impacts to groundwater
- Source area: Lead/lag configuration with dual treatment trains.
- Captures and treats groundwater from eastern and southern portions of the site
- Treated water is discharged to surface water per state permit
  - PFAS non-detect in all discharge samples
- Routine monitoring via site inspections and remote telemetry with monthly sampling per permit
- Also use to periodically treat IDW (e.g. monitoring well purge water)



3D Rendering of Treatment System

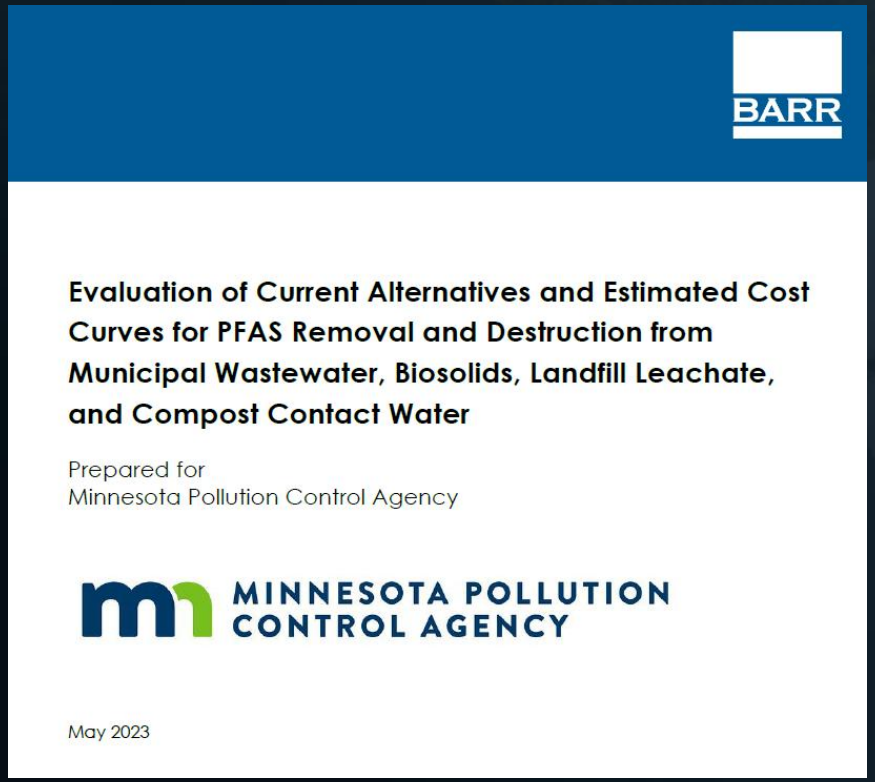
Granular Activated Carbon Vessels

What about Landfills and WWTPs? Leachate Treatment Costs

- Representative of difficult media, particularly biosolids
- Several options are go-to and/or emerging
- Not too many public water systems impaired by PFAS
- They want/are required to keep it that way
- Will result in moving treatment to upstream facilities

Key resource

https://www.pca.state.mn.us/sites/default/files/c-pfc1-26.pdf



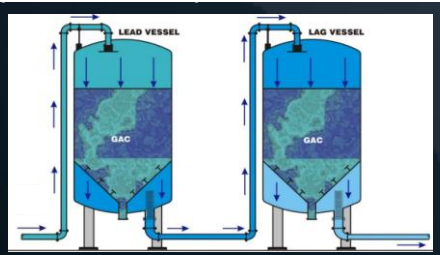
PFAS Treatment Targets

PFAS Abbreviation[1,2]	PFAS Full Name	Typical Concentration (ng/L)	High Concentration (ng/L)
PFBA	Perfluorobutanoic acid	950	2,600
PFBS	Perfluorobutane sulfonic acid	250	650
PFHxA	Perfluorohexanoic acid	1,500	4,000
PFHxS	Perfluorohexane sulfonic acid	350	750
PFOA	Perfluorooctanoic acid	900	1,900
PFOS	Perfluorooctane sulfonic acid	150	300
6:2 FTS	6:2 Fluorotelomer sulfonate	150	350
N-EtFOSAA	N-ethyl perfluorooctane sulfonamido acetic acid	150	450

[1] Concentrations based on values presented in Lang et al. (2017).
[2] No data available or non-detections for PFOSA and N-MeFOSAA.

PFAS Separation Technologies

Liquid-solid separation (media)



Granular activated carbon (GAC) media

- Single-use -> disposal
- Reactivated -> reactivation, reuse
  -PFAS to thermal oxidation

Anion exchange resin (AER)

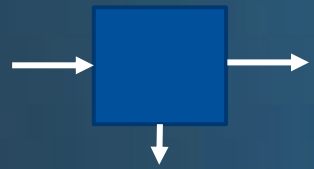
- Single-use -> disposal
- Regeneration -> regeneration, reuse
  -PFAS to brine and destruction option

Modified clay media

- Single-use -> disposal

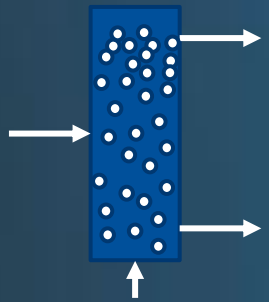
Liquid to liquid separation

NF/RO membrane separation

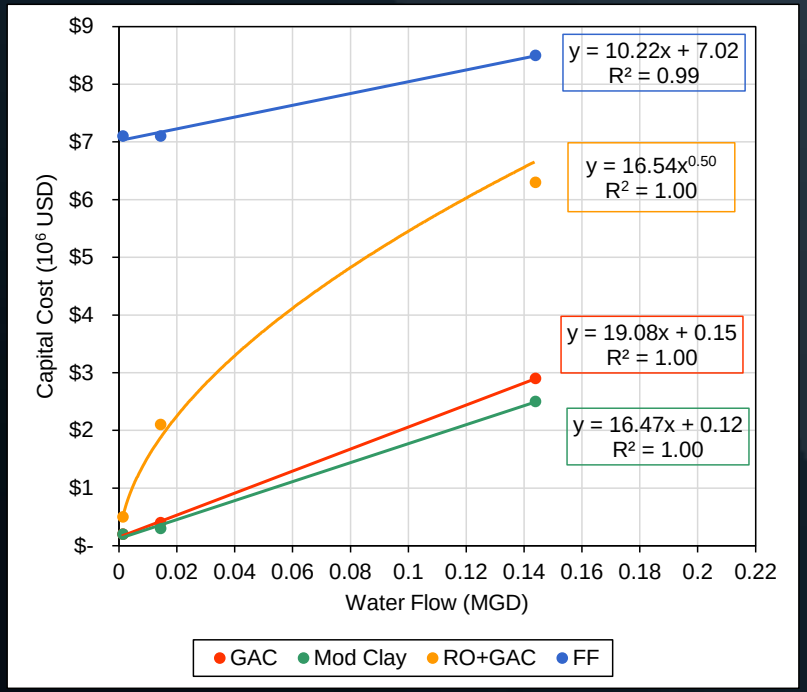


concentrate (with PFAS)

Foam fractionation

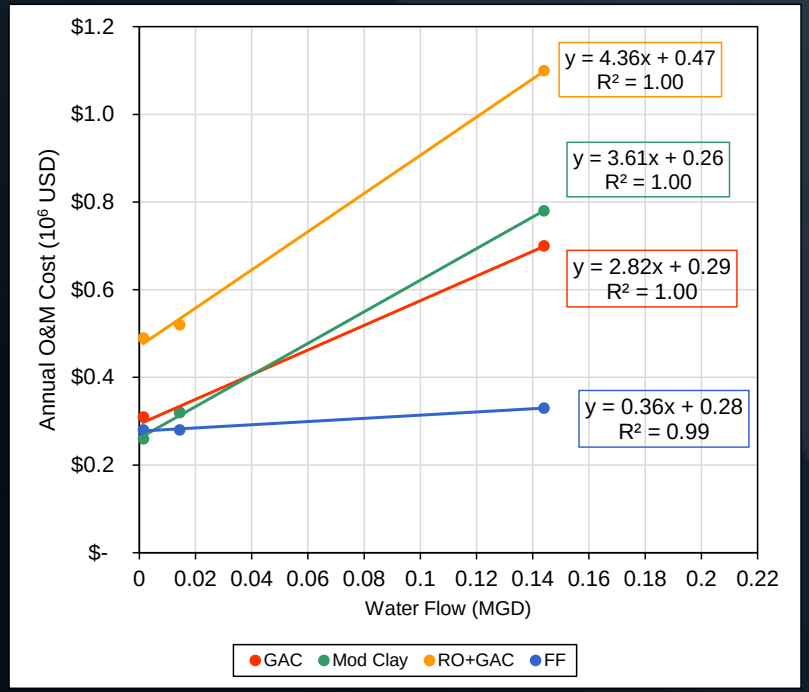


Cost Curves – Capital



- Both GAC and modified clay vary linearly over this flow range
- RO+GAC follows a power function, suggesting economies of scale
- Foam fractionation costs are relatively flat over this range reflecting the modular nature of this technology

Cost Curves – O&M



- GAC, Modified clay, and RO+GAC scale linearly with flow
- RO+GAC has the highest O&M cost estimate
- Foam fractionation is relatively consistent over this flow range primarily because the systems are similar sizes
- The cost associated with foamate disposal is expected to be small relative to the cost of disposal of GAC or modified clay

Other Treatment Approaches

Specialty wide-spaced RO – beneficial because of limited pretreatment, but doesn't meet project objective

Supercritical Water Oxidation (SCWO) – versatile technology, but energy intensive with low calorific wastes

Regenerable AER – beneficial because AER can be reused, AER challenged in high TDS water

Electrochemical oxidation (EO) – beneficial because of potential versatility and scalability for liquid wastes, but not retained due to low commercialization (which may change)

EPA's Updated Destruction & Disposal Guidance

- Published in *Federal Register* on April 16, 2024
  - Public comment closes October 15, 2024
- Does not establish destruction or disposal requirements
- Decision-makers should prioritize technology options with lower potential for environmental release of PFAS
- What about new technologies?

Summary

- New rules new limits – good news, bad news
- Same steps – investigation, CSM/receptors, extent/magnitude and remediation
- The nuance of PFAS – challenges with media, low levels
- Futurescape – expect PFAS to involve some novel situations. Also solutions may take longer and involve interim actions designed to protect receptors and modified over time
- Technology – getting better and cheaper

Questions?

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