Effective, Sustainable PFAS Water Treatment: Regenerable Ion Exchange Resin

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Outline

• How does ion exchange (IEX) resin remove PFAS?
• How does it get installed?
• What are the significant technology benefits?
• Performance data
• EBCT and other important parameters
• Residuals handling
How does IEX resin remove PFAS?

- **Influent Water**
  - Transfer Pump
- **IX1**
- **IX2**
- **IX3** (Optional Polish Vessel)
- **Treated Water**
- **Spent Regenerant**
  - Regenerant Recovery
  - Regenerant Supply
  - Transfer Pump
  - Residuals Destruction

Regenerable IEX Resin Sorbix A3F
Dual mechanism of removal: IEX and adsorption

PFOS Molecule

Simplified Resin Bead
How are the IEX treatment systems installed?
Resin vessels and centralized (proprietary) regen system
Public outcry is driving action
C-17 transport plane is delivering interim treatment systems to Australia
What are the significant technology benefits?

- **Dual mechanism** of removal takes advantage of unique properties of PFAS compounds
- **Capacity** is 5-6X greater than GAC for PFOA and > 8-10X greater for PFOS.
- **Kinetics** are faster, too, allowing use of smaller vessels
- Resin can be **regenerated in place** for reuse
- Distillation, ultra concentration and PFAS destruction maximize **sustainability**
- Exciting R&D in progress: **on-site PFAS destruction** in regenerant still bottoms
- Central regen and installation in shipping containers: compact, rapidly-deployable, mobile, cost-effective PFAS treatment process
- New resins are being tested successfully: e.g., effective removal of **shorter chain** compounds
- Unlike GAC, no pH or endotoxin issues
- Potential to effectively remove **cationic and zwitterionic** species
Side-by-side testing: IEX resin vs GAC
PFOA breakthrough at 5-min EBCT

![Graph showing PFOA breakthrough over volume treated (BV) with different adsorbents (GAC, Resin, Influent, Sorbix, Filtrasorb).]
PFOS breakthrough at 5-min EBCT

Graph showing the concentration of Perfluorooctane Sulfonate (PFOS) in different treatment processes. The graph indicates a decrease in concentration after treatment with GAC and Resin, with Resin showing a more significant reduction in concentration over volume treated.
Very promising results for alternative resins: Resin A = Sorbix A3F
Residual management: successful destruction of PFAS compounds

PFAS removal from regen still bottoms using plasma treatment
Thank you!

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