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# **Adapting to Change: PFAS Treatment Residuals Management**

**Liz Garvey, PE**  
Senior Process Engineer

**PNWS-AWWA Annual Conference**



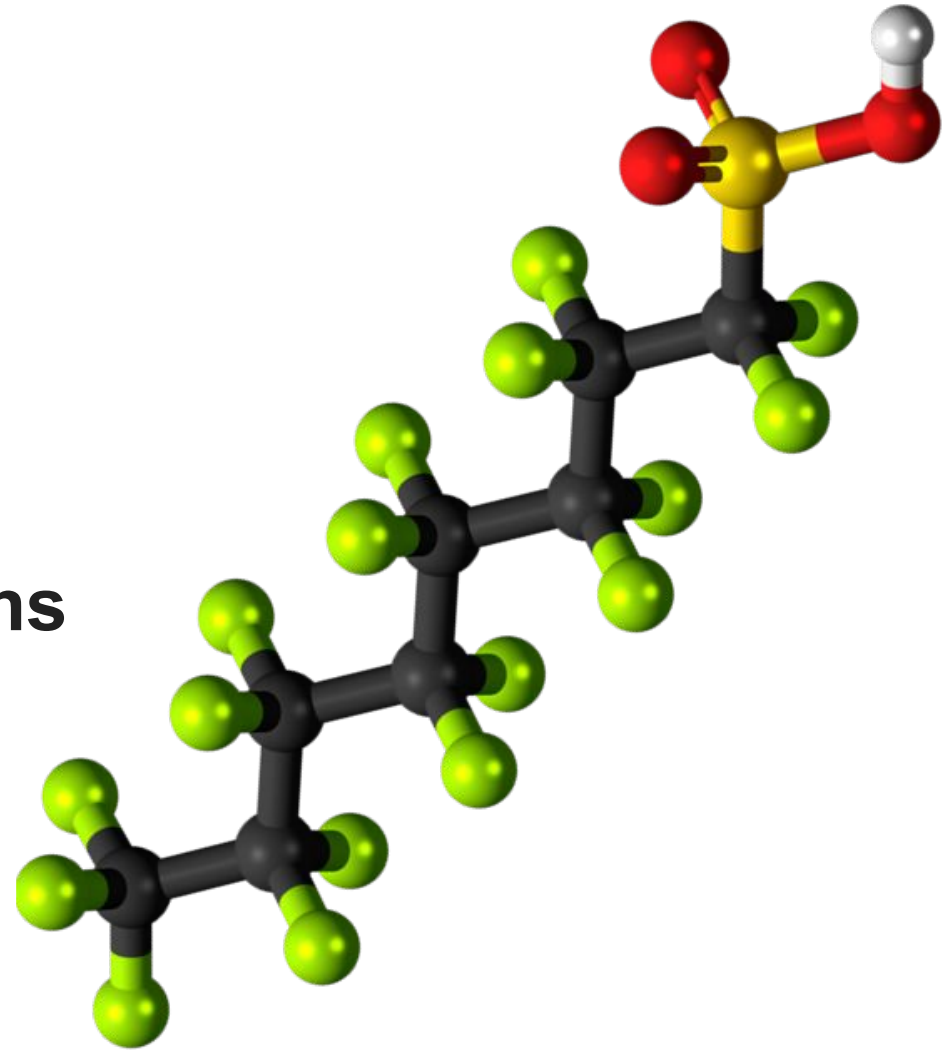
American Water Works Association

**Pacific Northwest** Section



# Agenda

- **Regulatory Update**
- **PFAS Sources & Residuals**
- **New England PWS Survey**
- **Residuals Management Options**
- **Q & A**





# Regulatory Update

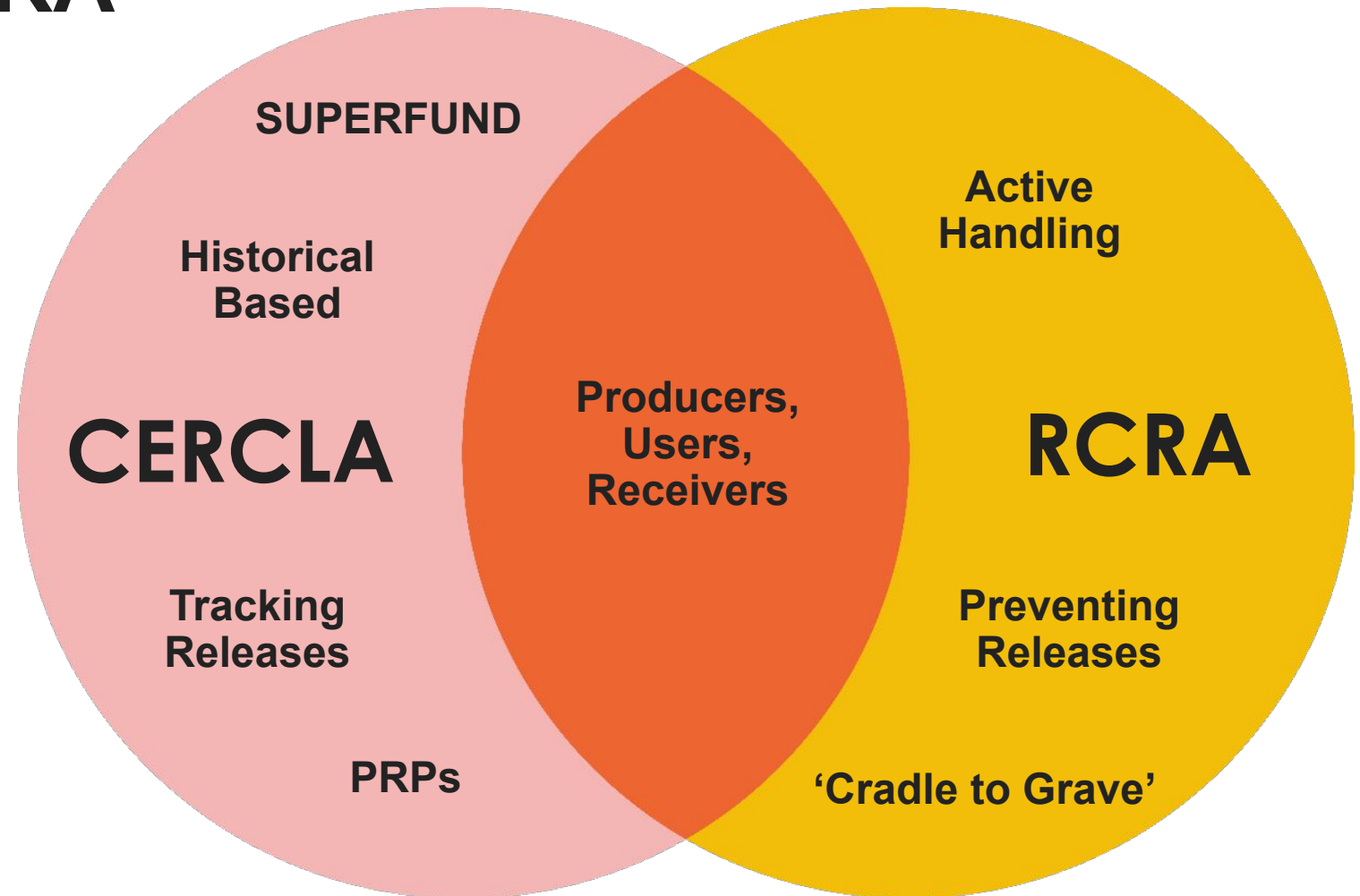




# Regulatory Update: Background on CERCLA vs. RCRA

**C** - Comprehensive  
**E** - Environmental  
**R** - Response  
**C** - Compensation  
**L** - Liability  
**A** - Act

**R** - Resource  
**C** - Conservation  
**R** - Recovery  
**A** - Act





# CERCLA

- PFOA & PFOS = Hazardous
  - April 2024
  - Objective: “Polluters Pay”
- Key Features:
  - Retroactive Liability
  - EPA’s Enforcement Discretion Policy
  - Right-of-Action for PRPs







# CERCLA – Response to Concerns

- Liability Protections - EPA
  - PRP Settlement Requirements
- PRPs to Implement Controls
  - In-kind controls, monitoring
- Proposed Water Systems PFAS Liability Act





# Proposed Water Systems PFAS Liability Act

- Protect Water & Wastewater Systems from Financial Liability
  - Prevent litigation involvement -> less impact to rate payers
- Bipartisan Bill
  - Introduced to Senate May 2023 – Not yet reintroduced
    - Sponsors & Co-Sponsors (10 total): WY\*, AR, ND, SC, OK, NE, AK, MS, ID
  - Introduced to the House April 2024 – Reintroduced Feb. 2025
    - Sponsors & Co-Sponsors (30 total, 14 current):
      - WA\*, UT\*, KS, ME, CA, IL, FL, PA, AL, HI, WI, IN, KY, GA, TX, OR, OH, MN, AK, IA, NV



# What can WE do?

- Reach out to House Representatives & Senators
- Water Utility's: Letters to States
  - Utility letter template by AWWA
  - Find your Senator/State Rep.
    - [Congress.gov](https://www.congress.gov)

**Dear Representative Mathias (ID),**  
Don't be silly,  
advocate for me!







# Letter Template to Representatives & Senators

[ASSOCIATION/UTILITY LETTERHEAD]

[Date]

The Honorable [Legislator's Name]

[Address of Legislator]

[City, State ZIP Code]

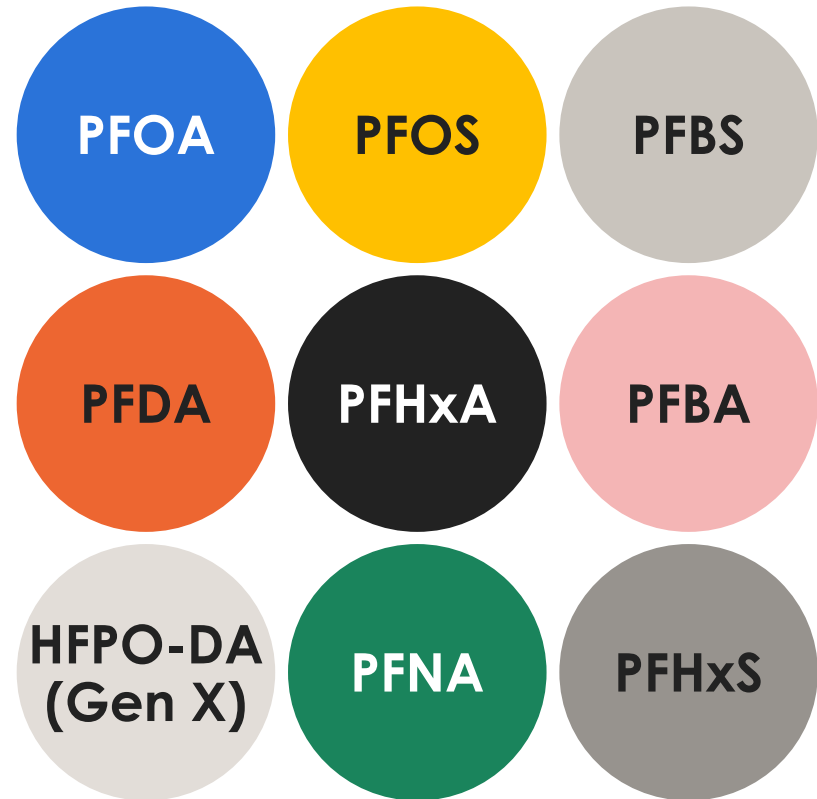
Dear [Representative/Senator] [Legislator's Last Name],

I am writing to urge your support for H.R. 7944, the Water Systems Per- and Polyfluoroalkyl Substances (PFAS) Liability Protection Act. As you are likely aware, per- and polyfluoroalkyl substances (PFAS) are synthetic chemicals that have been widely used in various industries due to their resistance to heat, water, and oil. However, these "forever chemicals" have been linked to serious health risks, including cancer, hormone disruption, and immune system damage. While it is critical that we take decisive action to limit PFAS contamination, it is equally important to ensure that our nation's drinking water and wastewater systems – and



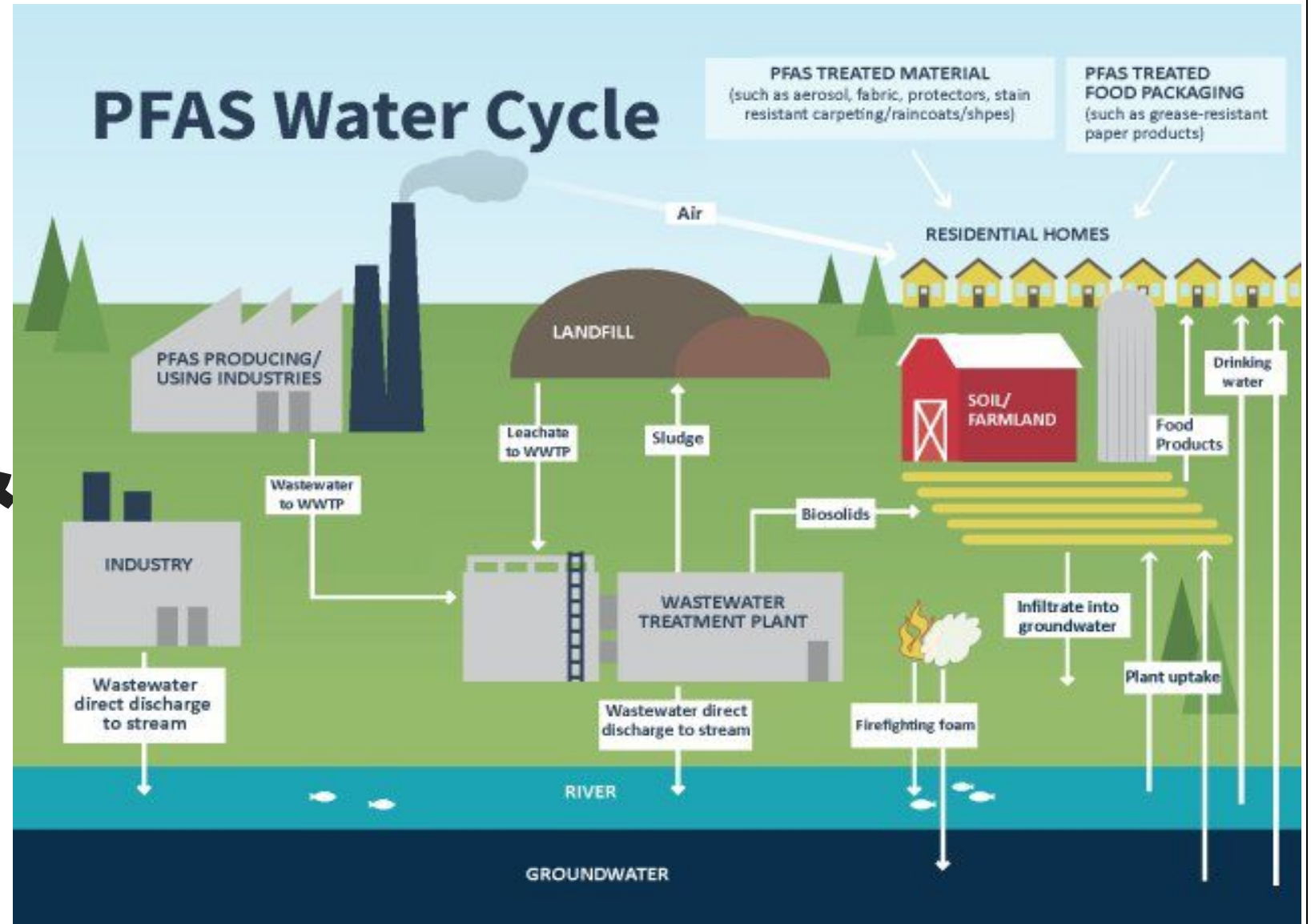
# RCRA

- Proposed Changes – Feb. 2024
  - 9 PFAS Compounds = “Hazardous Constituents”
  - Expand scope of facilities EPA can apply corrective actions to
- Current Status:
  - Not yet finalized by EPA





# PFAS Sources & Residuals

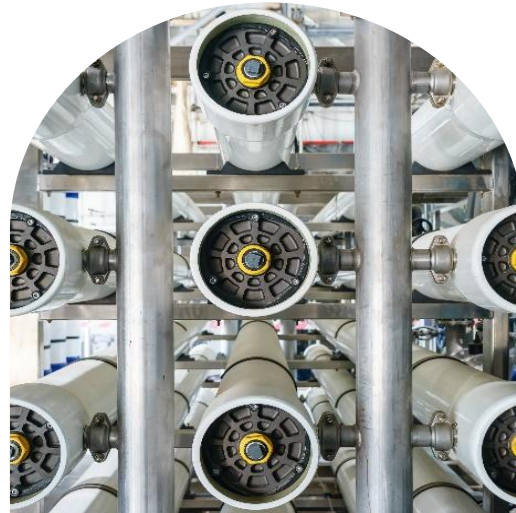




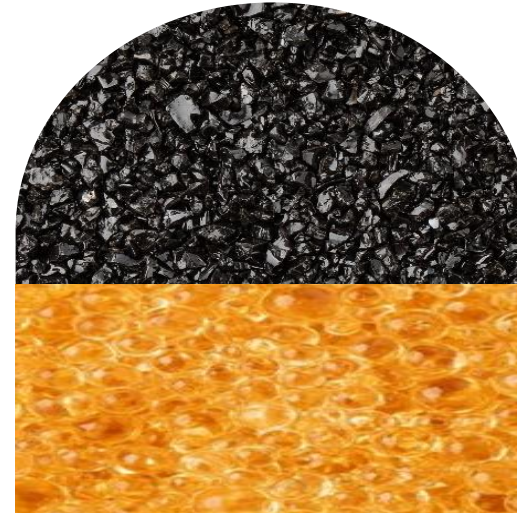
# PFAS Residuals From WTPs



**Pretreatment  
Residuals**



**RO Brine**



**Spent Media**



**System  
Commissioning  
& O&M**





# New England Public Water System Survey

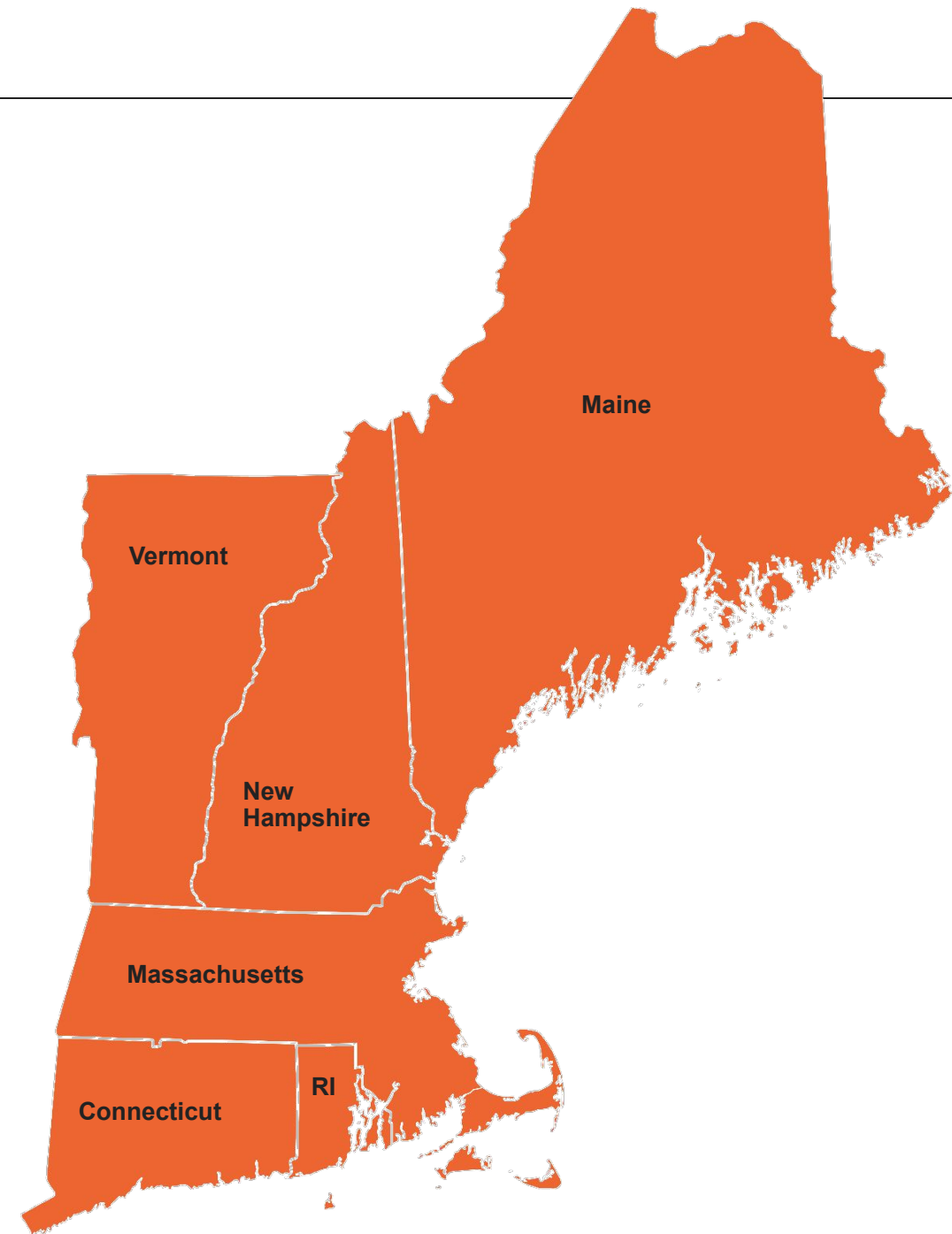






# New England Public Water Systems Survey

- Led by NEWWA Residuals Committee
- Objective:
  - Identify PFAS residuals management methods & difficulties
- 73 Water Utility Responses
- Conducted in 2018
- Committee is planning a new survey round!





# Residuals Management Forecasting



**Sewer**

↓ 43.8%



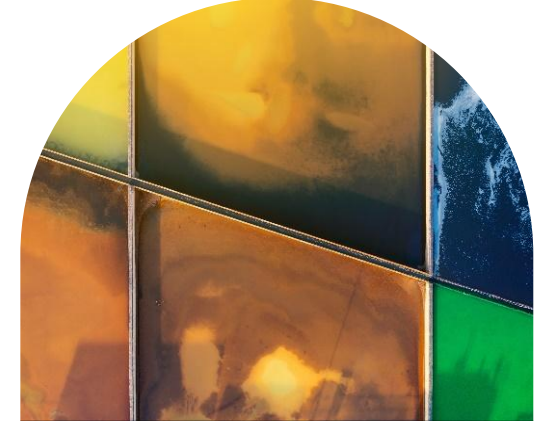
**Incineration**

↑ 0%



**Land  
Application**

↓ 6.9%



**On-Site Basin/  
Pond/Lagoon**

↓ 17.8%



# Residuals Management Forecasting



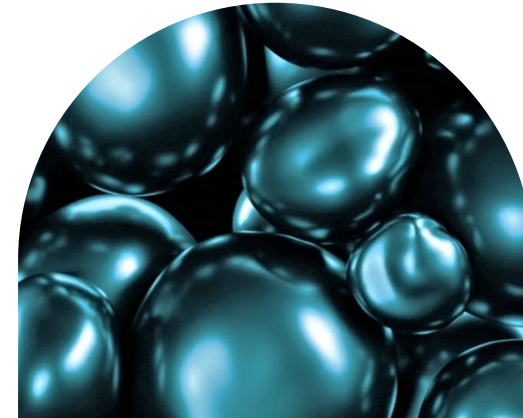
**Landfill**  
**20.6%**

↑ Haz. Waste  
↓ Non-Haz.  
Waste



**Discharge to  
Surface Water**

↓ 8.2%



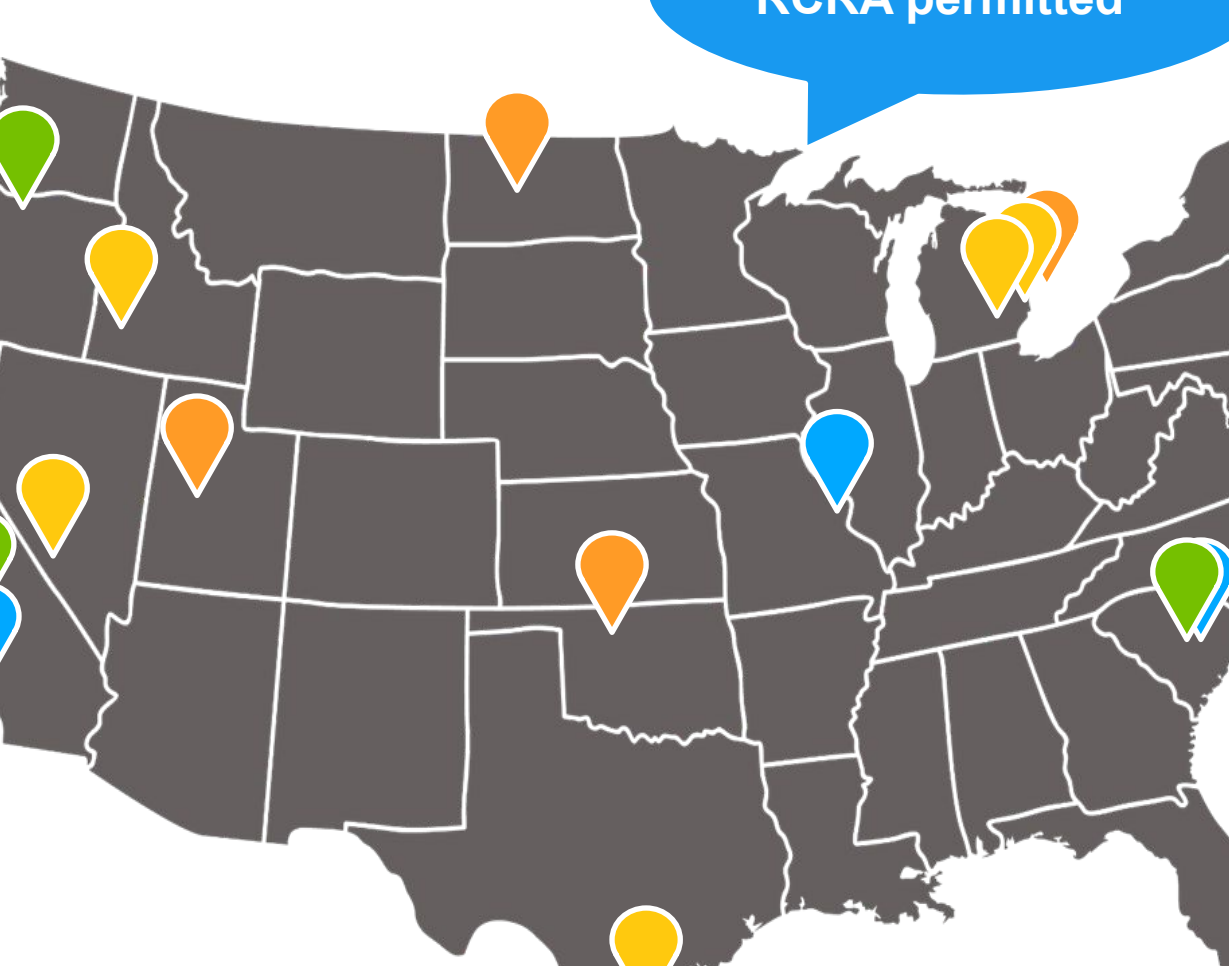
**Destruction  
Technologies**

↻ 0%



# Residuals Management Options



- # Landfills
- 
- A map of the United States with colored pins indicating RCRA permitted landfills. The pins are color-coded: blue, green, orange, and yellow. A blue speech bubble points to the map with the text "RCRA permitted".
- | Color  | Approximate Locations                   |
|--------|---|
| Blue   | California, Michigan, New York          |
| Green  | Washington, California, North Carolina  |
| Orange | Idaho, Montana, Colorado, Texas         |
| Yellow | Washington, California, New York, Texas |





# Hazardous Waste Landfills

## Clean Harbors

- Lone Mountain, OK
- Grassy Mountain, UT
- Sawyer, ND
- Buttonwillow, CA
- Lambton, ON (Canada)

## Republic Services

- Pinewood, SC
- Richmond, CA
- Sylmar, CA
- Bridgeton, MO

## US Ecology


- Beatty, NV
- Grand View, ID
- Robstown, TX
- Belleville, MI
- Detroit, MI

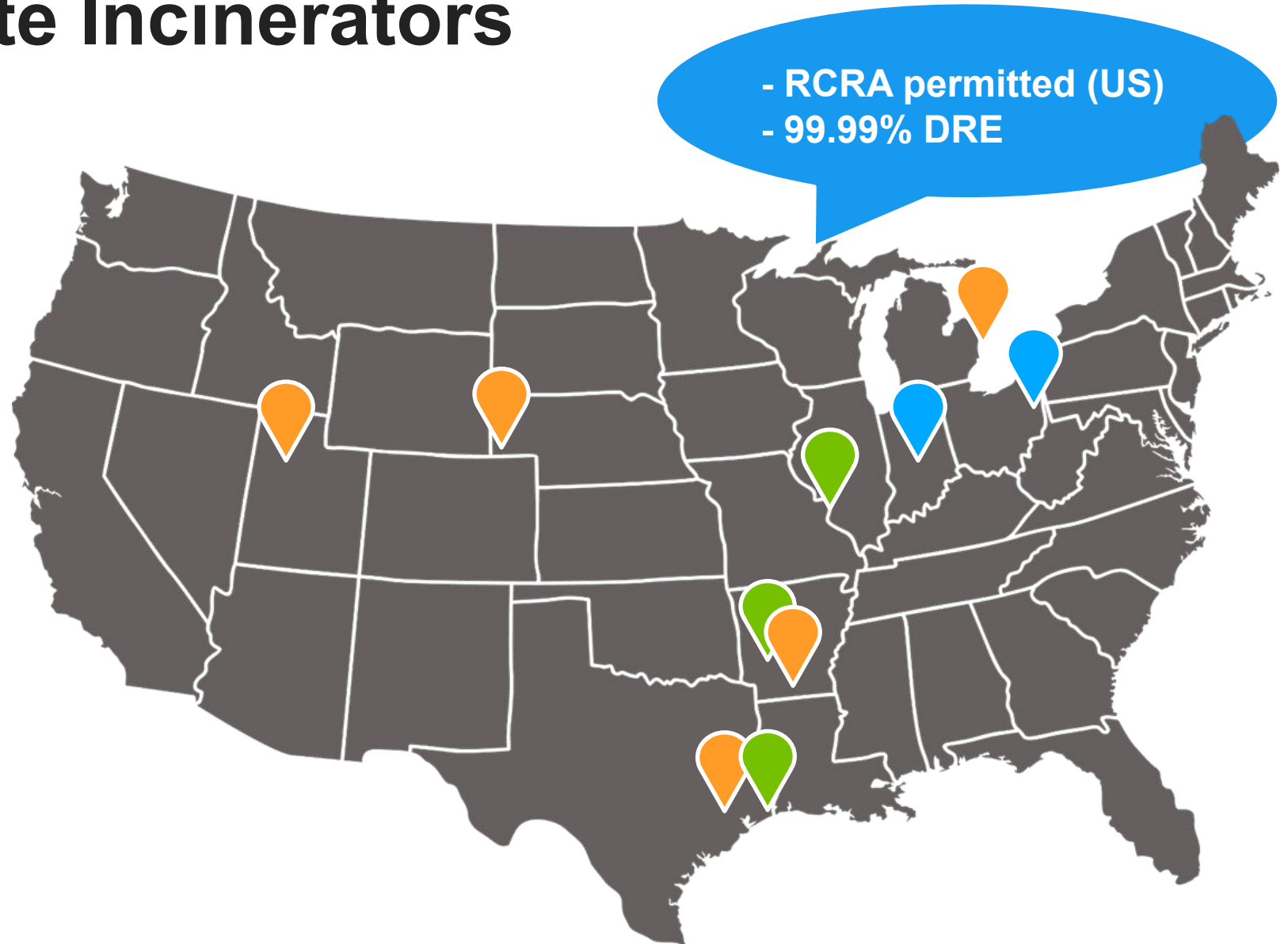
## Waste Management

- Kettleman City, CA
- Buttonwillow, CA
- Pinewood, SC
- Arlington, OR



# Hazardous Waste Incinerators

-  Clean Harbors
-  Veolia
-  Heritage Environmental





# Hazardous Waste Incinerators

## Clean Harbors

- Deer Park, TX
  - Aragonite, UT
  - Kimball, NE
  - El Dorado, AR
  - Sarnia, ON
- Veolia**
- Gum Springs, AR
  - Port Arthur, TX
  - Sauget, IL

## Heritage Environmental Services

- East Liverpool, OH
- Indianapolis, IN



# Residuals Management Options

	Hazardous Waste Landfills	Hazardous Waste Incinerator
<b>Acceptance</b>	May vary (< 1 ppm PFAS)	Accept all PFAS concentrations
<b>Cost</b>	Varies with concentration ~40% cost savings	Increases with AFFF compounds
<b>Certificate</b>	Certificate of <b>Disposal</b>	Certificate of <b>Destruction</b>
<b>Risk</b>	Liability Risk	Reduced Liability



# Residuals Management Options

## GAC Regeneration




## GAC Reactivation

<b>Temperature</b>	Low temperature (<400°F) Option: Nitrogen Atm.	High temperature (1,800– 2,000°F) Volatilize / Pyrolyze
<b>Adsorbed Contaminant Removal</b>	Removes some of the adsorbed contaminants*	Removes and destroys adsorbed contaminants
<b>Location</b>	Can be performed in-situ with hot gas or nitrogen gas	Performed at a specialized facility (NSF-61 Kilns)
<b>Other Considerations</b>	Temperatures too low to destroy most PFAS compounds	Returns carbon to virgin-like state 20-30% cost savings as compared to replacing with virgin carbon





# GAC Reactivation Facilities

-  Calgon
-  Evoqua
-  Carbon Activated





# GAC Reactivation Facilities

## Calgon

- Gila Bend, AZ
- North Tonawanda, NY
- Pittsburgh, PA
- Catlettsburg, KY
- Guelph, Ontario, CAN

## Evoqua

- Darlington, PA
- Red Bluff, CA
- Parker, AZ

## Carbon Activated

- Compton, CA



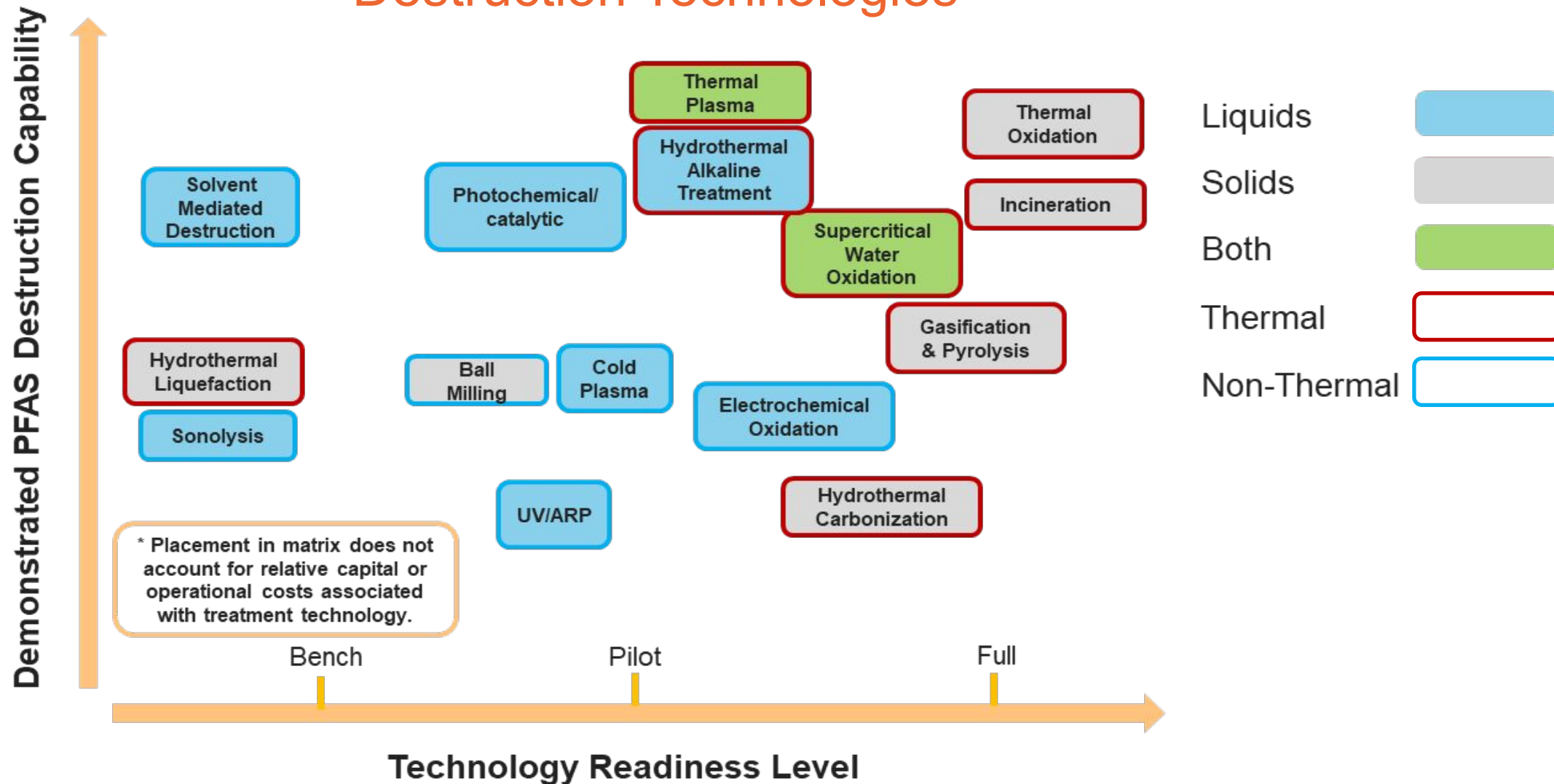
# Destruction Technologies





# Residuals Management Options

## Destruction Technologies



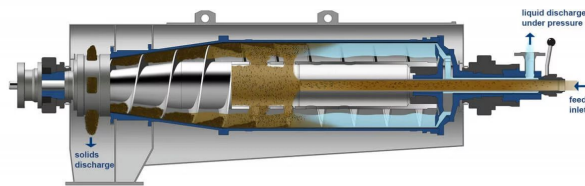




# Residuals Management Options

## On-Site PFAS Destruction

- Pre-concentration -> Increase PFAS concentration -> Improved degradation



**Solids  
Separation**



**Foam-  
Fractionation**



**Membrane  
pre-concentration**

- Liquid Stream Destruction Depends on:
  - PFAS Concentration - Higher PFAS Lead to Faster Kinetics
  - Water Matrix Constituents
    - Background Organics **WILL** compete with PFAS & use up Oxidants



# On-Site PFAS Destruction

- Important Considerations:
  - Mobilization Fee
  - Permitting
  - Mass Balance
  - Analytical Methods







# Increasing Cost Considerations

- Life Cycle Cost Analyses
  - Disposal options
- Get in line for Funding
  - State Revolving Fund
  - Grant Funding
- Concentrate / Reduce Waste Volume
- Destruction Technology Advancements



**COST**



# Acknowledgements

## Stantec

- Katie Chamberlain
- Ryan Capelle
- Andrew Nishihara

## Vendors

- Aqueous Vets
- Calgon
- Clean Harbors

## Municipalities

- West Morgan – East Lawrence, AL WTP Team
- Brunswick, NC WTP Team





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# Thank You!

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