374WATER

Clean & Sustainable Destruction of Organic Waste

Is SCWO the Answer? City of Orlando's Pursuit to Manage Biosolids Using Supercritical Water Oxidation

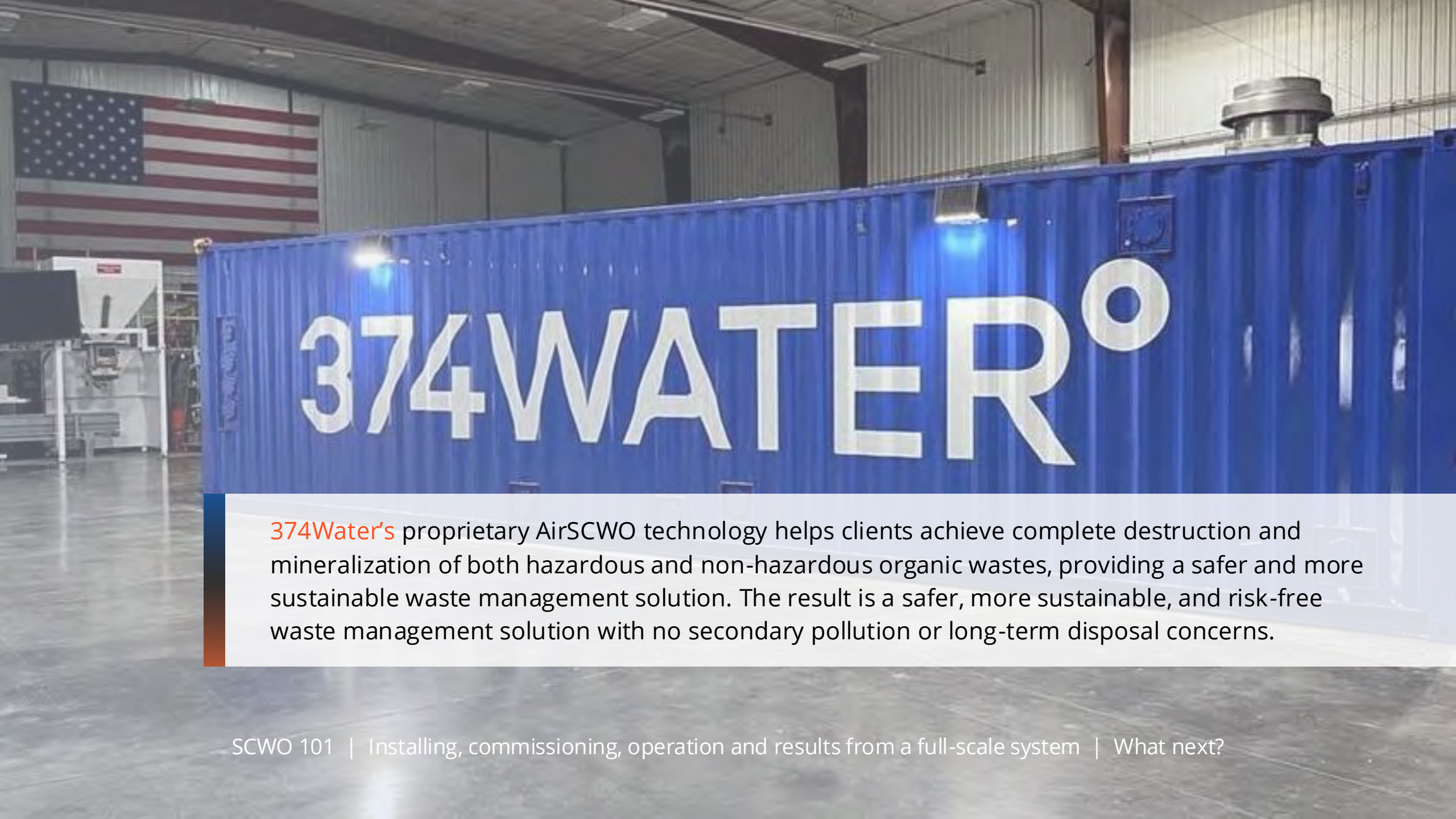
Wednesday, November 18, 2025
11:00 – 11:30 PM

NORTH EAST RESIDUALS & BIOSOLIDS CONFERENCE
Managing Residuals and Biosolids in a Time of Uncertainity

2025 SPECIALTY CONFERENCE & WORKSHOP SERIES

NEWEA
WORKING FOR WATER QUALITY

nebra
North East Biosolids & Residuals Association



374Water's proprietary AirSCWO technology helps clients achieve complete destruction and mineralization of both hazardous and non-hazardous organic wastes, providing a safer and more sustainable waste management solution. The result is a safer, more sustainable, and risk-free waste management solution with no secondary pollution or long-term disposal concerns.

SCWO Introduction & Evolution

The many phases of water

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Increasing pressure, phase boundary disappears

Pressure

0°C + 1 bar

100°C + 1 bar

Solid

Liquid

Gas

Subcritical / Transcritical

Supercritical

374°C + 221 bar

Temperature

Supercritical Water 101

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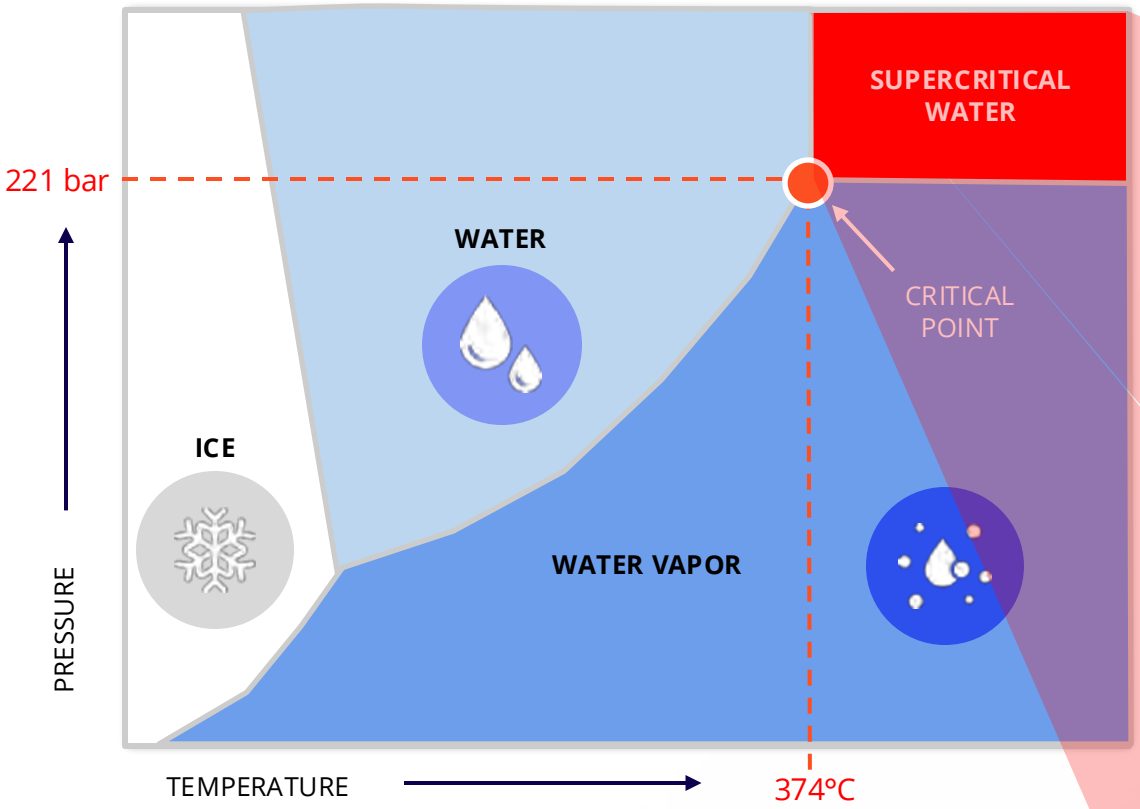

Source: Public Domain, enviro.wiki (log scale)

SUPERCRITICAL WATER

- Gases (e.g., O2) are highly soluble
- Inorganic salts precipitate
- Organic compounds readily dissolve and dissociate, aided by radicals

Note: organic compounds contain carbon, inorganics do not

How SCWO works – put simply

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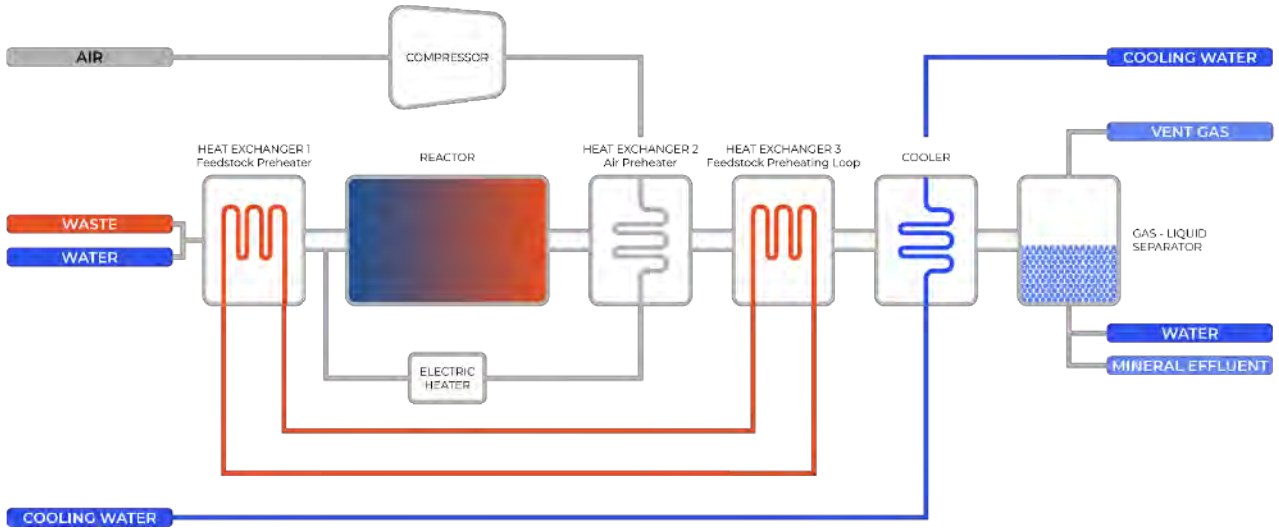


1. Slurried wastes and compressed ambient air heated towards 374ºC
2. Waste/air mixture oxidizes in reactor at P>221 bar and T > 374ºC
3. Gasses, liquids, and solids (minerals) are separated by lowering the pressure and temperature
4. Heat is recycled to the front of the process, enabling economic operation amidst higher operating temperatures

AirSCWO is a physical-thermal process powered by air, and water above its critical point (374°C and 221 bar) that yields a highly effective oxidation reaction that eliminates organic compounds. AirSCWO eliminates recalcitrant wastes like PFAS without creating waste byproducts.

374Water's AirSCWO Design Journey

2013

- Duke University in Durham, NC built first air-based SCWO system (AirSCWO) for the Bill & Melinda Gates Foundation
- AS1 was capable of processing 1 wet ton per day
- Nearly 190 different wastes processed over ~10 years

2022

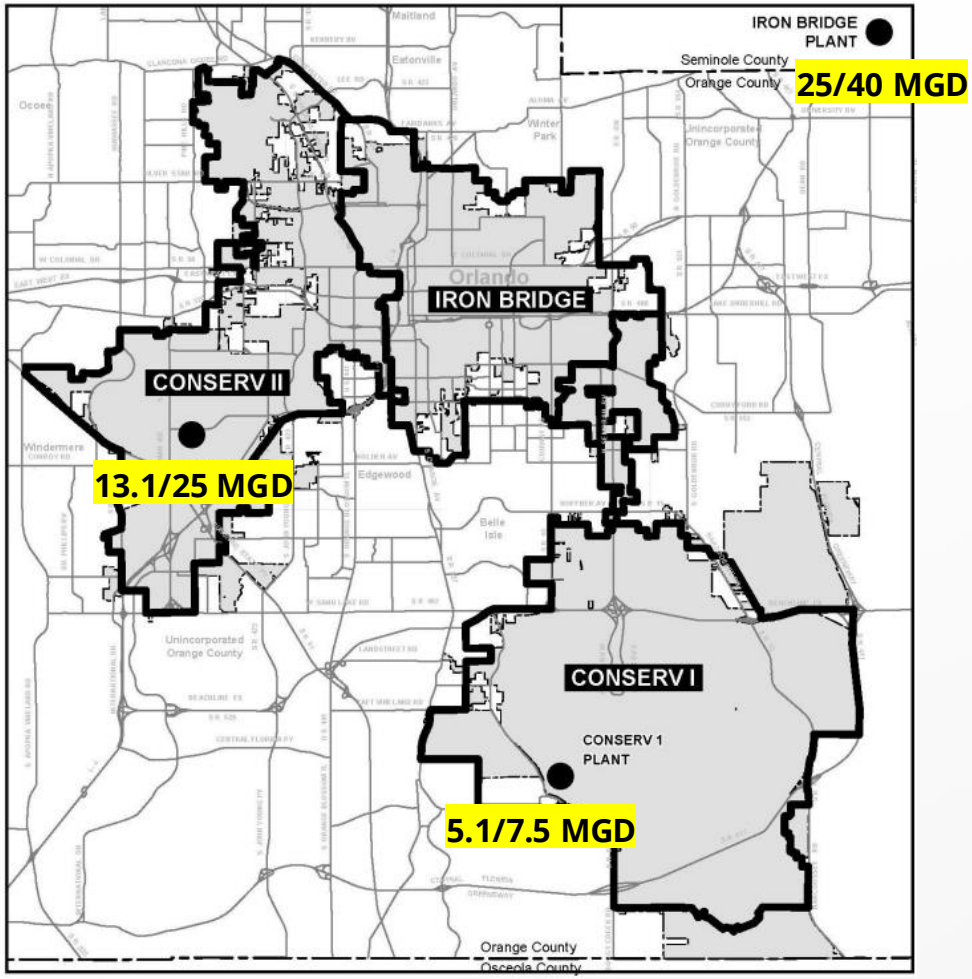
- First commercial scale unit built in Kokomo, IN
- AS6 designed to process up to 6 wet tons of waste per day

2024 - Present

- AS6 unit deployed at the City of Orlando, FL
- New AS1- mobile unit - commissioned
- New AS6 unit commissioned and FAT performed

Deployment: Orlando, FL

Project Background



Project Current Status

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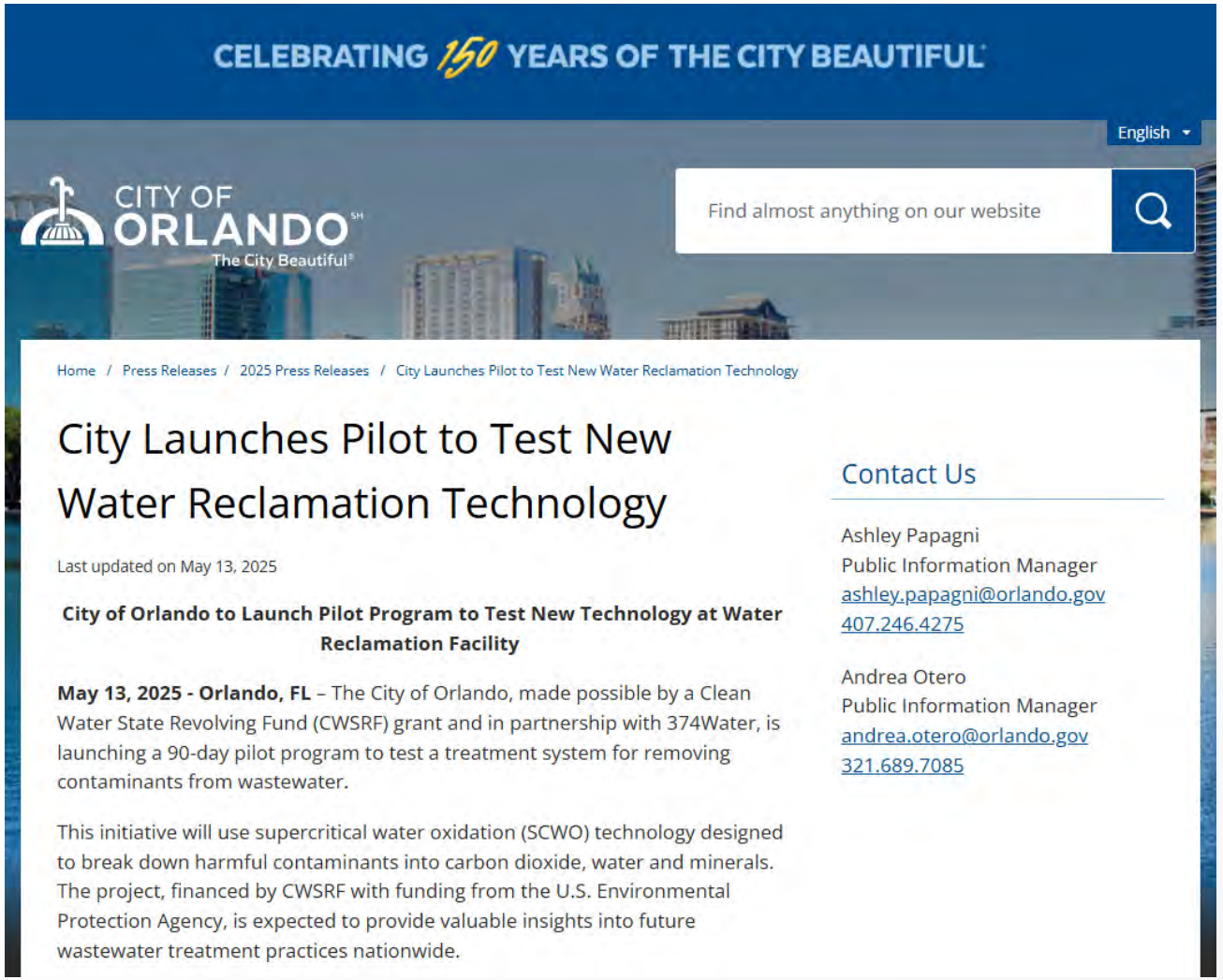
Iron Bridge Water Reclamation Facility

- Largest of three facilities' managed by City
- 40 MGD Max / 25 MGD AADF
  - ~56,000 wet tons sludge/ year (13.8% DS)
- Sludge Treatment :
  - Storage
  - Dewatering
  - Shipped out to 3rd party
- Challenges:
  - Land availability (policy change/urban development pressure)
  - Water table level (climate change)
  - Emerging contaminants (regulatory change/scientific discovery)



Project Demonstration Siting

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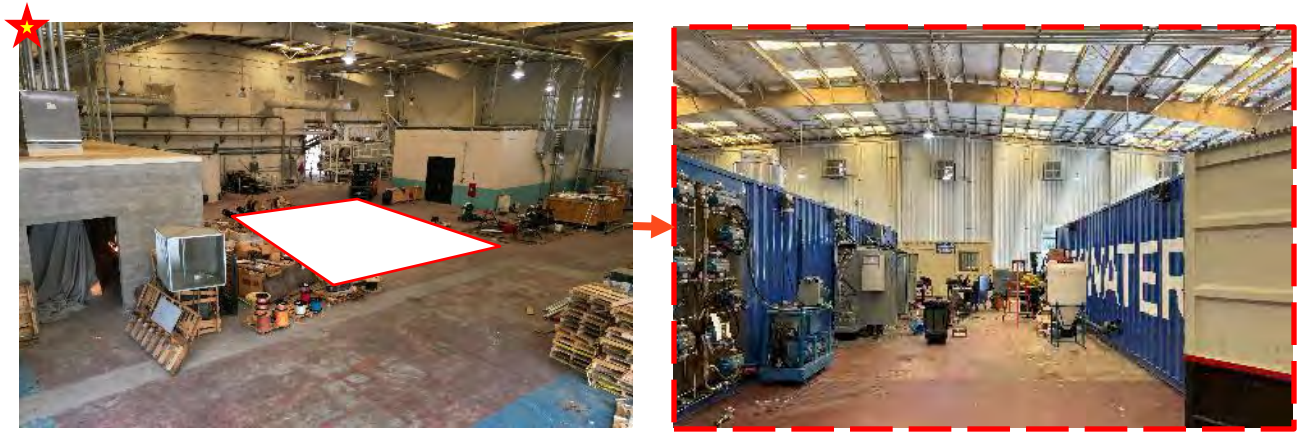
Iron Bridge Water Reclamation Facility

- Water
  - Hose or tap connection
  - Discharge or storage for distilled water
  - Discharge of SCWO effluent to headworks
- Electricity
  - 400/480V 3 Phase, 200 Amps max draw during start-up
- Fuel storage (~50 gal)
- Pre-treatment equipment:
  - Maceration
  - Screening
  - Dewatering
  - LBB w/rewetting (if needed)



Project Installation

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Materials destroyed by AirSCWO in Orlando

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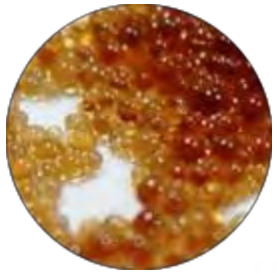
374Water's continuous flow AirSCWO System has successfully destroyed a wide range of organic wastes reaching non detect or below EPA required levels. These organic wastes include, but not limited to:

Sludges & Biosolids

Landfill Leachate



Spent Ion Exchange Resin

Spent Granular Activated Carbon

Firefighting Foam (AFFF)

AFFF Rinse Water

Foam Fractionate Concentrates

Munition Waste (Ammonium Nitrate)

Hazardous Organic Waste

Pharmaceutical Waste

Food Waste

Battery Recycling Waste

Lnapl (Light Non-Aqueous Phase Liquid)

Fog (Fats, Oils, & Grease)

Results and Observations

From Raw WAS to Water + Minerals

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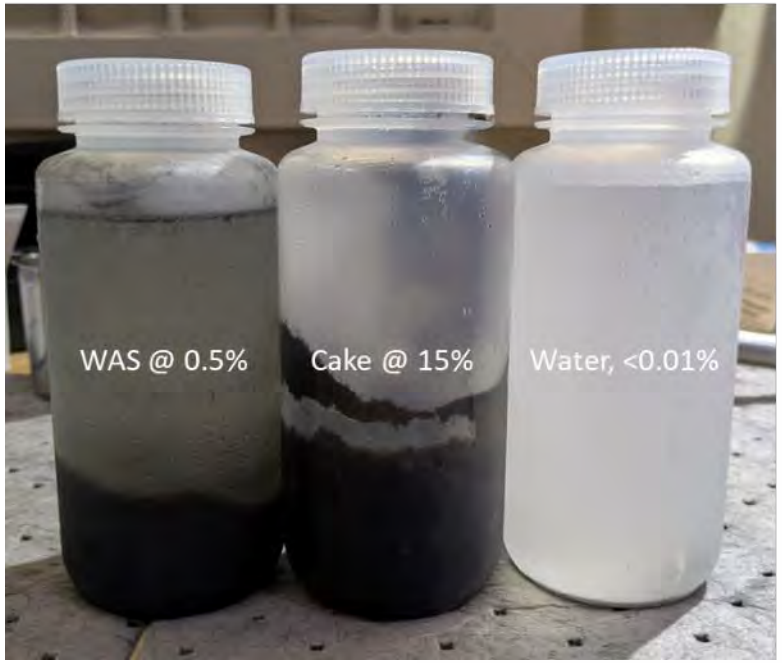
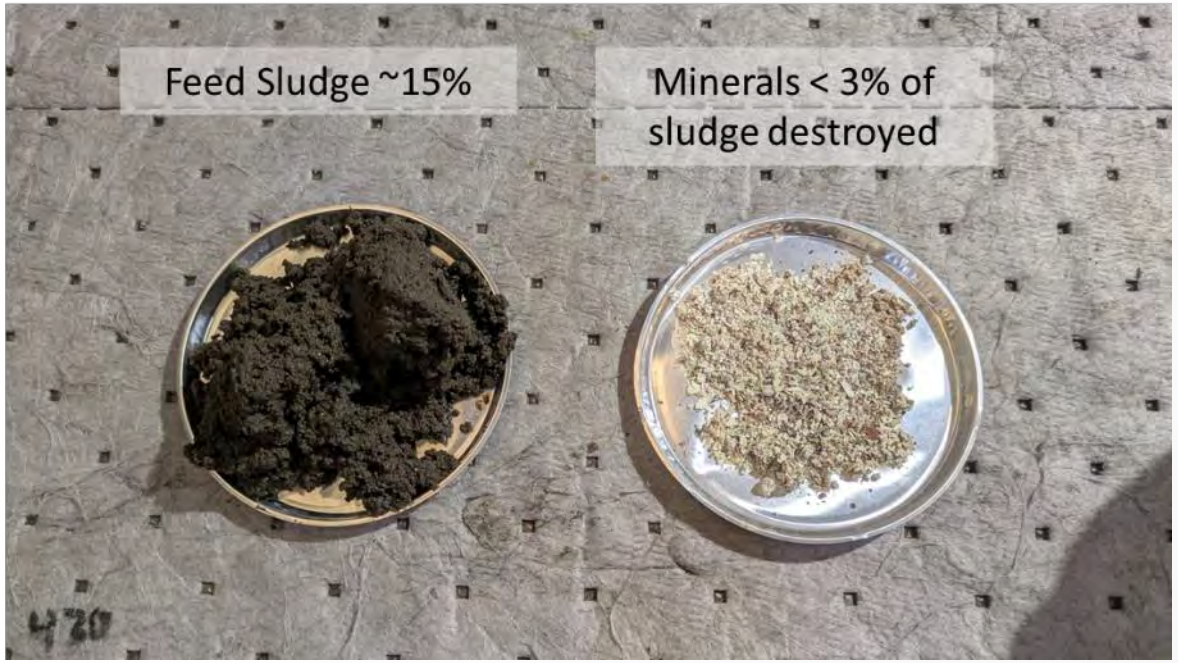
Top View





Project Results*: PFAS Elimination in Sludge (Short Chain (<7) PFCAs)

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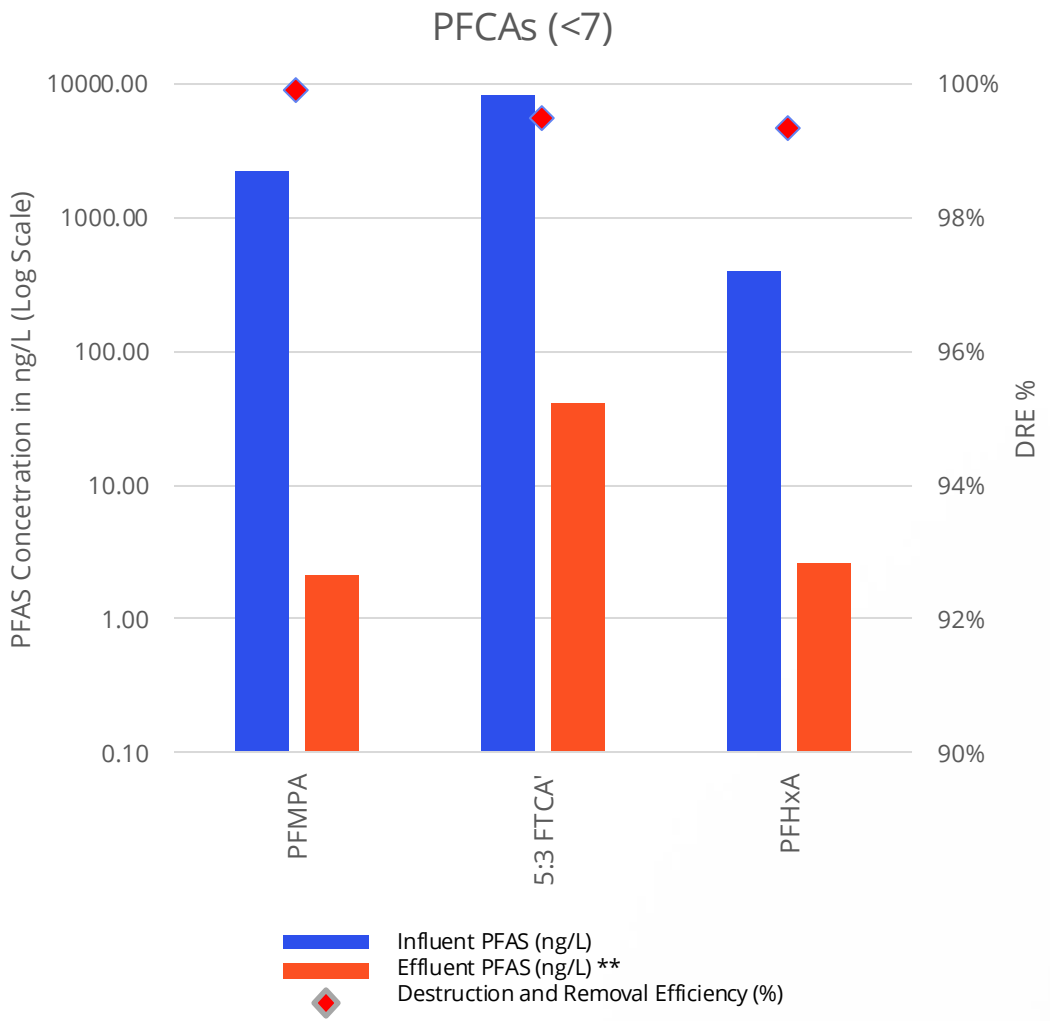

- Low incidence of short chained PFCAs compounds, with 25% at/above 1633 MDL
- 99.57% average DRE** for short chain PFCA's
  - MDL for terminal compounds ranged from 0.485 to 0.546 ng/L
  - MDL for precursor compounds ranged from 12.1 to 13.6 ng/L
- All effluent samples returned ND
- Lower DRE for precursors versus terminal compounds

* *As measured by EPA Method 1633*

** *MDLs are applied for ND results in the effluent*

Project Results*: PFAS Elimination in Sludge (Long Chain (>7) PFCAs)

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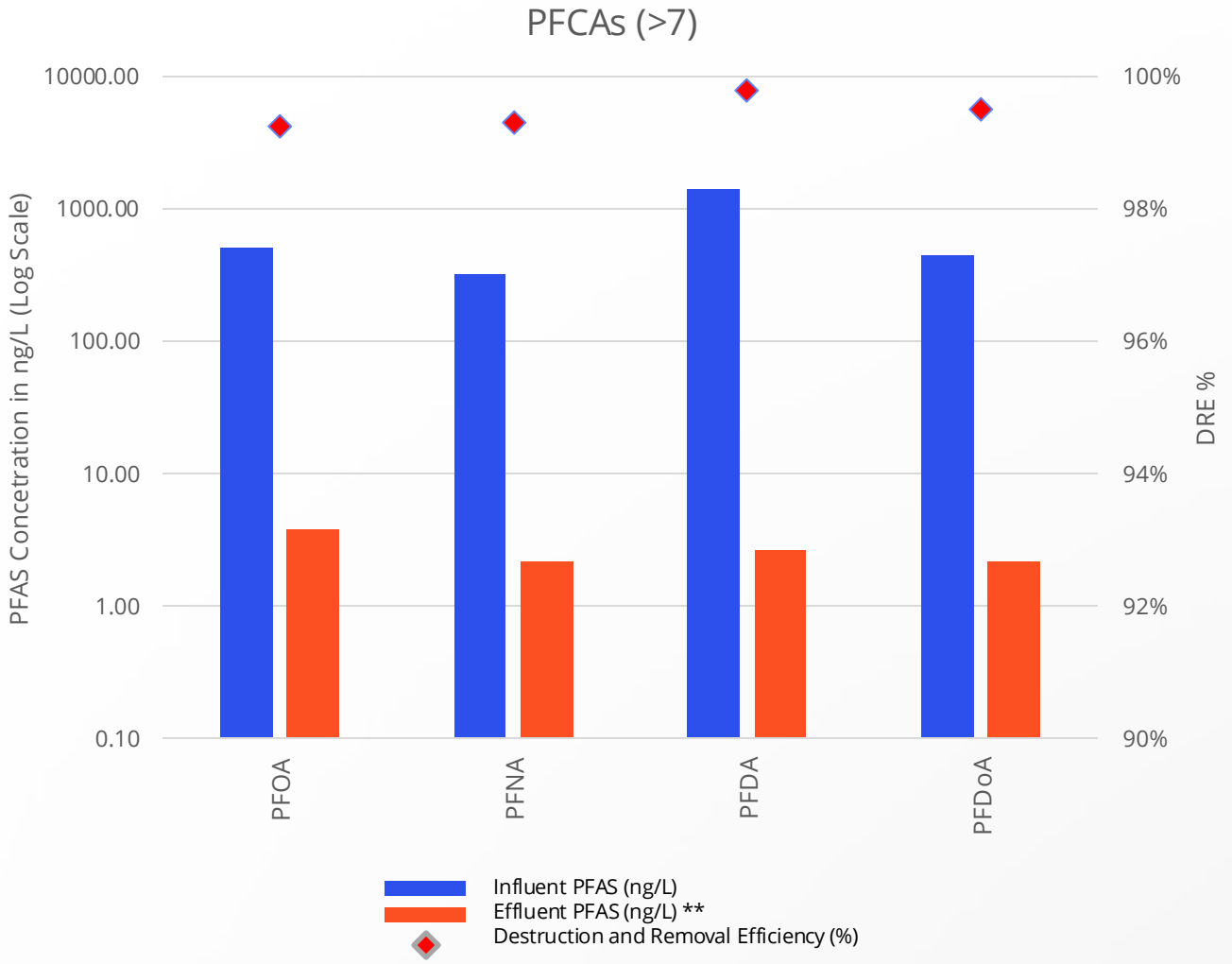
- Moderate incidence of long chained PFCAs compounds, with >50% at/above 1633 MDL
- 99.59% average DRE** for long chain PFCA's
  - MDL for terminal compounds ranged from 0.485 to 1.0 ng/L
  - No precursor compounds detected in this data set
- All effluent samples with one exception returned ND



* *As measured by EPA Method 1633*

** *MDLs are applied for ND results in the effluent*

Project Results*: PFAS Elimination in Sludge (Short Chain (<6) PFSAs)

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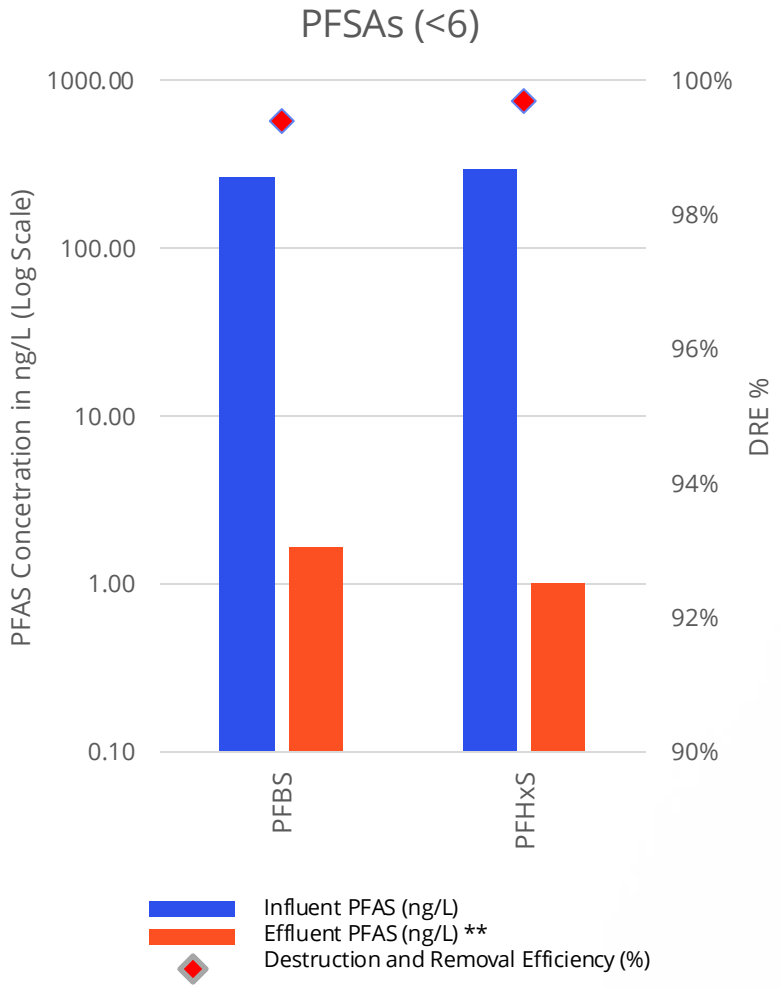

- Low incidence of short chained PFCAs compounds, with 33% at/above 1633 MDL
- 99.53% average DRE** for short chain PFCA's
  - MDL for terminal compounds ranged from 0.485 to 1.0 ng/L
  - No precursor compounds detected in this data set
- All effluent samples returned ND

* *As measured by EPA Method 1633*

** *MDLs are applied for ND results in the effluent*

Project Results*: PFAS Elimination in Sludge (Long Chain (>6) PFSAs)

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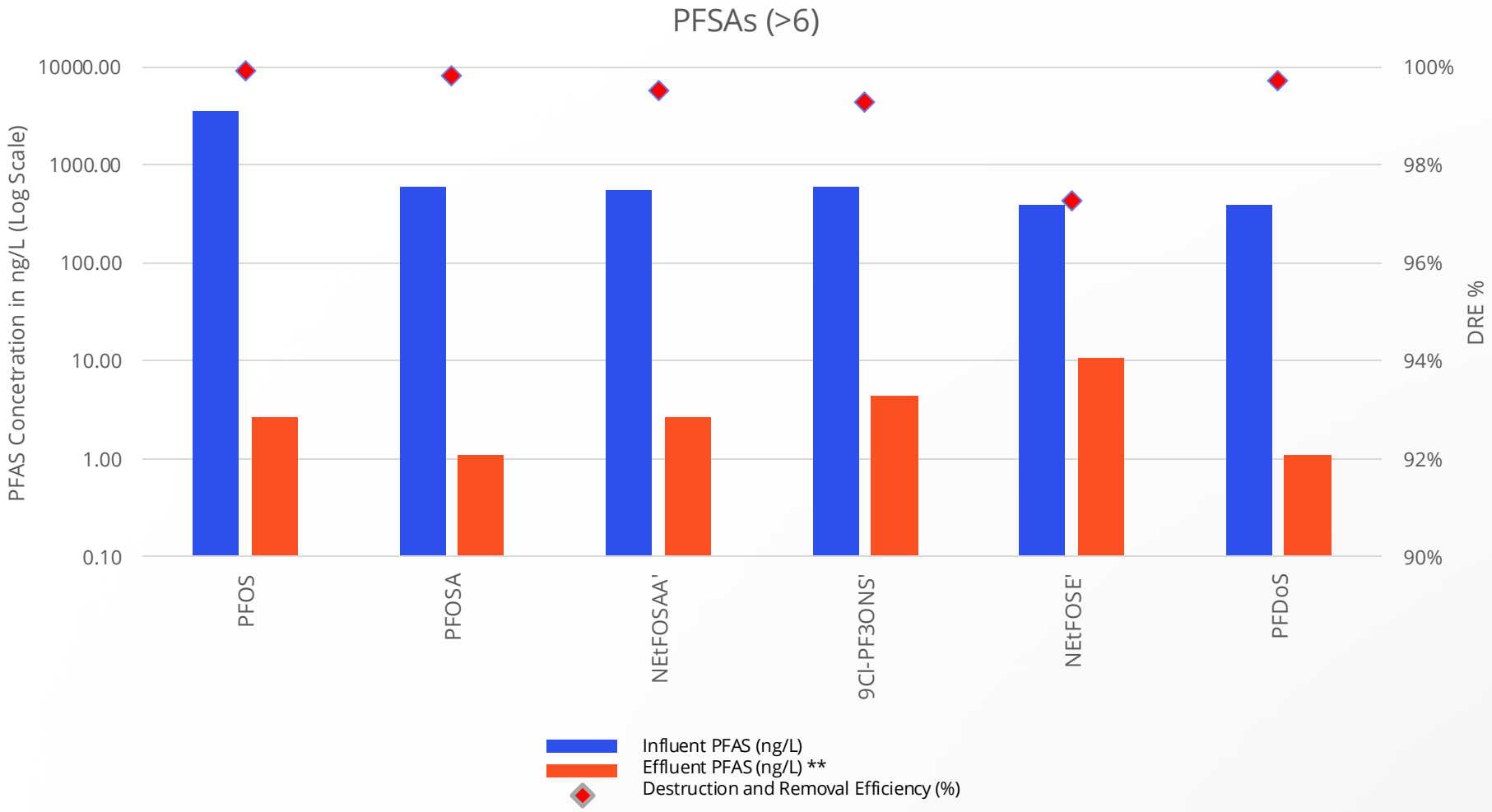
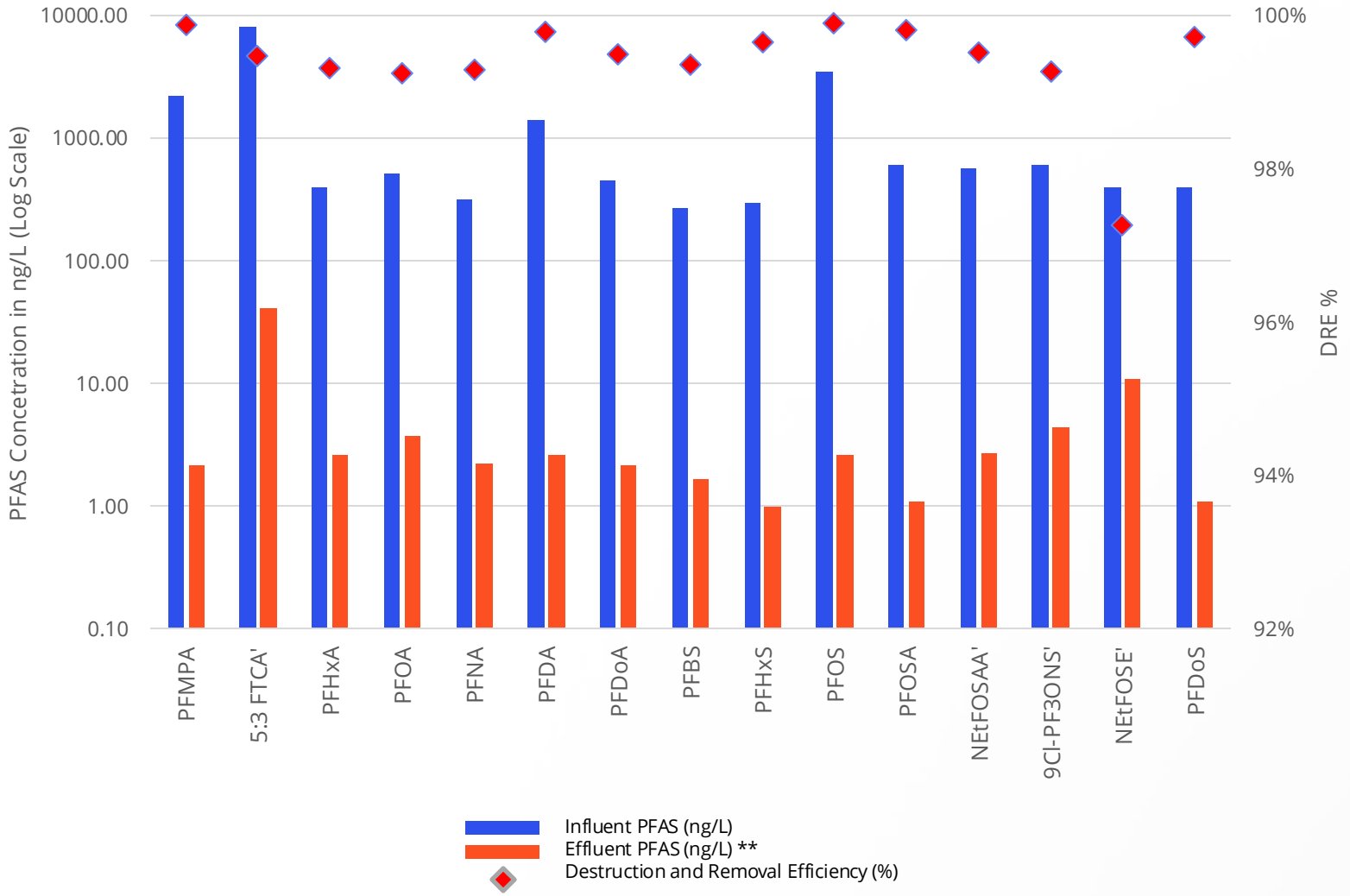
- Moderate incidence of long chained PFCAs compounds, with 50% at/above 1633 MDL
- 99.62% average DRE** for long chain PFCA's
  - MDL for terminal compounds ranged from 0.485 to 1.0 ng/L
  - MDL for precursor compounds ranged from 0.027 to 5.46 ng/L
- All effluent samples returned ND



* *As measured by EPA Method 1633*

** *MDLs are applied for ND results in the effluent*

Project Results*: PFAS DRE for Sludge (Summary)



- DRE is 99.59%** when MDLs are applied for ND results in the effluent
- DRE > 99.99% when zero are applied for ND results in the effluent

* *As measured by EPA Method 1633*

** *MDLs are applied for ND results in the effluent*

Project Results: PFAS in Emissions * (AFFF)

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F mass balance								
Using TF data for the influent & effluent: calculated in the influent (based on Total PFAS from TOP Assay, and assuming 64 wt% F); measured (fluoride (IC)) in the effluent Using fluoride in process water (ISE) Assuming DI water with no F (post RO, not analyzed, for one of the water streams)								
Composite effluent (x4 IBC totes)								
Based on feedstock Total PFAS per TOP Assay x 64 wt.% F (assumption)	**Feed conc. x Feed volume**	Based on process water (WB) IF (approximate value based on previous blanks)	**Feed conc. x Feed volume**	DI water - no fluoride assumed (not measured)	**Feed conc. x Feed volume**	Based on effluent TF	**Effluent conc. x Effluent volume**	**Outlet F mass / inlet F mass**
mg/L	g	mg/L	g	mg/L	mg	mg/L	g	%
711.7	**271**	**0.4**	**1**	**0.0**	**0**	**124.0**	**319**	**118%**

	Polar	Non-Polar	Volatile	Semi-Volatile	Non-Volatile
OTM-45	X			X	X
OTM-50		X	X		
OTM-55		X		X	X

- OTM-45 and OTM-50 analyses were performed
  - Achieved >99.99% average destruction and removal efficiency (DRE**) for liquid influent and effluent
    - Method detection limits (MDL) ranged from 1.0 to 5.0 ng/L
  - PFAS concentrations in liquid
    - 14,700,000 ng/L in influent
    - 7.82 ng/L in effluent
  - Six PFAS compounds were detected in emissions at detection levels
    - Method detection limits (MDL) ranged from 0.15 to 0.66 ng/L for detected compounds
  - Emissions accounted for 0.101% of PFAS levels found in the effluent

* *Sludge test pending, data presented is from AFFF destruction phase*

** *MDLs are applied for ND results in the effluent*

Project Results*: PFAS Elimination in Other Wastes

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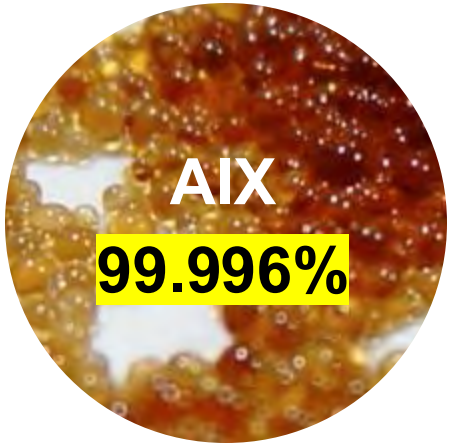

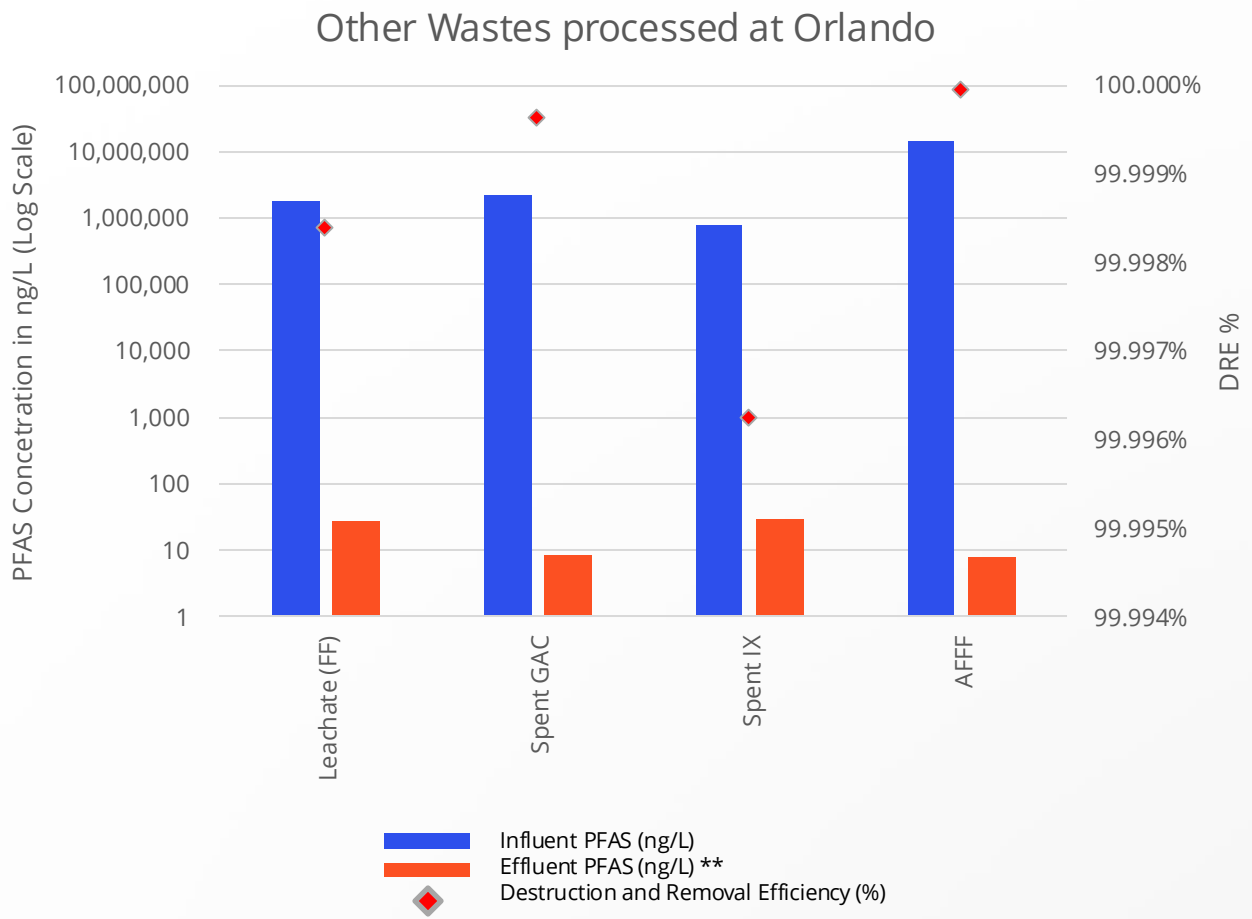

* *As measured by EPA Method 1633*

** *MDLs are applied for ND results in the effluent*

Next Steps

374Water Future Facilities and Deployments

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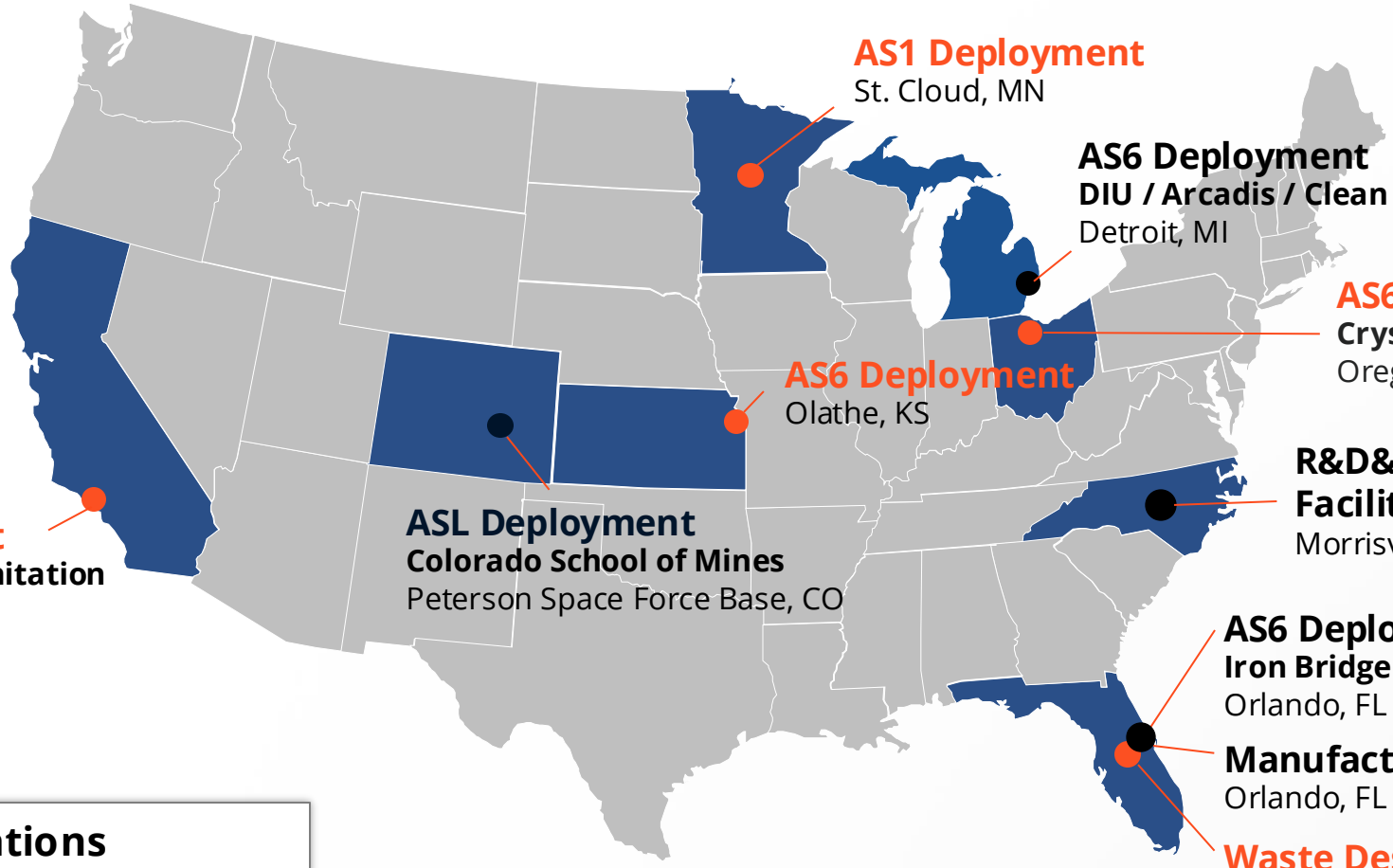
Plans to establish Waste Destruction Facilities throughout U.S. starting in 2025. Multiple AirSCWO deployments throughout 2025 announced. Transitioning to a larger, dedicated manufacturing facility to insource most assembly and light manufacturing activities, as well as increase production velocity and flexibility.



AS1 Deployment
St. Cloud, MN

AS6 Deployment
DIU / Arcadis / Clean Earth Hazardous Waste Center
Detroit, MI

AS6 Deployment
Crystal Clean Waste Destruction Services
Oregon, OH

AS6 Deployment
Olathe, KS

R&D&E Biosafety L1 Lab Facility
Morrisville, NC

AS6 Deployment
Orange County Sanitation District Plant No. 1
Fountain Valley, CA

ASL Deployment
Colorado School of Mines
Peterson Space Force Base, CO

AS6 Deployment
Iron Bridge Regional Water Reclamation Facility
Orlando, FL

Manufacturing and R&D&E Facility
Orlando, FL

Waste Destruction Services Facility
Orlando, FL

- **Existing Operations**
- **2025-26 Planned Expansion[1]**

[1] AS Capital Sale and TSDF Waste Destruction Services facilities under negotiation in AK, AL, IL, IN, KY, KS, NC, NV, OH, etc.

Future of AirSCWO

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- Scale Up: design, build and test an AirSCWO 30 system
- AirSCWO 6 demo unit used for DIU work in Detroit
- AirSCWO 1 demo unit used for WDS contract execution in Orlando
- Develop modules for novel wastes & contaminants
- Gather more data on air emissions, develop CO_2 sequestration solution
- Develop mineral recovery modules

Municipal

OCSAN Orange County Sanitation District; City of Orlando; Olathe Kansas; City of St. Cloud Minnesota; Hazen; Burns McDonnell; Garney; Barr

Federal Government & Prime Contractors

US Army Corps of Engineers; NDC; NAVFAC; WSP; ESTCP; Defense Innovation Unit; ARCADIS; Geosyntec consultants; CleanEarth

Industrial / Corporate

MIDWAY; PharmaChem Technologies GB Ltd

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THANK YOU

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Naomi Senehi, M.S. / ns@374water.com

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