



evoqua
WATER TECHNOLOGIES

**PFAS CHALLENGES AND
SOLUTIONS FOR INDUSTRY**

2022 PA CHAMBER ANNUAL
ENVIRONMENTAL CONFERENCE

CAITLIN BERRETTA

10.27.22

Agenda

Evoqua Overview

PFAS Funding and Regulatory Overview

PFAS Solution Technologies

Case Study

Who We Are \e-vōk-wä\

Water is a critical yet finite resource. We believe there is power and purpose in combining expertise, innovation and a commitment to maintaining this resource, now and in the future.

Evoqua Water Technologies is a leading provider of water and wastewater treatment solutions, offering a broad portfolio of products, services and expertise to support industrial, municipal and recreational customers.

Evoqua's new Sustainability and Innovation Hub in Lawrenceville



Headquartered in Pittsburgh, Pennsylvania, Evoqua and our brands have over a 100-year heritage of innovation. We help more than 38,000 customers solve water challenges at over 200,000 installations worldwide and operate in more than 150 locations across ten countries. Every day, millions of people and thousands of companies rely on us as their trusted advisor to help them meet their water needs.



PRODUCTS



TECHNOLOGIES



SYSTEMS



SERVICES

Evoqua At a Glance

100+

year legacy of quality
and innovation

150

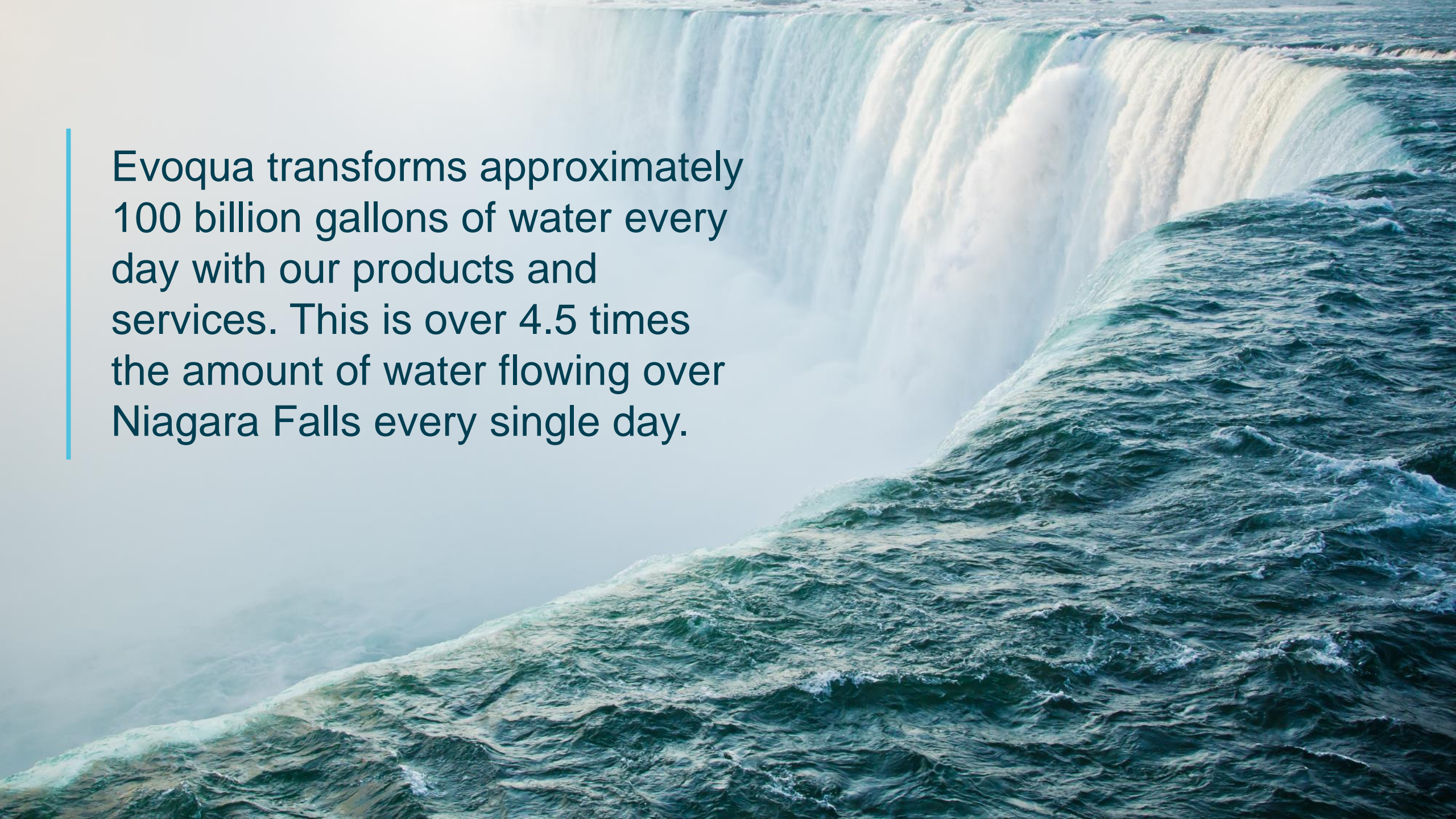
locations globally

200K+

Installations worldwide

\$1.46B

~ FY2021 Revenues

A wide-angle photograph of Niagara Falls, showing the massive volume of water cascading over the edge and creating a large plume of white mist. The foreground shows the turbulent, churning water of the rapids below the falls, with deep blue and green hues. The background is a soft, hazy blue sky.

Evoqua transforms approximately
100 billion gallons of water every
day with our products and
services. This is over 4.5 times
the amount of water flowing over
Niagara Falls every single day.

Infrastructure Investment and Jobs Act/Bipartisan Infrastructure Law

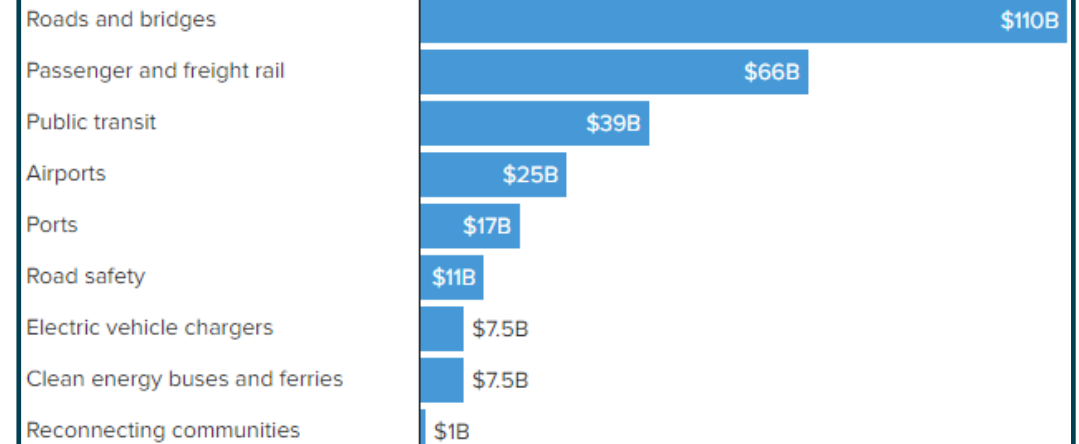
Includes \$10B in funding for addressing Emerging Contaminants/PFAS

- **\$55 Billion** for clean drinking water, generally dispersed over 5 years.
- **Of this \$55B, \$10 Billion** is proposed for PFAS/emerging contaminants funding:
 - **\$1 Billion** to address emerging contaminants in wastewater through the Clean Water State Revolving Fund
 - **\$4 Billion** to address PFAS in drinking water through the Drinking Water State Revolving Fund
 - **\$5 Billion** for small and disadvantaged communities to address emerging contaminants

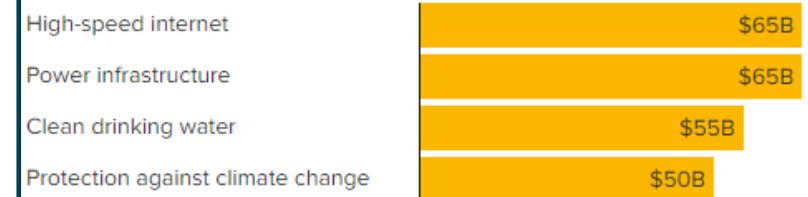
New investment in the bipartisan infrastructure bill

The legislation includes around \$550 billion in new federal spending

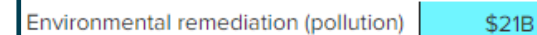
Transportation



Utilities



Environment



Note: Chart shows categories grouped into three sections, but many target more than one area of transportation, utilities, and the environment.

Source: The White House

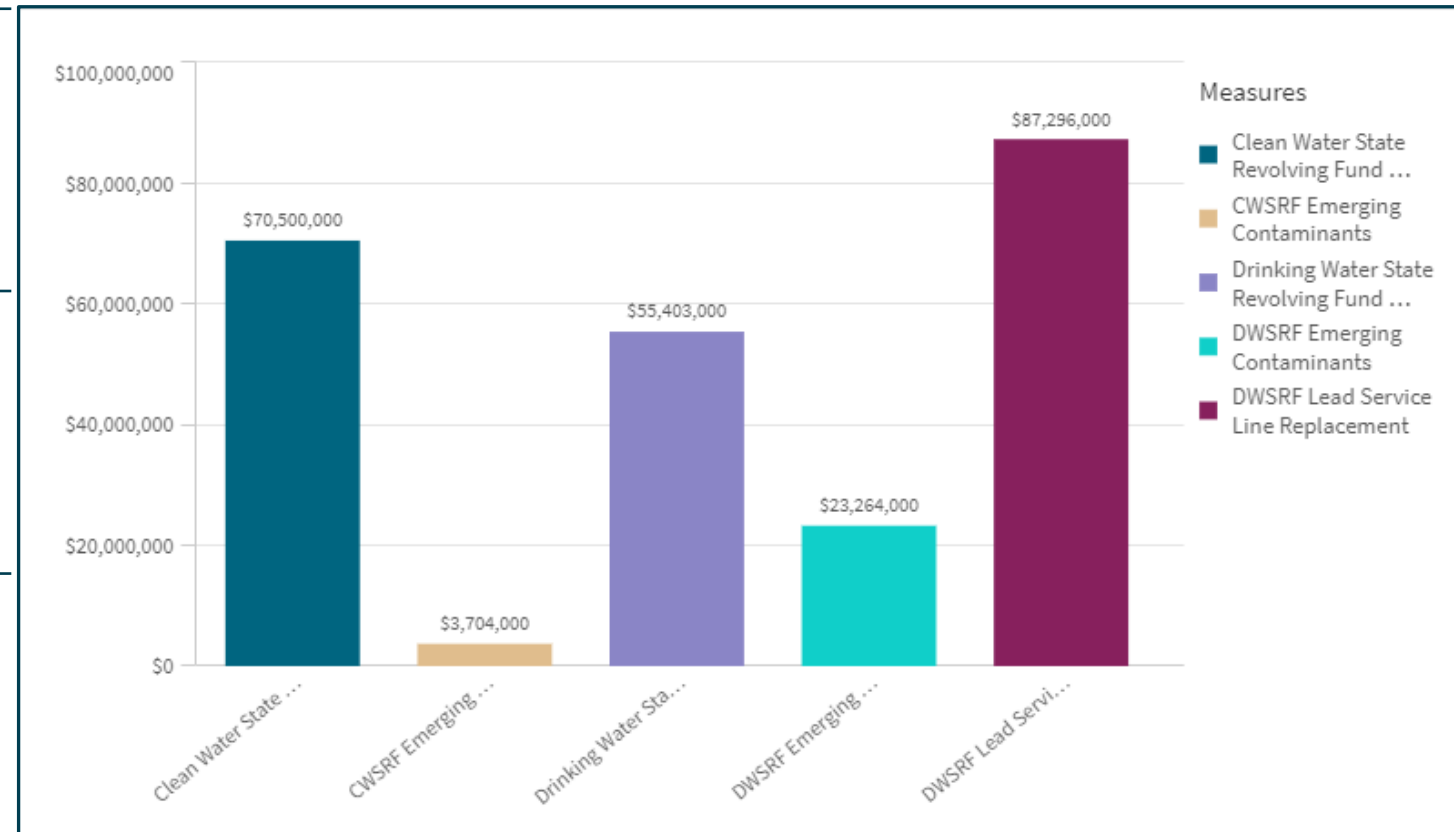
What's in it for PA?

The chart on the right summarizes the first-year allotment in SRF funding that will be provided to PA through the Bipartisan Infrastructure Law.

[September 2022] Update: The EPA announced the first significant distribution of water infrastructure improvement funding for Pennsylvania.

This included a **\$5.5M** grant awarded to Aqua Pennsylvania to install PFAS treatment technology.

To date, **\$17,741,000** remains available for emerging contaminants under the DWSRF for the 2022-2023 budget cycle.



Pennsylvania PFAS Regulatory Action Timeline

February 2022: PFAS Proposed Rule for Drinking Water Regulations

Chemical	Proposed Maximum Contaminant Level
PFOA	14 ppt
PFOS	18 ppt

2021: Statewide Sampling Results Published – Finding about 1/3 of PA water systems contain PFAS

2019: Statewide sampling begins to guide regulatory process

2018: Governor Wolf Establishes PFAS Action Team

US EPA PFAS Strategic Roadmap: EPA's Commitment to Action

On Oct. 18th, 2021 the US EPA announced its “PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024,” which provides the agency's plan and timeline for regulating PFAS over three years.

EPA Action	Expected Timeline
Publish health advisories for GenX and PFBS	<u>Published</u> Summer 2022
Propose to designate certain PFAS as CERCLA hazardous substances	Proposed rule <u>released</u> Summer 2022, Final rule Summer 2023
Establish a national primary drinking water regulation for PFOA and PFOS	Proposed rule by Fall 2022, Final rule Fall 2023 <u>[not yet announced]</u>

US EPA Health Advisories for PFOA, PFOS, GenX and PFBS

On June 15, 2022 the EPA announced updated Lifetime Health Advisories for PFOA, PFOS and Final Health Advisories for PFBS, and GenX. Interim Health Advisories for PFOA and PFOS will be finalized with the announcement of the MCL.

Chemical	Lifetime Health Advisory Level/Value (ppt)	Minimum Reporting Level ¹ (ppt)
PFOA	0.004 (interim)	4
PFOS	0.02 (interim)	4
GenX Chemicals	10 (Final)	5
PFBS	2,000 (Final)	3

¹Unregulated Contaminant Monitoring Rule (UCMR) 5 MRL is the minimum quantitation level that, with 95 percent confidence, can be achieved by capable analysts at 75 percent or more of the laboratories using a specified analytical method. These MRLs are based on the UCMR 5 requirement to use Method 533.

US EPA Proposes PFOA and PFOS as CERCLA Haz Substances

Announced September 2022

Currently in an open comment period. Expected to be finalized mid to late 2023.

This designation would allow EPA to clean up contaminated sites and force responsible parties to either perform cleanups or reimburse the government for EPA-led cleanup work.

This designation is expected to spark clean up efforts while also adding accountability for polluters.

The US Chamber of Commerce estimates that the Superfund designation would cost at least \$700 million per year (some say easily greater than \$1B).



PFAS Removal Solutions | Each Water is Unique

Granular Activated Carbon



- Named Best Available Technology by EPA for organic contaminant removal
- Removes other organic contaminants
- Minimal maintenance

Single Pass Ion Exchange



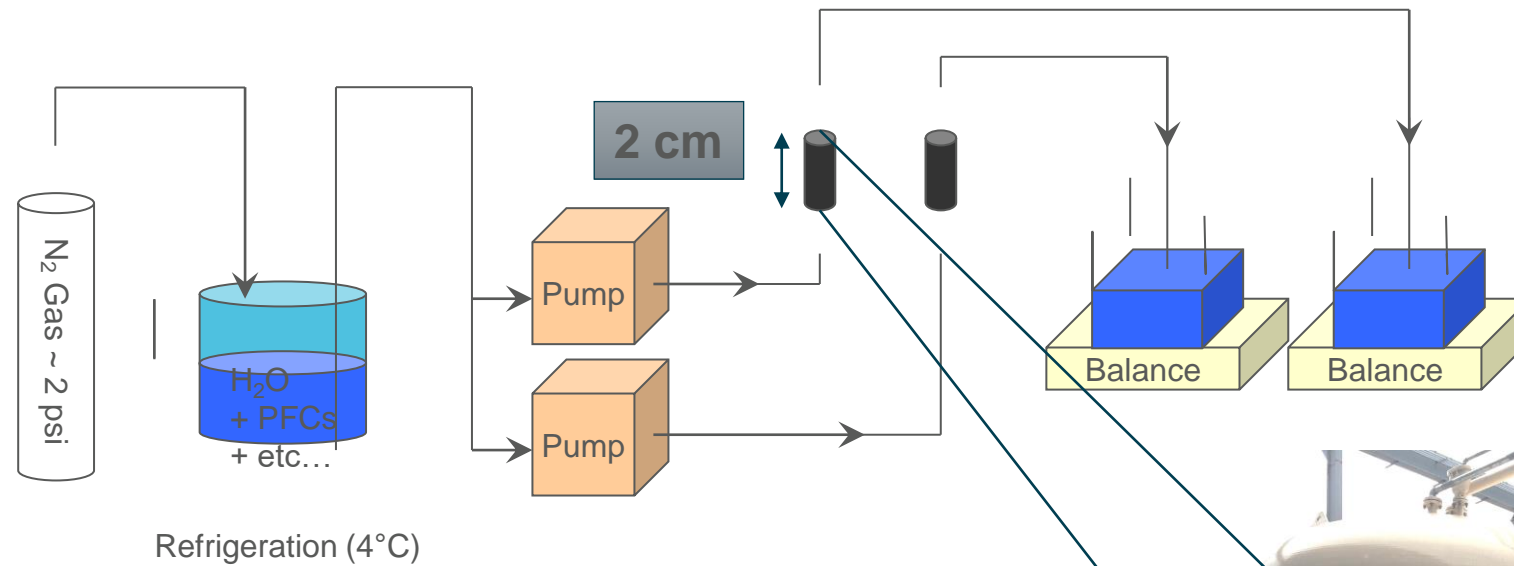
- Lower EBCT / Higher flowrate
- Small footprint
- No chemicals or liquid waste
- Minimal maintenance

Membranes

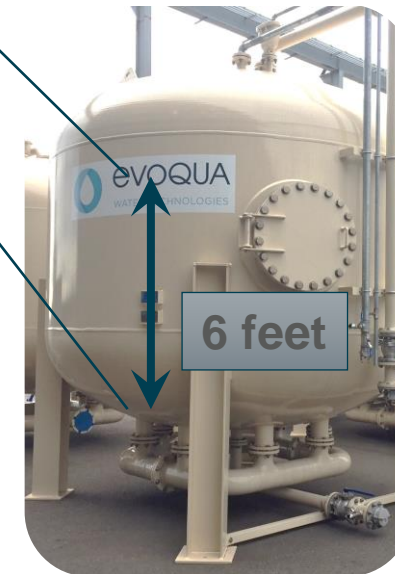


- Highly effective
- Removes dissolved solids

Performance Testing: RSSCT (ASTM D6586)



- **RSSCT** = Rapid Small-Scale Column Test
- Only ASTM approved method
- Simulates months of runtime within days





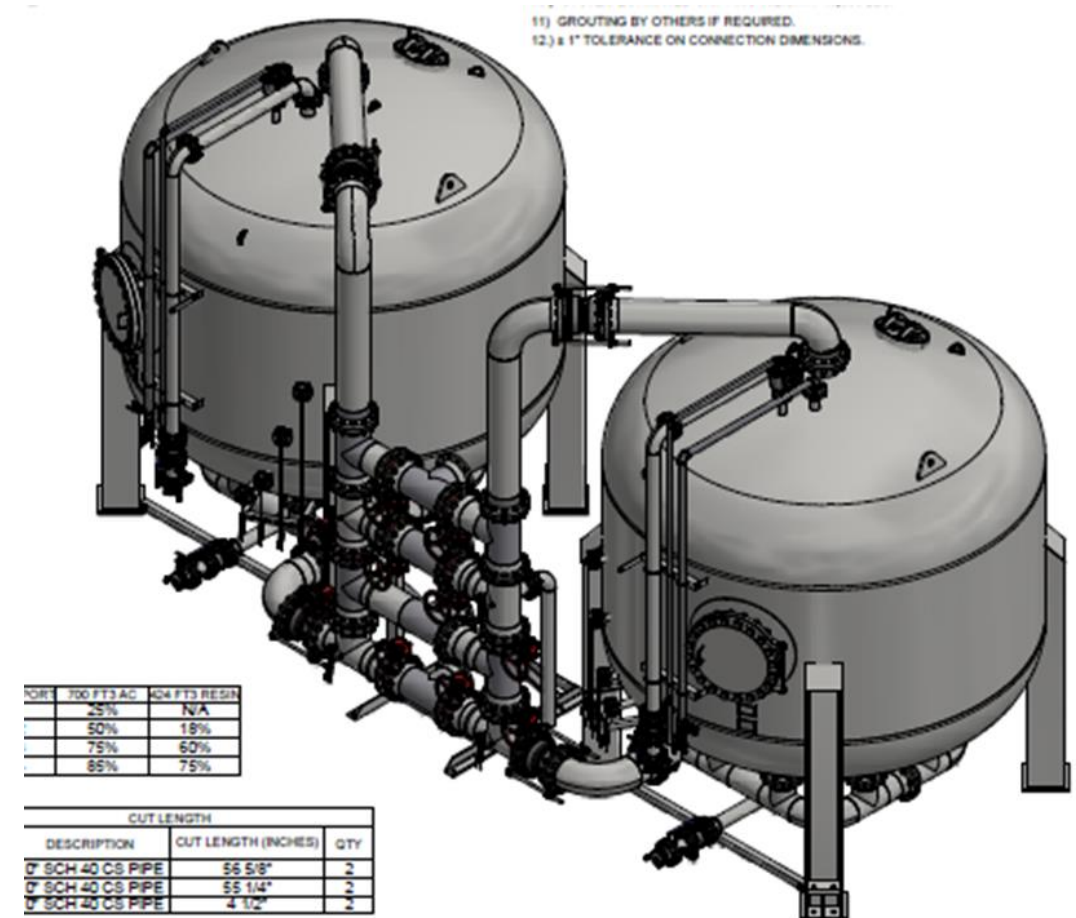
Pilot Scale Performance Testing

- Pilot scale can be used to test the effectiveness of the technology for contaminant removal before a full-scale system is installed for community's drinking water.
- Uses small diameter (3" to 6") columns to simulate operating conditions of full scale adsorber.
- Matching hydraulic loading rate and shortening bed depth (e.g. 0.5 full scale) can decrease time to reaching conclusions.
- Requires more time and labor, however pilot studies provide more accurate predictions of bed life in full-scale applications

HP CIX Systems Designs

Designed for Emerging Contaminant Treatment

- Designed for ease of lifetime operations & flexibility for future configurations
 - Flexible design allows for use of multiple types of medias
 - Allows pre-purchase of equipment while piloting GAC/IX/Novel sorbents
 - Allows for overall lifetime cost optimization as more products become approved/available
- Patent-Pending Design
- “System” includes two vessels + manifold



Mobile Units

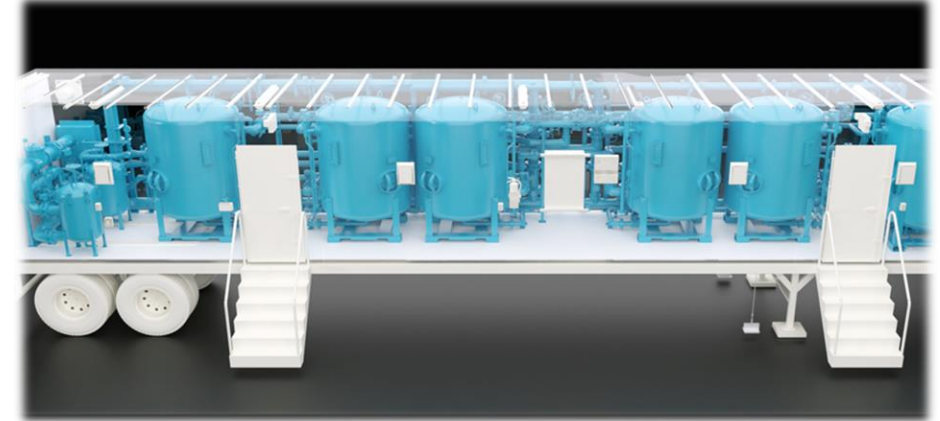
When your operation cannot be interrupted

- Rapid or emergency response
- Temporary or semi-permanent installation
- More than drinking water applications ...
 - Construction site water treatment (50-2000+ gpm)
 - Industrial process water
 - Industrial wastewater
- Footprint: variable / skid-mounted and tailored to site constraints



Mitigator Product Overview

- Portable trailer for potable water applications with NSF 61 wetted components
- Maximum flow rate 1000 GPM (designed for 200-1000 GPM)
- Two Bag filters for pre-filtration (left side of the trailer)
- Six - 60in custom CIX vessels
- Carbon and or Resin can be used to meet your complex water need



Stratmoor Hills Water District (CO)



- Local Air Force base is source of PFAS contamination affecting aquifer that supplies several communities
- Treating water for:
 - Perfluorooctanoic acid (PFOA)
 - Perfluorooctanesulfonic acid (PFOS)
 - Perfluoroheptanoic acid (PFHpA)

Stratmoor Hills Water District | Installed Solution

- Pre-filters
- Two lead/lag trains
- 4' diameter vessels
- 60 cubic feet PSR2 Plus per vessel
- 2.6 minute EBCT
- Outdoor installation
- Vessels moved indoors for winter storage



Stratmoor Hills Water District | Results

- Quickly and safely installed
- Processes 350 gpm
- Removes PFAS to levels below detection limits of 2 ppt
- **“It’s been fantastic ever since it went online,”** says District Manager of Stratmoor Hills Water District





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THANK YOU

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WATER TECHNOLOGIES

APPENDIX
CASE STUDIES

Kennebunk, Kennebunkport & Wells Municipal Water District (KKWWD)

CASE STUDY #1



- PFOA and PFOS found in source well
- Concentrations were below the EPA Health Advisory Limit at 50 ppt
- KKWWD shut the well down voluntarily and looked for a treatment solution

KKWWD Tested Multiple Carbon Systems

CASE STUDY #1



- Evoqua advised KKWWD to pilot test several types of carbon to determine which performed best given their local water chemistry
- The results showed that the Evoqua's carbon made from coconut provided an additional 3 months of full scale run time, versus other carbons
- KKWWD installed a full-scale high pressure vessel system to remove PFAS from the water

KKWD | Installed Solution

CASE STUDY #1

- Single 12' sand filter vessel
- One lead/lag GAC system
- 12' diameter vessels
- 34,700 lbs AquaCarb®1230 CX media
- 10 minute EBCT design | 8 min EBCT actual
- Outdoor installation
- Moving indoors later this year
- Custom-Segregated React and Return can save 30% on carbon rebeds
- Septa design allows for built in flexibility



Right | Interior lining of GAC vessel with Septa underdrain design



Kennebunkport | Online in Time for Tourists with Minimal Impact to Ratepayers

CASE STUDY #1



- “Our goal now is to continuously produce drinking water with non-detectable levels,” says KKWWD Superintendent Labbe. **“With Evoqua’s lead-lag system we should have no problem.”**
- **The impact to ratepayers is roughly three to four cents per day**, per Labbe, and they won’t see the increase for several years.
- “It’s still cheaper than buying water from an outside water utility, and **it keeps us independent**,” he said.

Emergency Treatment in Vermont

CASE STUDY #3

- PFOA was detected in the drinking water
- As a result, a district in VT serving 400 people was put under a “do not drink” order
- Evoqua was able to quickly mobilize a GAC system to treat the water



<http://www.mynbc5.com/article/governor-drinks-pownal-water-to-prove-its-safe/3032663>