

Hot Topics in the Water Sector

PFAS

AQUASM

An  Essential Utilities Company

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How Does PFAS Affect Health?



Increased cholesterol levels



Changes in liver enzymes



Small decreases in infant birth weights



Decreased vaccine response in children



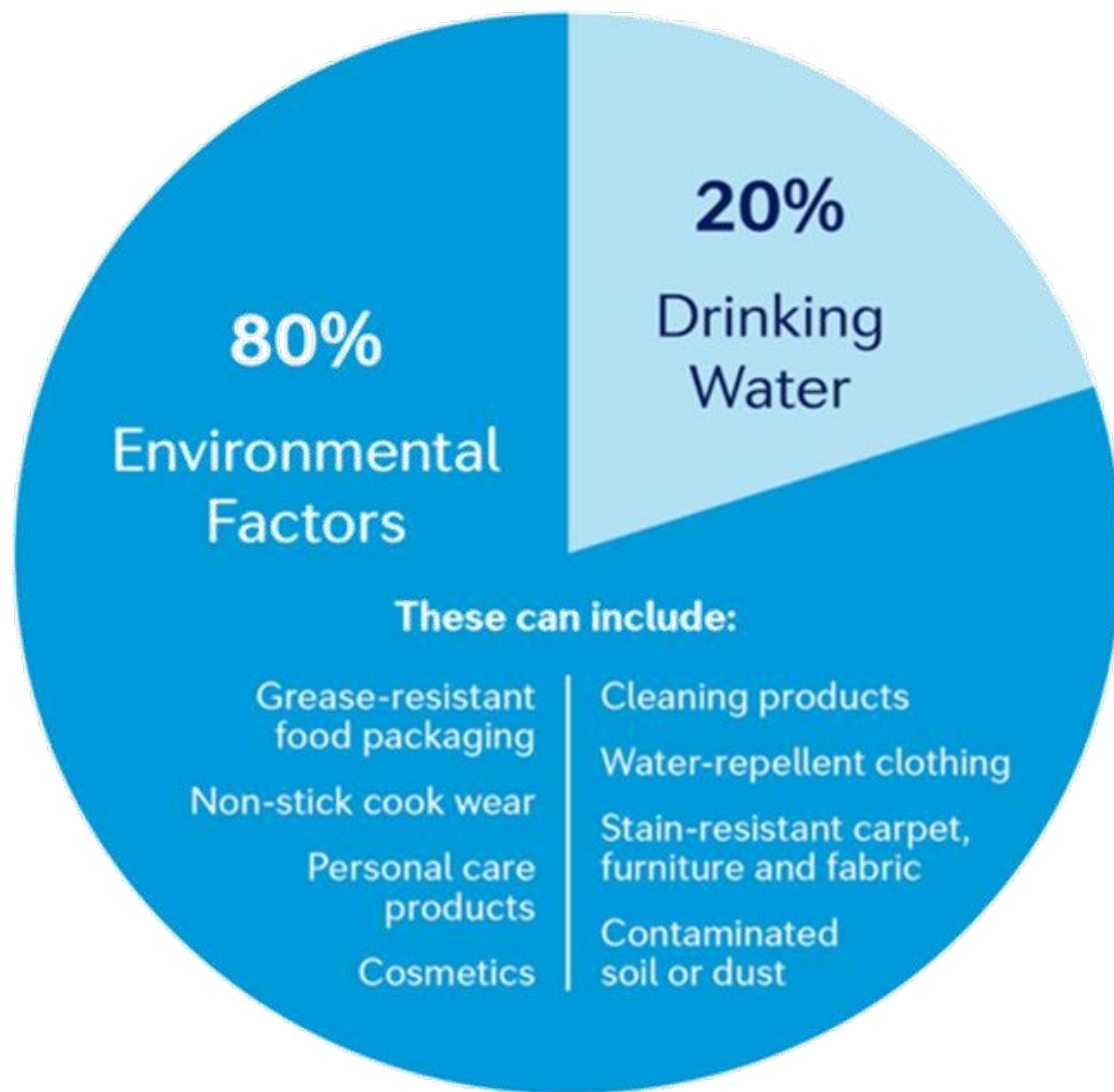
Increased risk of high blood pressure or pre-eclampsia in pregnant women



Increased risk of kidney or testicular cancer

PFAS – Where Is It?

Sources of PFOA Exposure



Source: U.S. Centers for Disease Control and Prevention (CDC)

- “Forever” chemicals have been mismanaged for decades
- Worst were manufactured and used heavily
- Testing and treating for these toxins is expensive and takes a long time

THE WALL STREET JOURNAL.

U.S.

EPA Proposes Limits for ‘Forever Chemicals’ in Drinking Water

Concern is growing over PFAS, which have contaminated water in hundreds of communities



Known as forever chemicals because they take a long time to break down, PFAS have been found throughout the environment.

Colleen Arnold, president of Aqua, which operates water systems in eight states, said the company is already working on installing filtration systems at 40 sites to meet a standard it had set on its own in 2020.

Under the EPA’s stricter proposed limits, she said the company expects the number of sources requiring treatment will increase. So far, the company has completed six treatment facilities, each costing about \$1 million to build in addition to annual maintenance costs.

She said the company is applying for federal grants and seeking aid from state legislatures to fund the treatment costs, which otherwise could be passed along to customers.

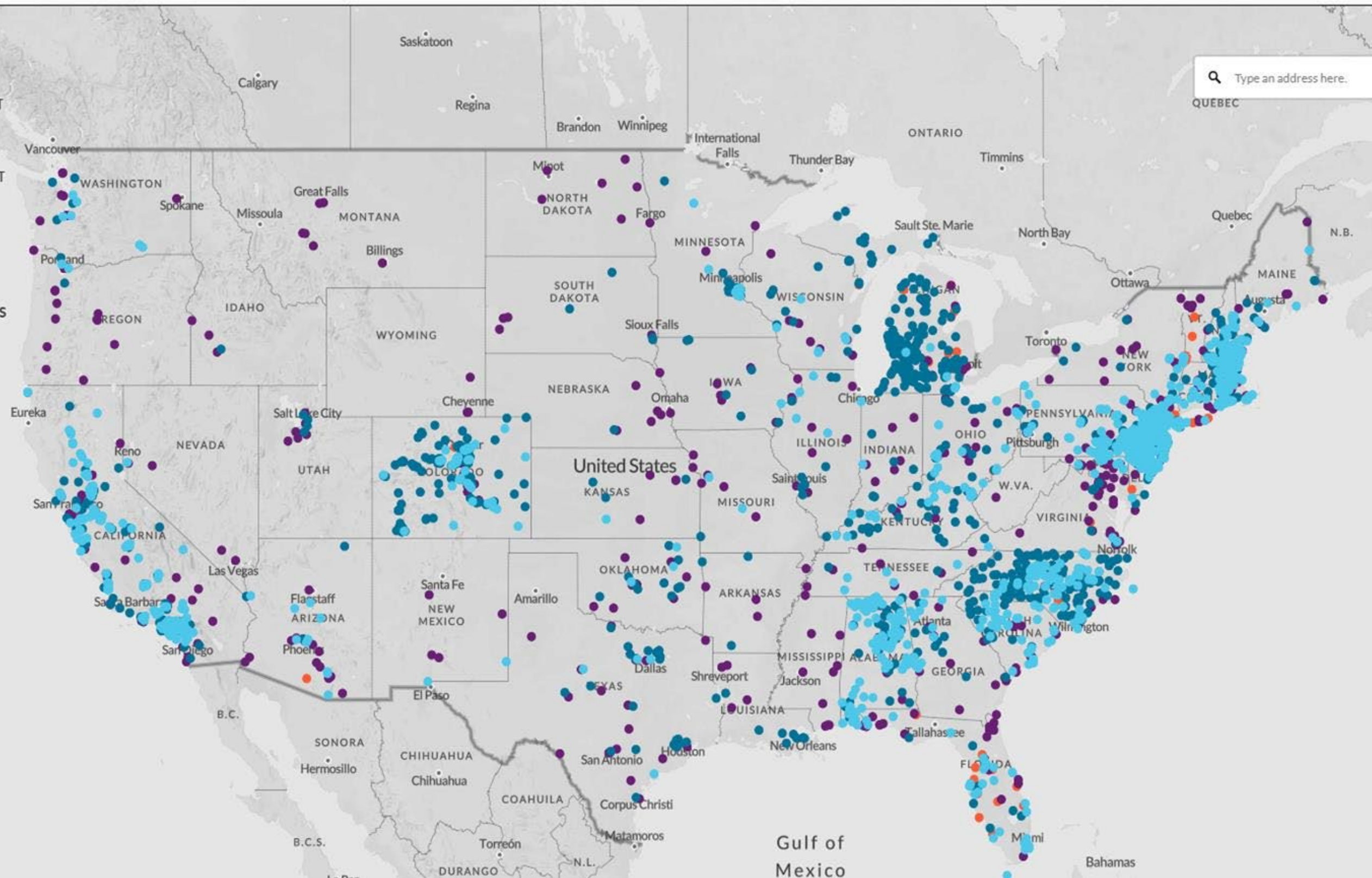
“The impact of this rule is huge,” she said. “It’s going to be a lot for small and medium systems that don’t have the customers to cover the costs.”

Preliminary National Impact



PFAS Contamination in the U.S. (August 17, 2023)

- On Drinking Water ABOVE PROPOSED LIMIT
- On Drinking Water BELOW PROPOSED LIMIT
- On Military Sites
- On Other Known Sites



Systems Impacted Nationally

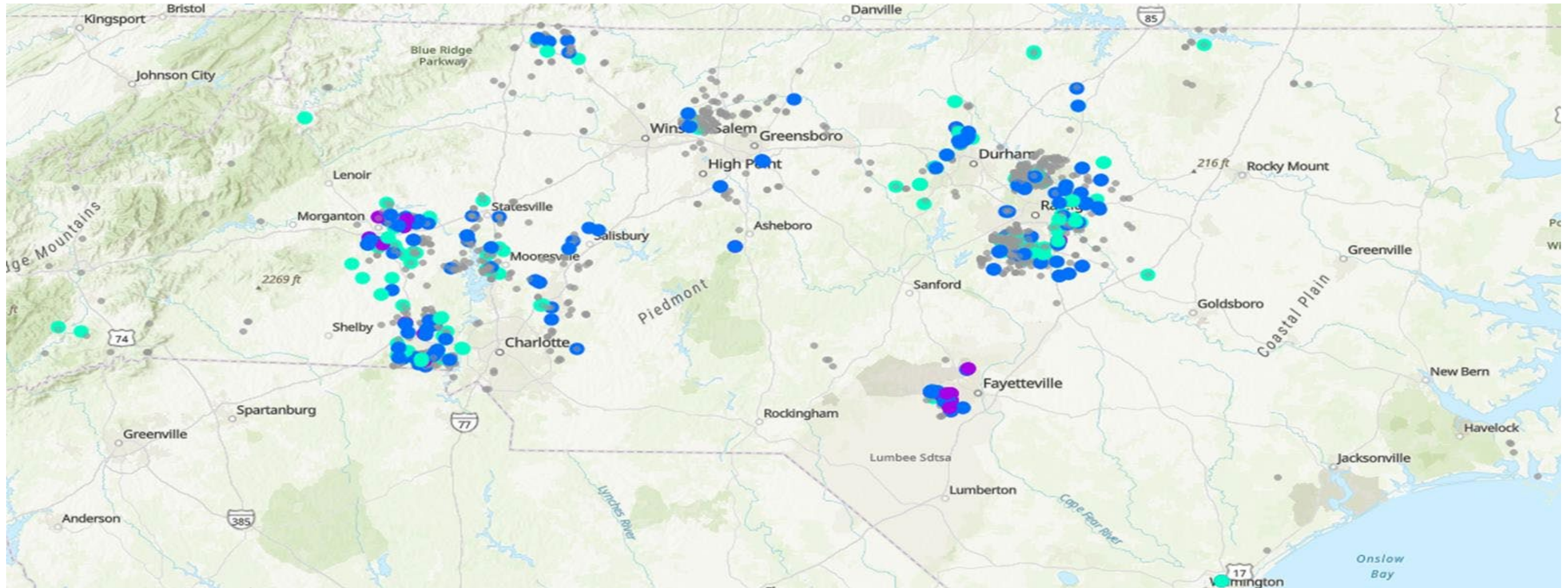
- EPA: 3,400 to 6,300 (< 10%)
- AWWA: 8,000 to 10,000 (10%- 30%)
- Disproportionate impact on small systems
- UCMR5 monitoring detecting PFAS at higher rate than EPA expected

Does It Affect Your Utility?

- Aqua began sampling in 2016
- Invested in PFAS Lab
 - Nearly \$1M
 - Quicker turn-around time
 - Handle larger sample capacity
 - Reduce errors
 - See lower concentrations
- 18,000 samples to date (3000 Entry Points)



ANC Spotlight | The Map – Survey Occurrence Data



Over 175 PFAS impacted Aqua NC water systems

Example Conventional Aqua NC Filter System



Necessity Is The Mother Of Invention

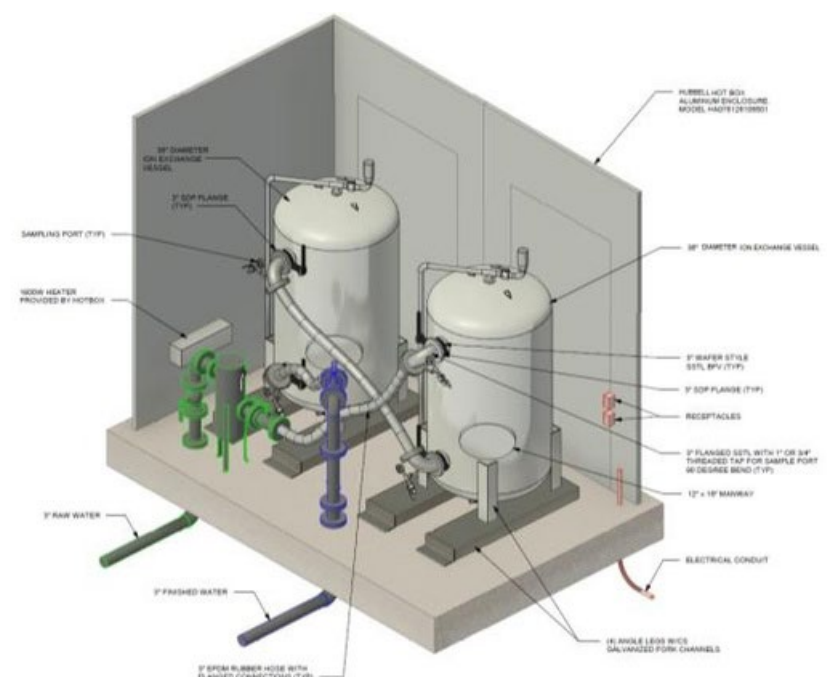
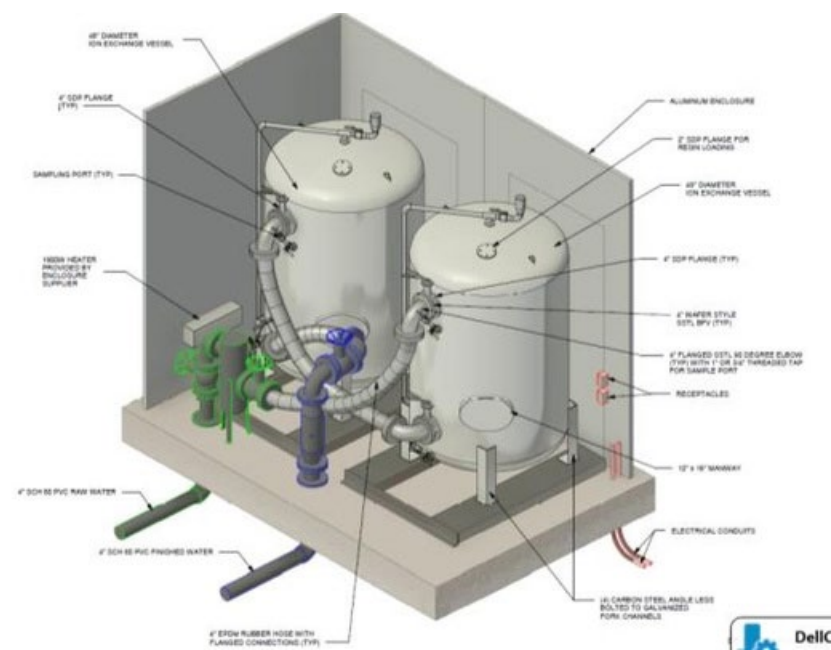
Modular Anion Exchange System is Born



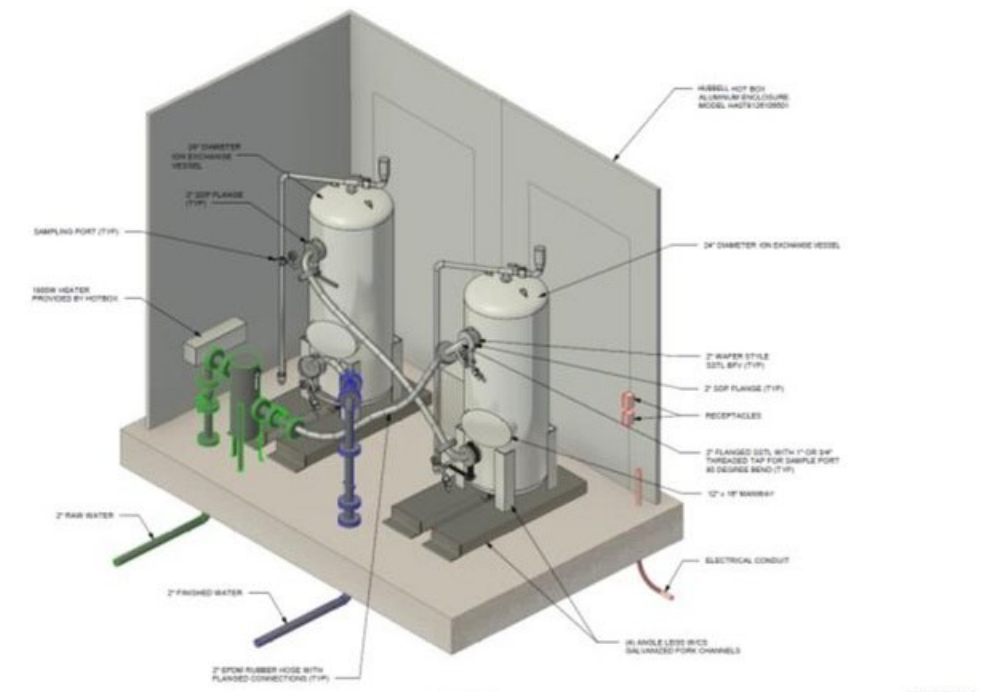
- NSF Approved Anion Exchange Resin
- Standard Canister Size and Specifications for Specific Flowrate Ranges
- NSF 61 Hoses
- Standard Sampling Locations
- Standard Resilient Enclosure (No wood)
- Built for Rapid Deployment, Rapid Replacement, and Offsite Refurbishment

Modular PFAS Options

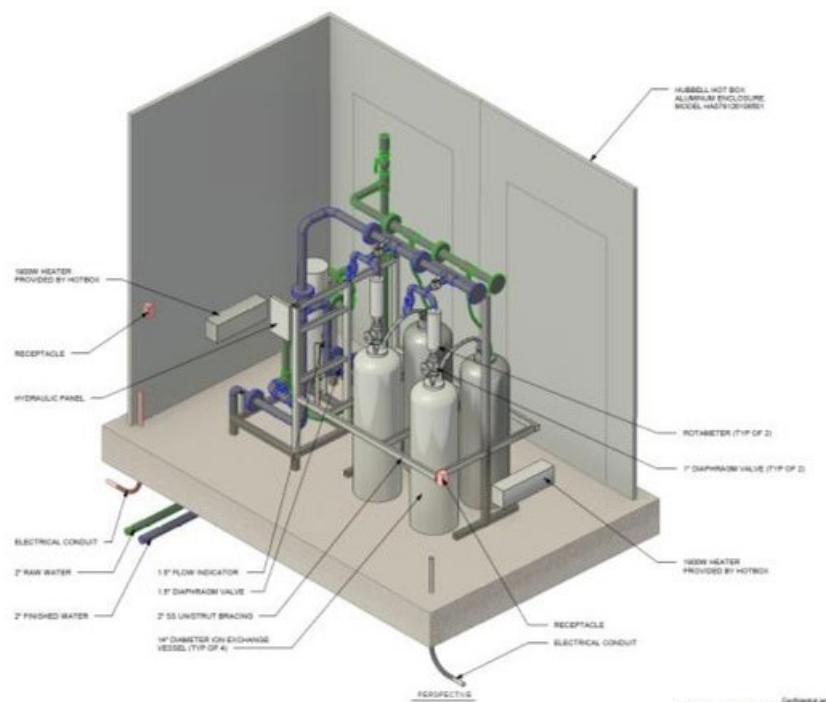
(14 gpm – 200 gpm) – 600 gpm with multiple trains



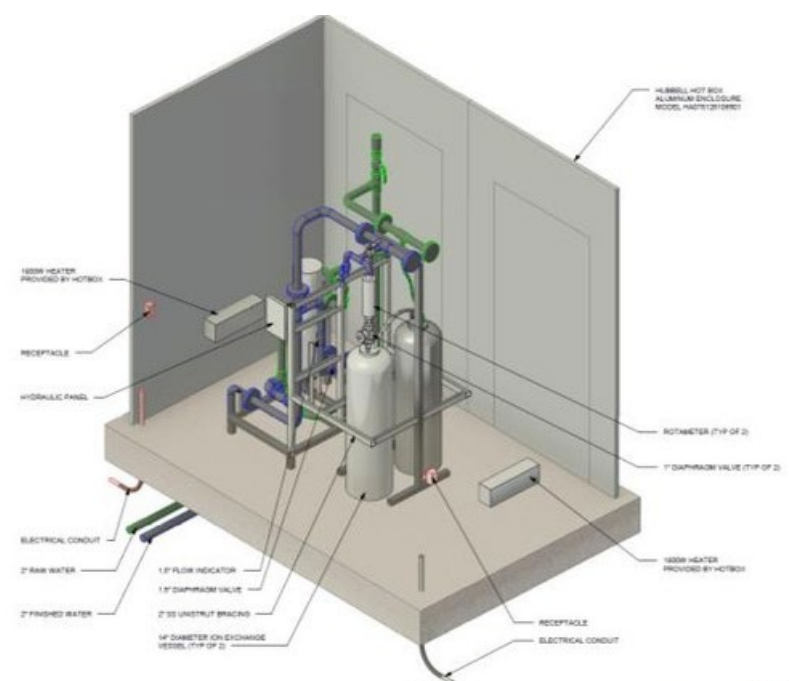
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Patent Pending



Is This The Solution For Every Utility?

- No. This is only for small systems, up to ~1000 connections.
- Larger Systems (up to 40 MGD)– Every system is “Bespoke”.
 - Powder Activated Carbon
 - Granular Activated Carbon
 - Anion Exchange and Proprietary Medias
 - Reverse Osmosis



The Nightmare

- Are the Environmental Regulators staffed and primed to issue construction permits?
- Is the Supply Chain for vessels and media sufficient to meet the worldwide demand?
- How will the customers afford the initial capital investment and the long-term costs of media replacement and disposal?