American Water Works Association
Pacific Northwest Section

PFAS: Developing a Drinking Water Treatment Approach

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Pre-Conference Seminar – Treatment
May 3, 2023

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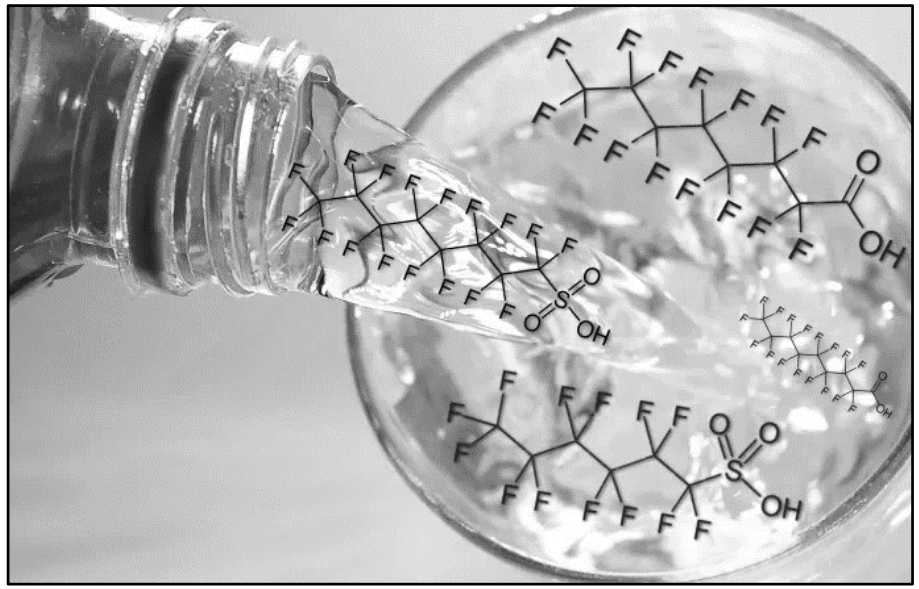
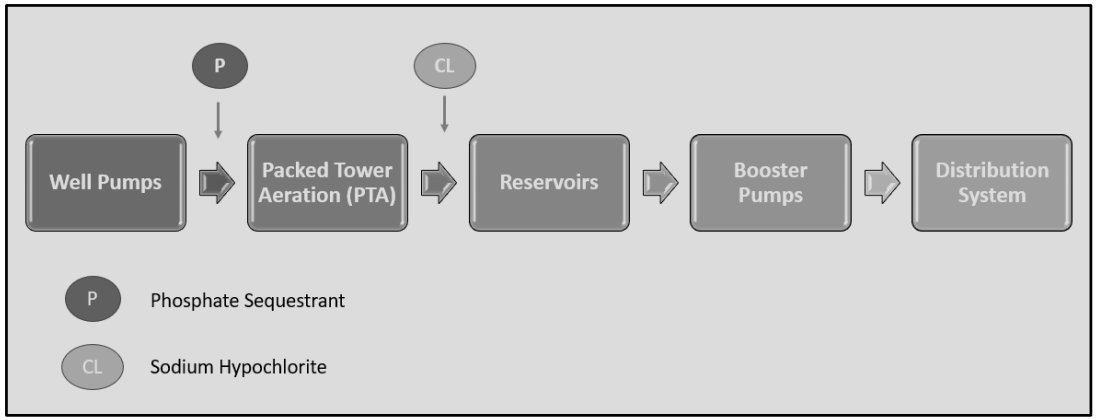
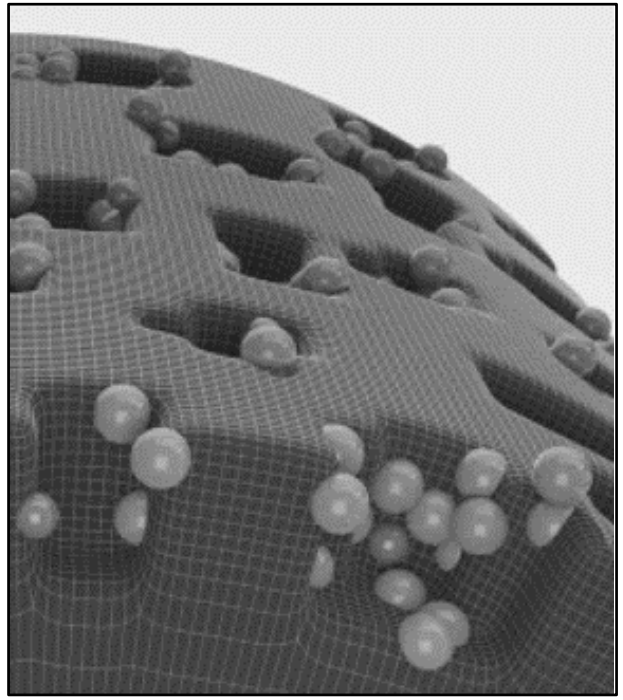
Effective use of treatment technologies can only be leveraged through an evaluation of site-specific needs







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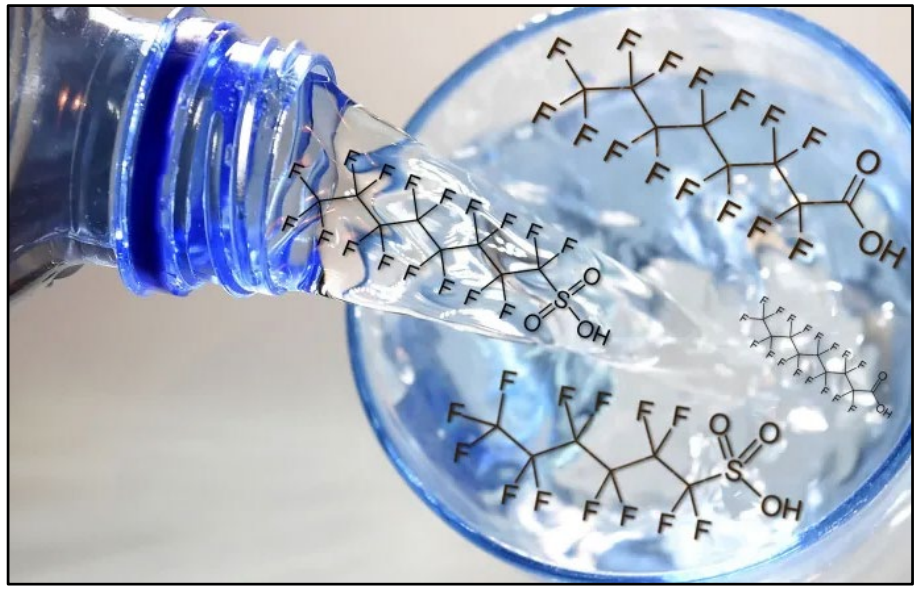

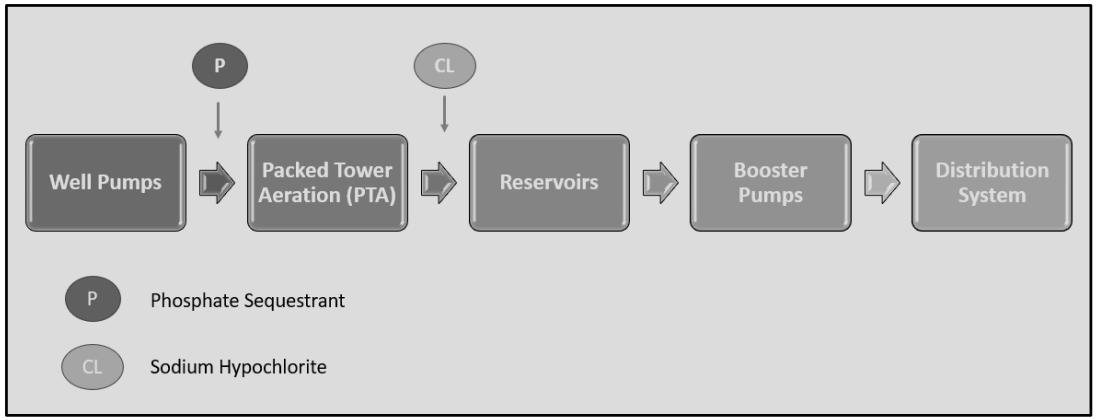

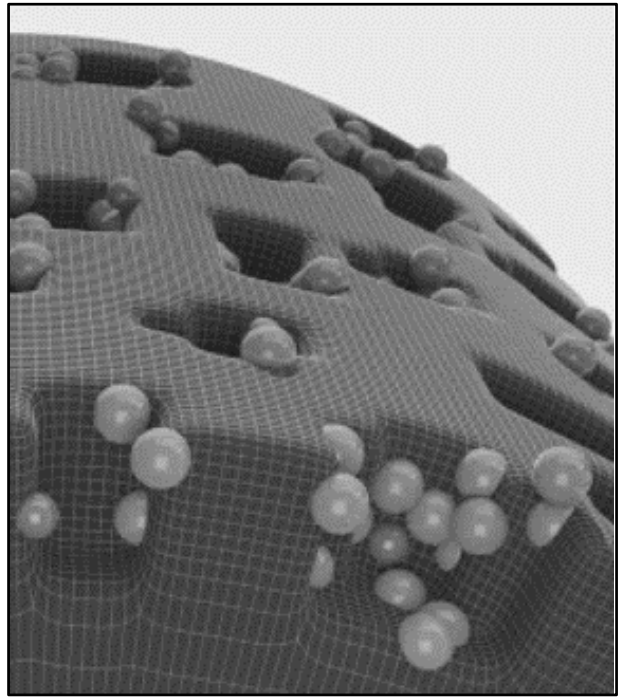

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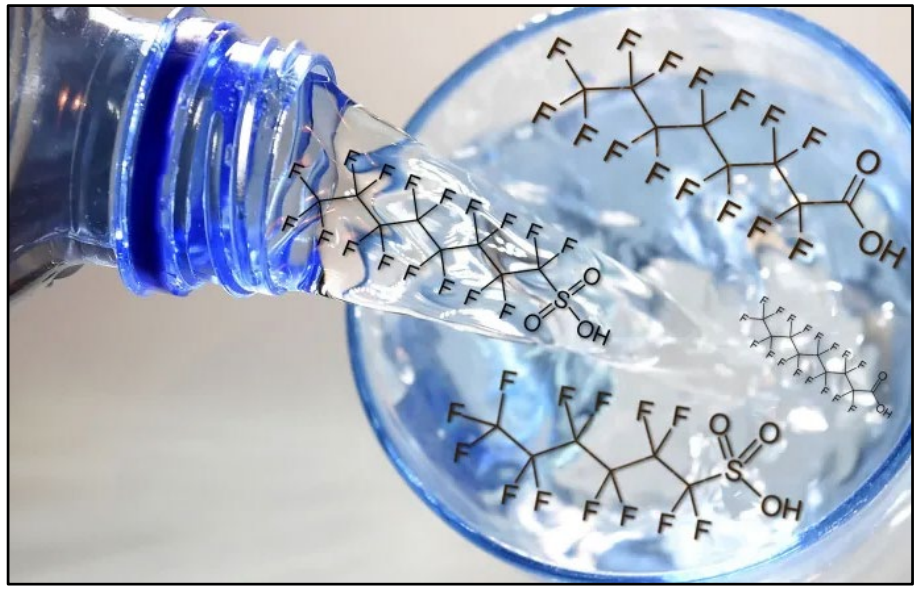

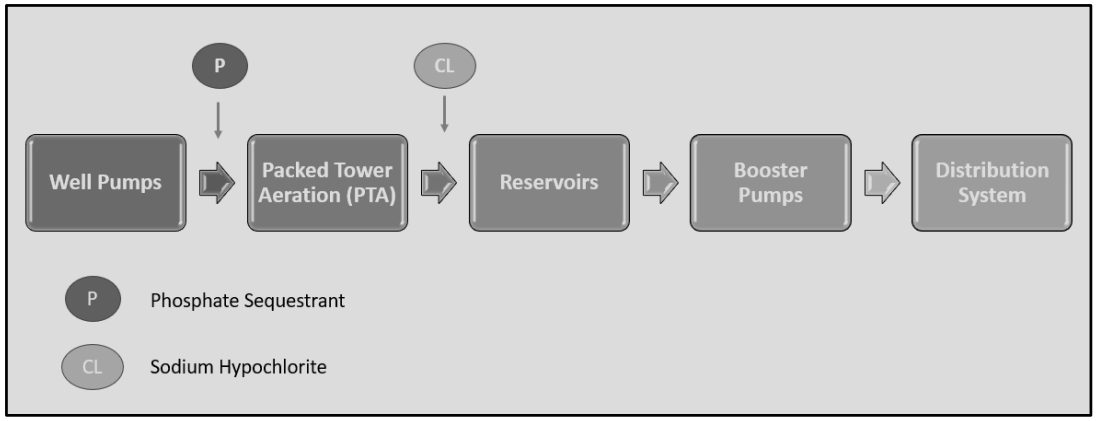

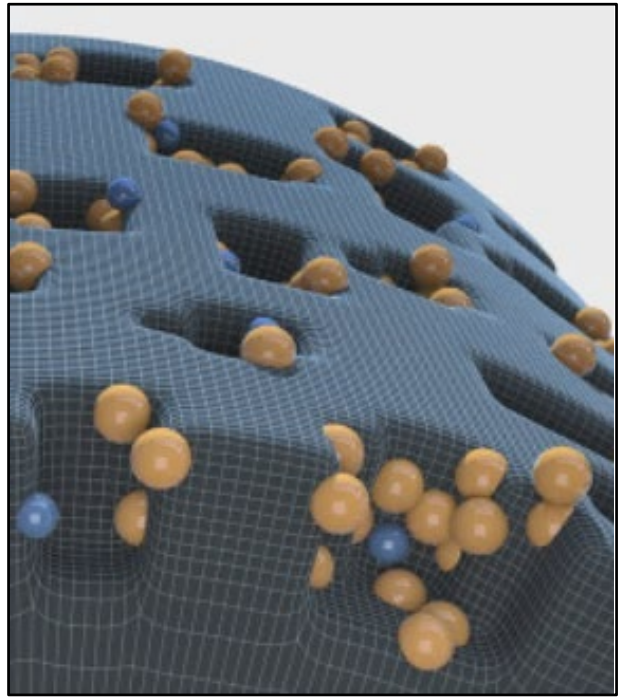

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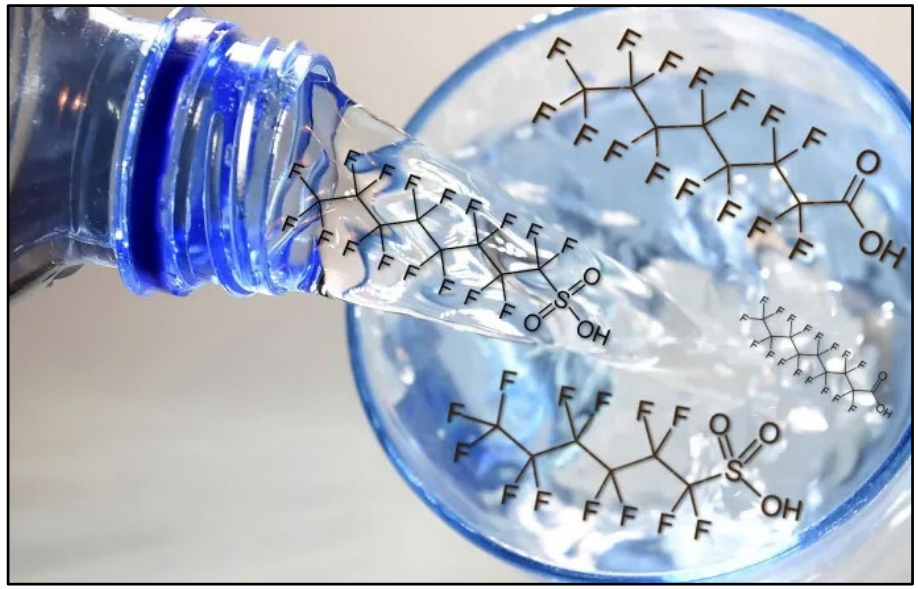
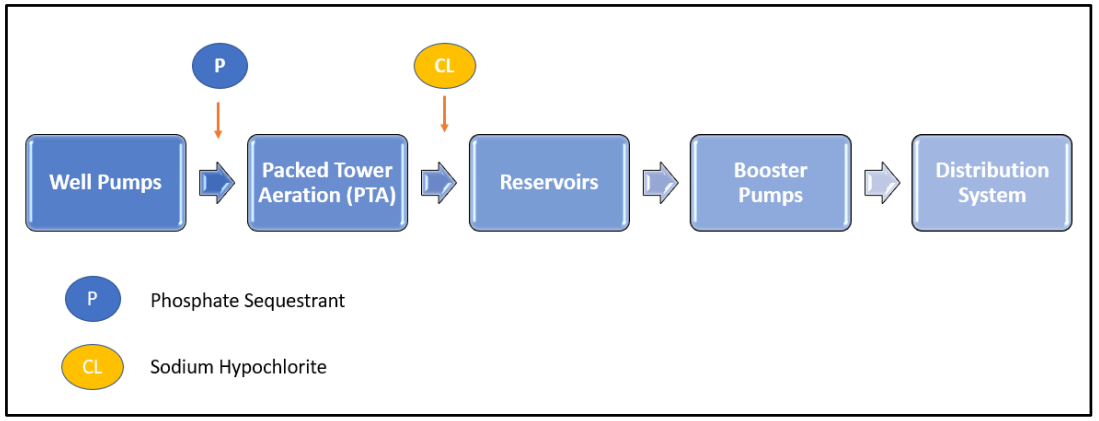
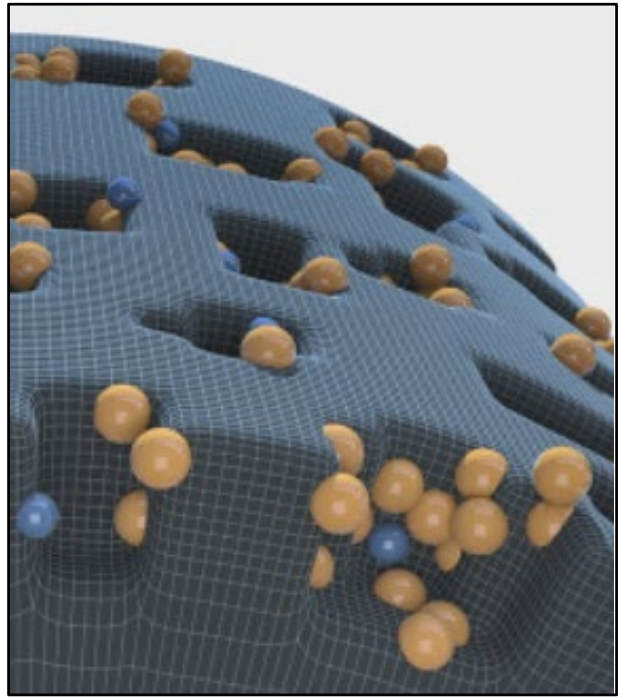
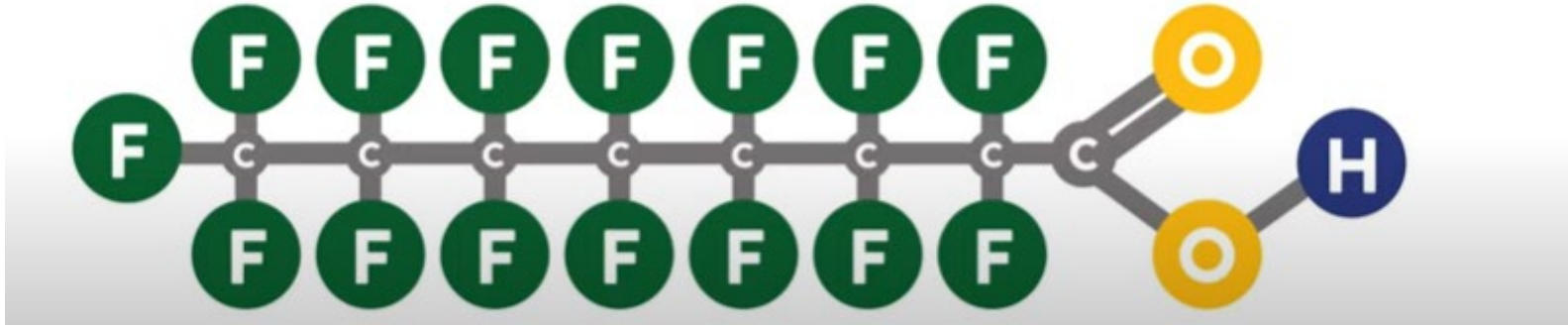






Per-and polyfluoroalkyl substances (PFAS) are a group of man-made "forever chemicals"



Non-stick cookware

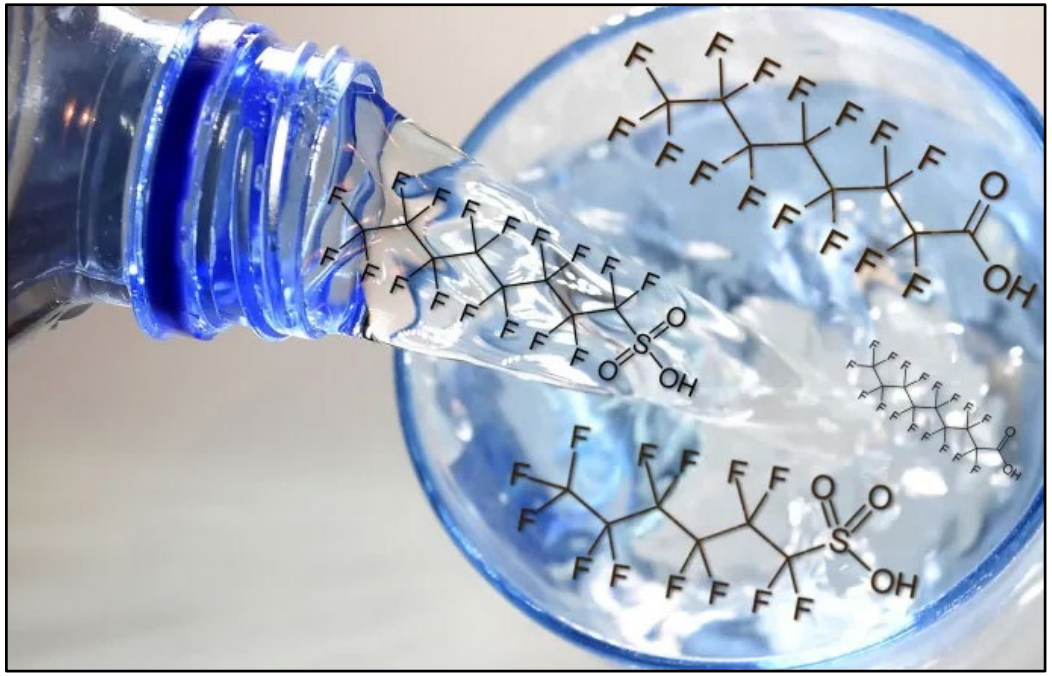
Waterproof clothing

Furniture and carpeting

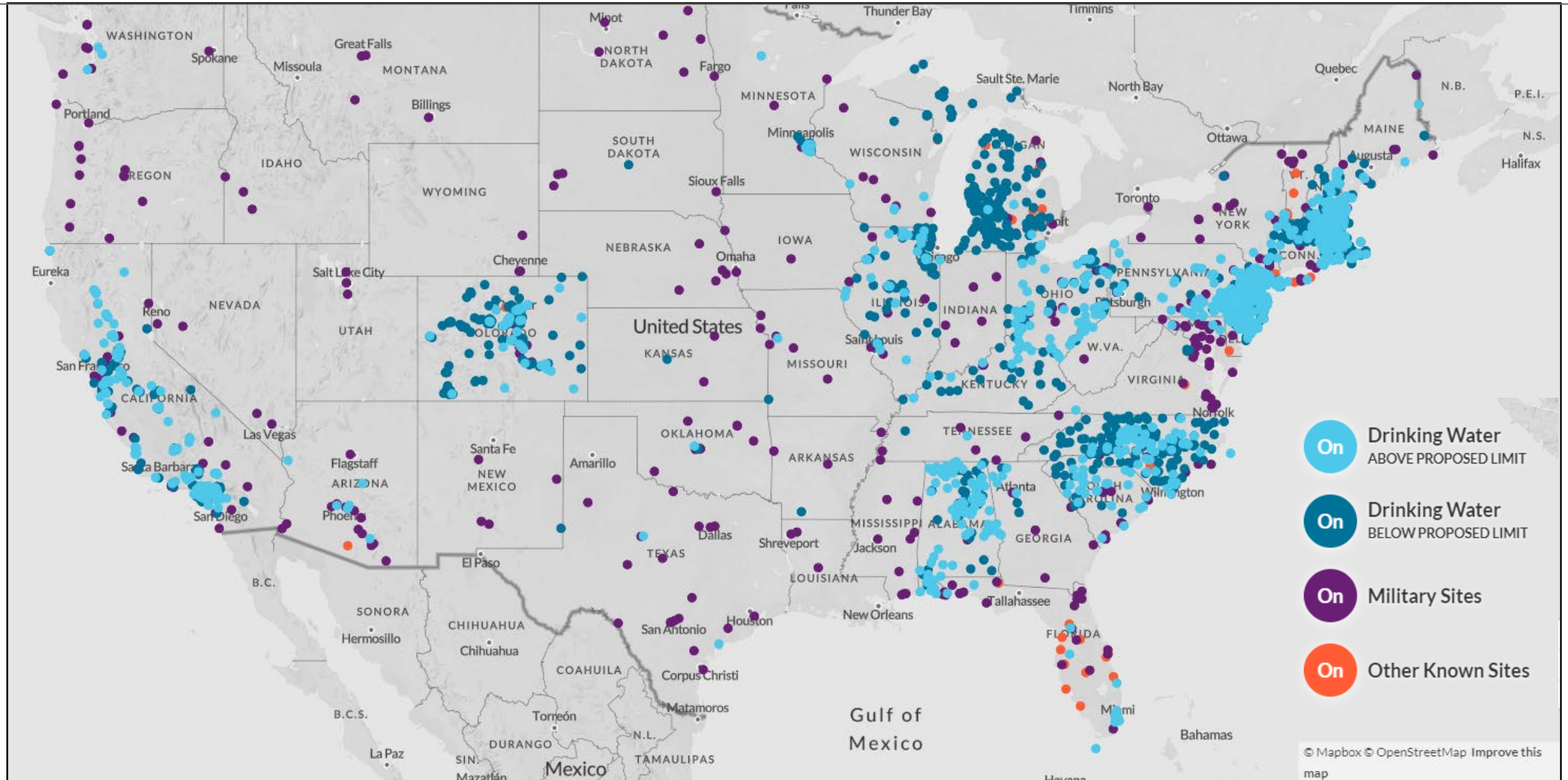
Personal care products

Food packaging

PFAS enters the environment at sites where they are made, used, disposed of which allows transport into waterways



The majority of sites tested and detected with PFAS are drinking water sites



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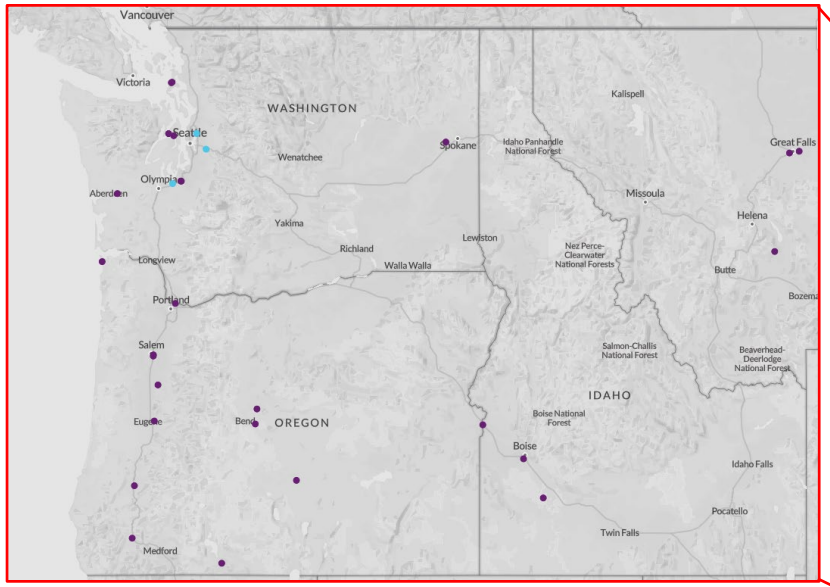
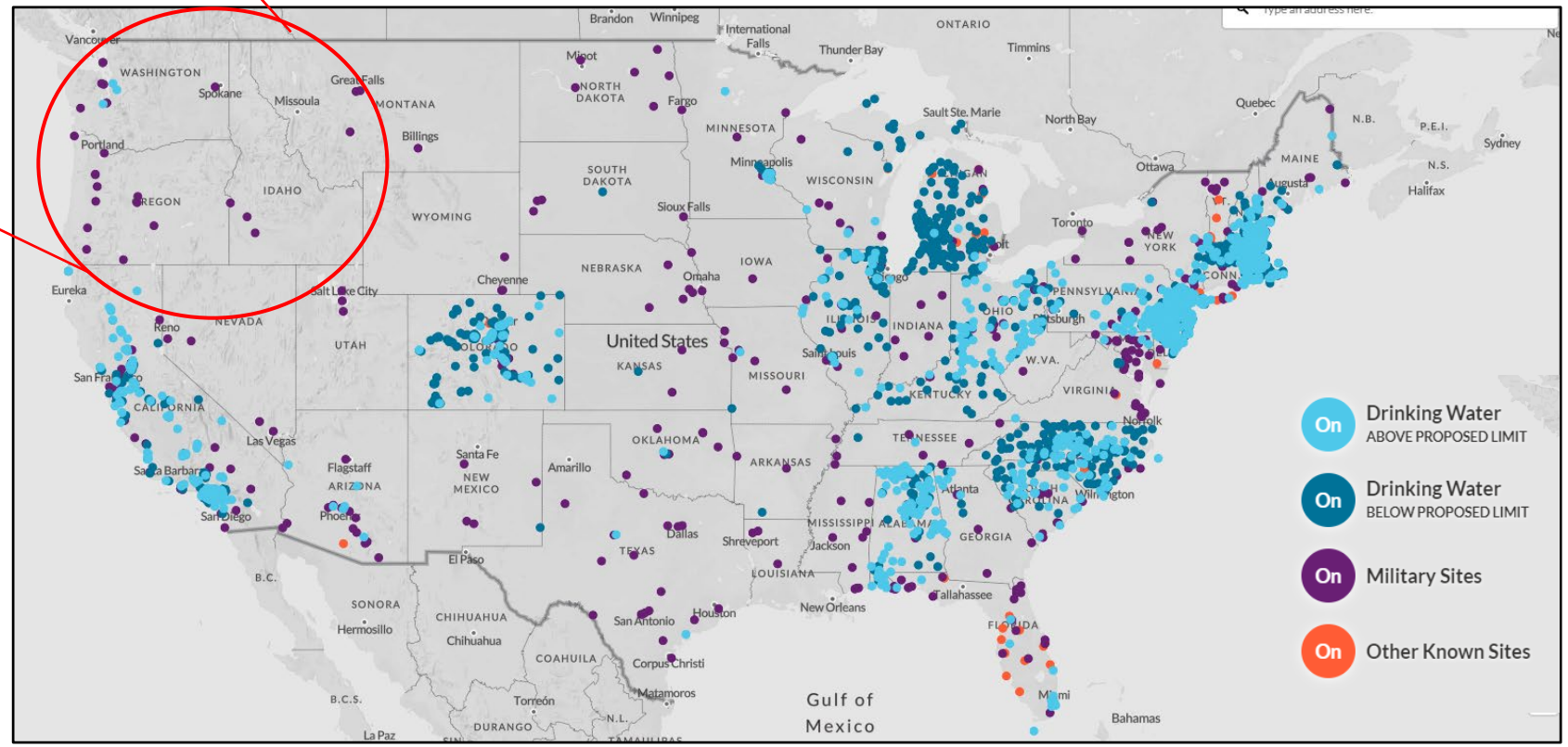




Source: Environmental Working Group and the Social Science Environmental Health Research Institute, at Northeastern University

EPA has proposed MCLs for PFOA/PFOS at 4.0 ppt

- Nov 2016 – EPA establishes health advisory level for PFOA/PFOS at 70ppt
- Dec 2019 – Guidelines for Groundwater Cleanup
- Feb 2020 – Issued a list of 172 PFAS subject to TRI reporting
- Started the process for listing PFOA and PFOS as hazardous substances under CERCLA
- Feb 2021 – Issue final regulatory determination to regulate PFOA and PFOS in drinking water
- March 2021 – Issued 5th UCMR requiring sampling of 29 PFAS in drinking water nationwide
- April 2021 – EPA establishes "EPA Council on PFAS"
- September 2021 – Announced plan to regulate PFAS in industrial discharges
- March 2023 – Proposed MCLs for PFOA, PFOS, PFNA, Gen-X, PFBS, and PFHxS

Key EPA Actions Addressing PFAS-Related Challenges

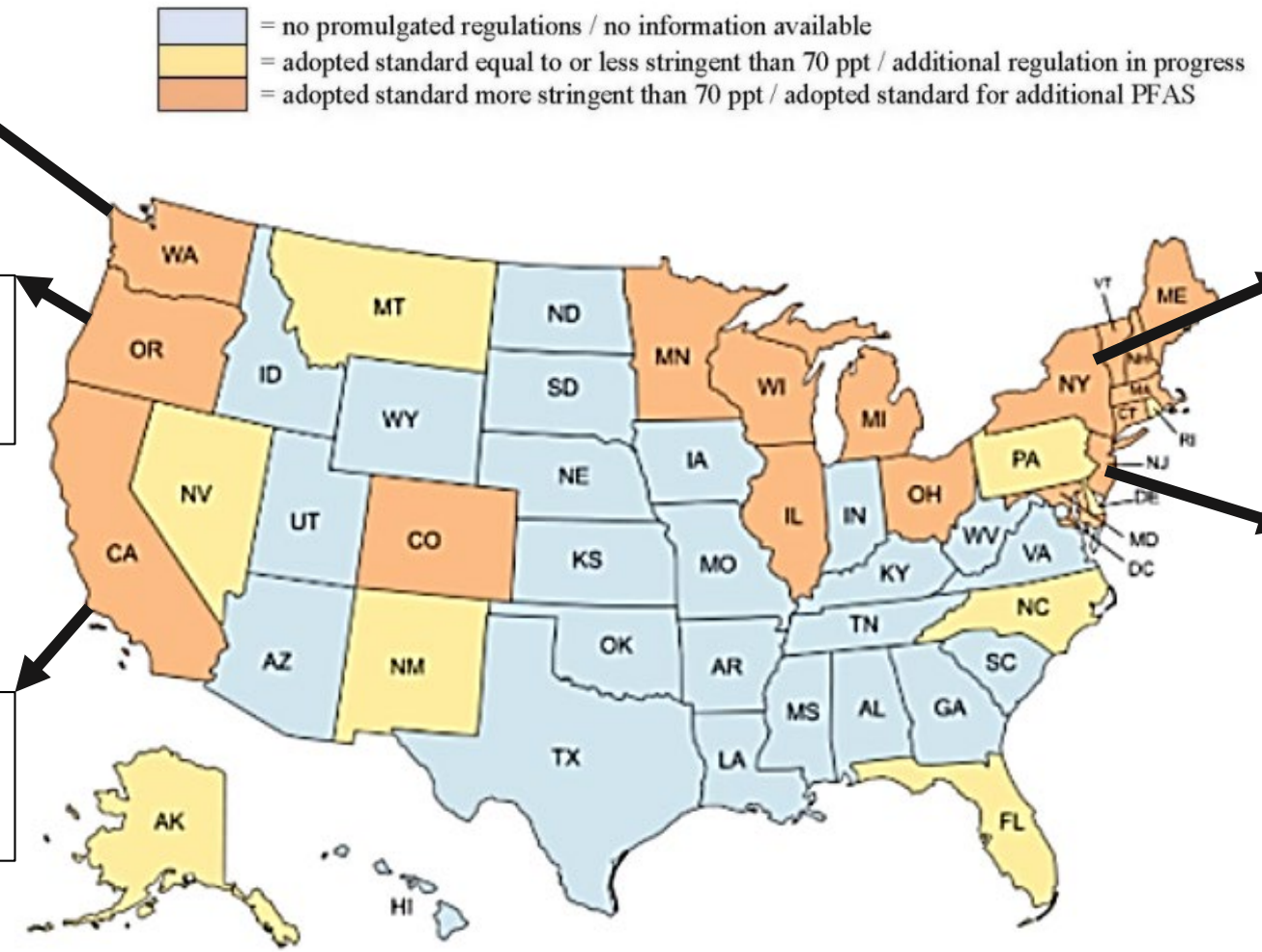
- Expand toxicity information for PFAS
- Develop new tools to characterize PFAS in the environment
- Evaluate cleanup approaches
- Develop guidance to facilitate cleanup of contaminated groundwater
- Use enforcement tools to address PFAS exposure in the environment and assist states in enforcement activities
- Use legal tools such as those in TSCA to prevent future PFAS contamination
- Address PFAS in drinking water using regulatory and other tools
- Develop new tools and materials to communicate about PFAS

Many states have begun the process of regulating PFAS in drinking water and have adopted enforceable standards

Washington Drinking Water State Action Levels: 10 ppt =PFOA, 15 ppt=PFOS

Oregon Drinking Water Health Advisory: 30 ppt for PFOS, PFOS, PFHxS and PFNA

California Drinking Water Response Levels: 10 ppt=PFOA, 40 ppt =PFOS



New York Drinking Water MCLs: 10 ppt =PFOA, 10 ppt=PFOS

New Jersey Drinking Water MCLs: 10 ppt =PFOA, 10 ppt=PFOS

Source: PFAS: State-by-State Regulatory Update - ALL4 (all4inc.com), July 2022

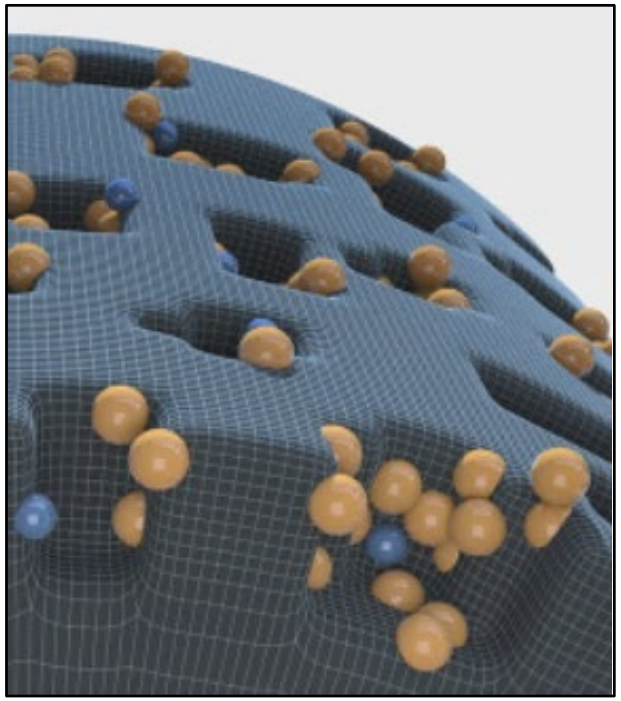
Adsorption and Filtration are the two common types of PFAS treatment alternatives

Adsorption

Granular Activated Carbon (GAC)

Ion Exchange (IX)

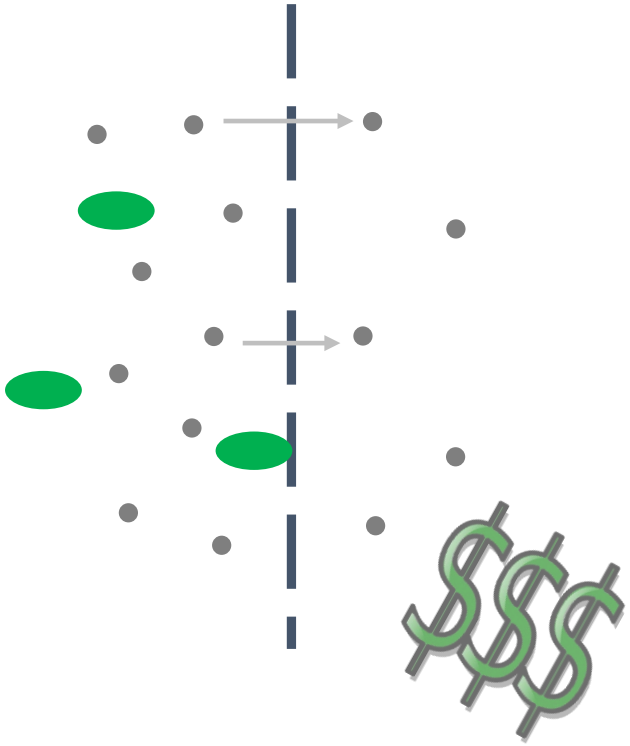
Powdered Activated Carbon



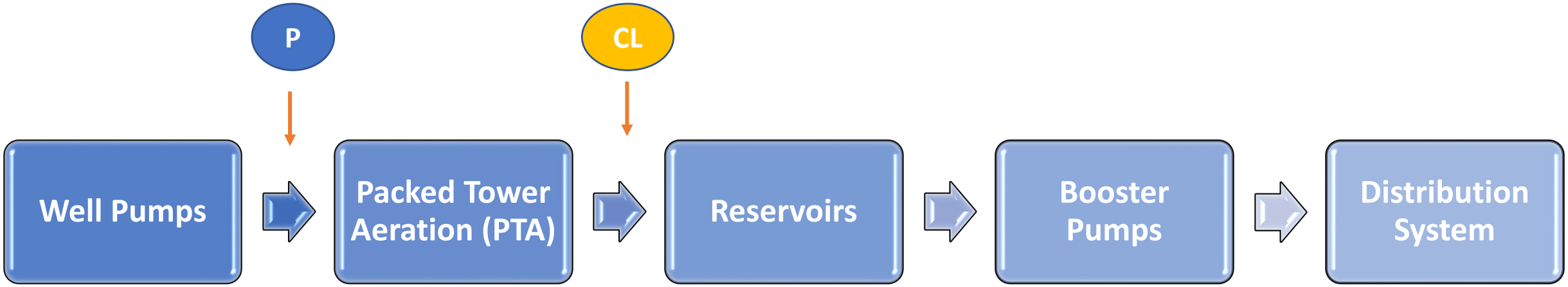
Filtration

Reverse Osmosis

Nanofiltration



Case Study : Groundwater Treatment Facility



P — Phosphate Sequestrant

CL — Sodium Hypochlorite

Evaluation of the treatment alternatives involves investigation into various site-specific conditions

Effectiveness	• Water quality and existing treatment • Specific adsorption media • Track Record
Site Constraints	• Available Space • Height Limits • Zoning
Pressure Losses	• Available head • Pumping costs • Pressure limits
Waste Generation and Disposal	• Source of treated water for backwashing • Backwash waste discharge • Spend media disposal
Cost	• Bed Life • Construction • Operating Cost
Permitting	• Pilot Testing • Rapid Small Scale Testing • Other Water Quality Effects

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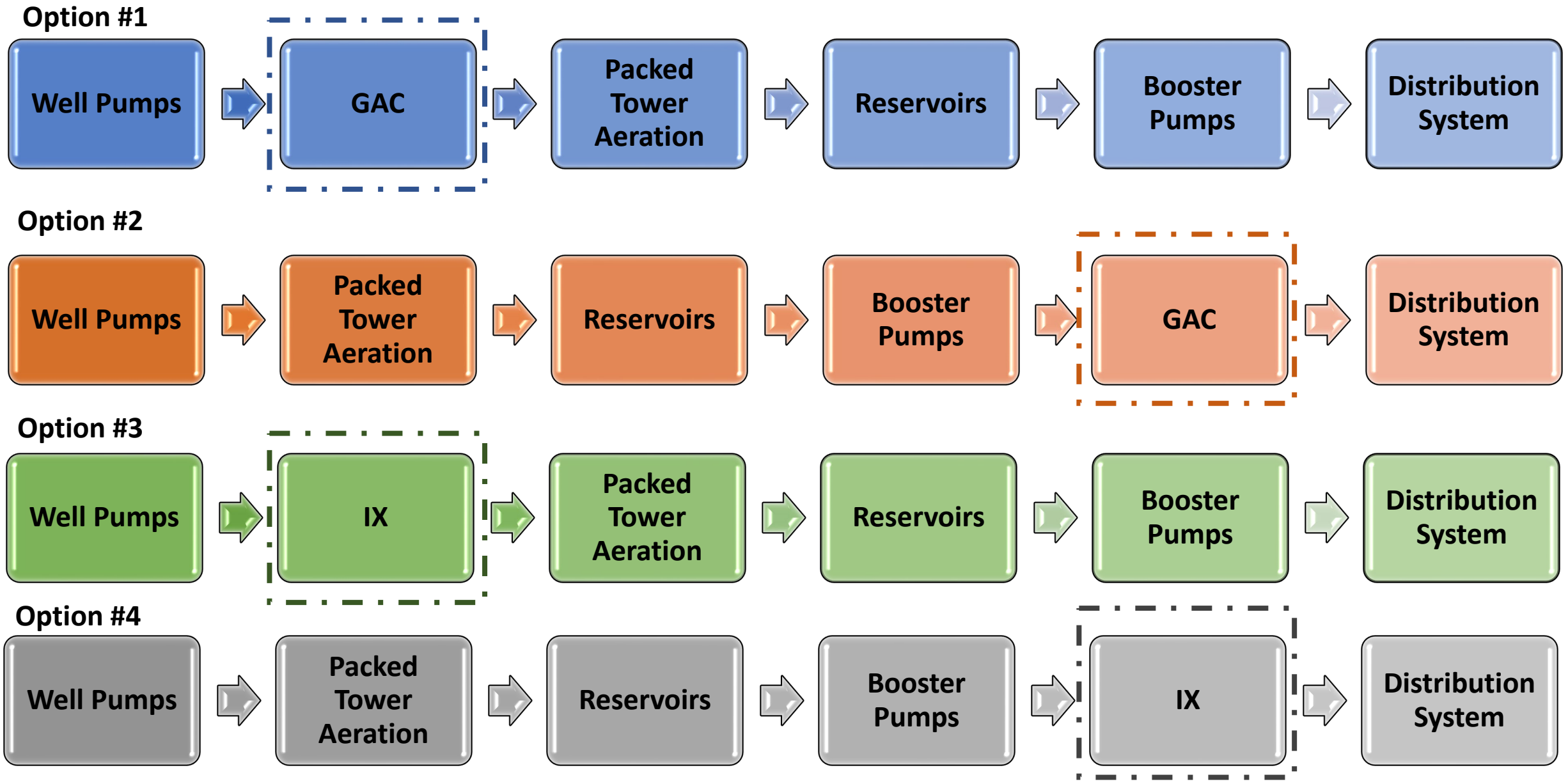
Parameter	Concentration	Potential Concern
pH - raw water	7.4	Rise in pH may lead to precipitation on the adsorption media
pH - finished water	8.5	
Alkalinity	185 mg/L as $CaCO_3$	
Hardness (carbonate)	325 mg/L as $CaCO_3$	
TDS	582 mg/L	
TOC	0.62 mg/L	Can impact GAC capacity
Sulfate	52 mg/L	Can impact resin capacity
Nitrate-N	2.34 mg/L	
Chloride	83.7 mg/L	
Iron	Below detection limit	If present, can precipitate and foul media
Manganese (total dissolved)	Below detection limit	
Trichloroethylene	11.1 µg/L	Can impact GAC capacity

Understanding the impact of proposed units on the existing treatment train is critical



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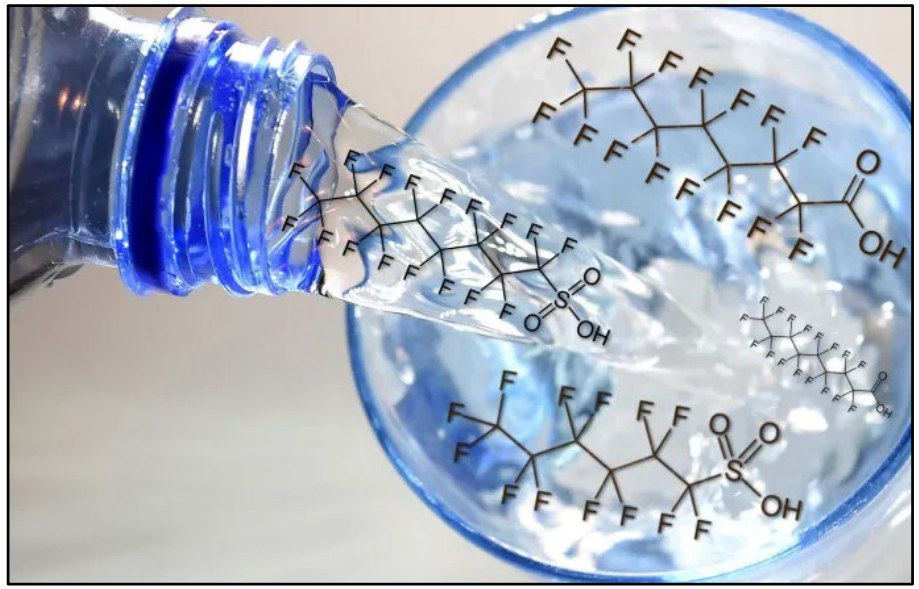

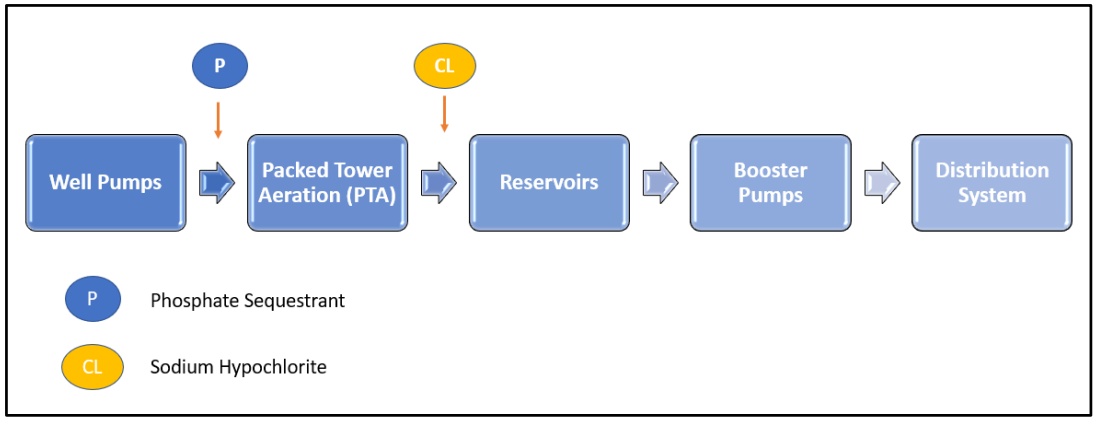

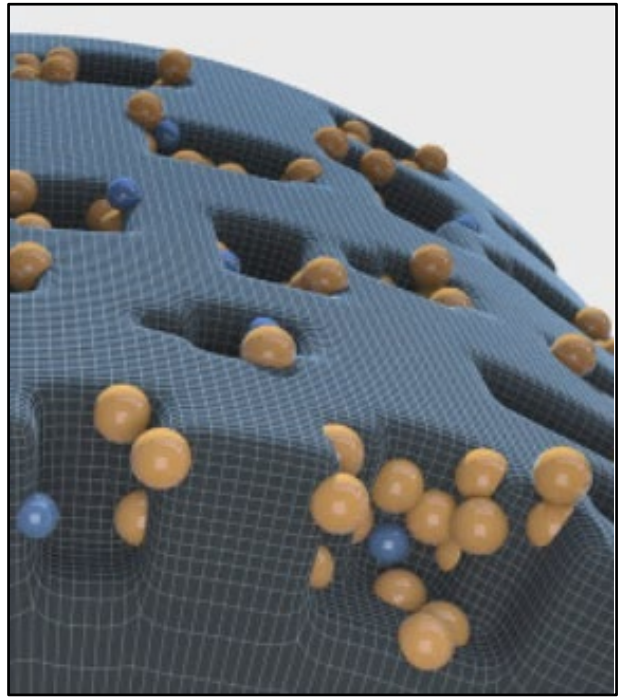

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Thank You!

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