



Proactive Treatment Solutions for PFAS Groundwater Contamination


Coupeville/Navy Fort Casey WTP Improvements

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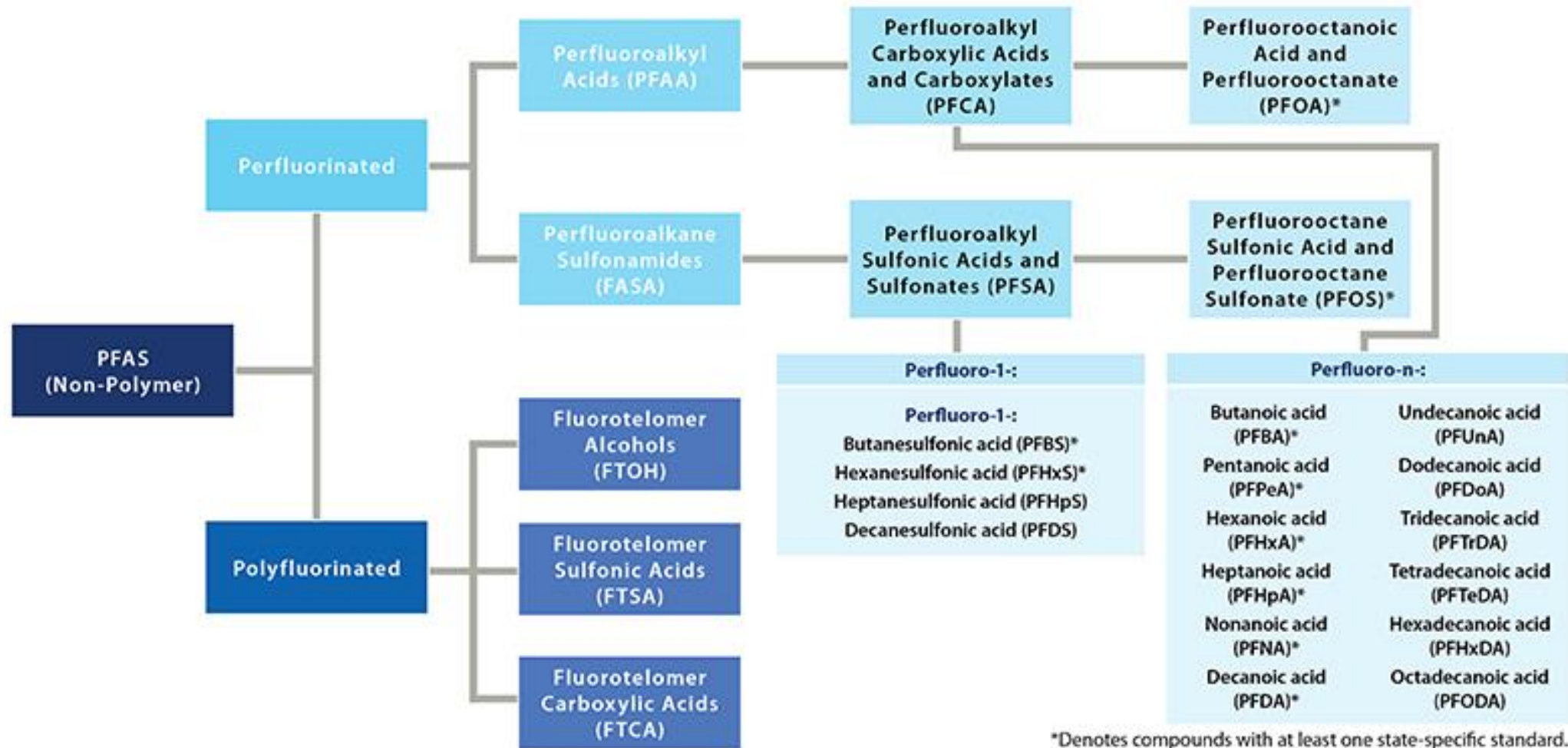
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Agenda

- Project Background
 - PFAS
 - Navy
 - Coupeville, WA
- System Design
- Implementation

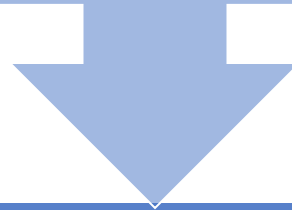
What are PFAS?



*Denotes compounds with at least one state-specific standard.

PFAS Sources

PFAS has been around since the 1950s



Products resistant to water, heat, and grease

Firefighting
Foam

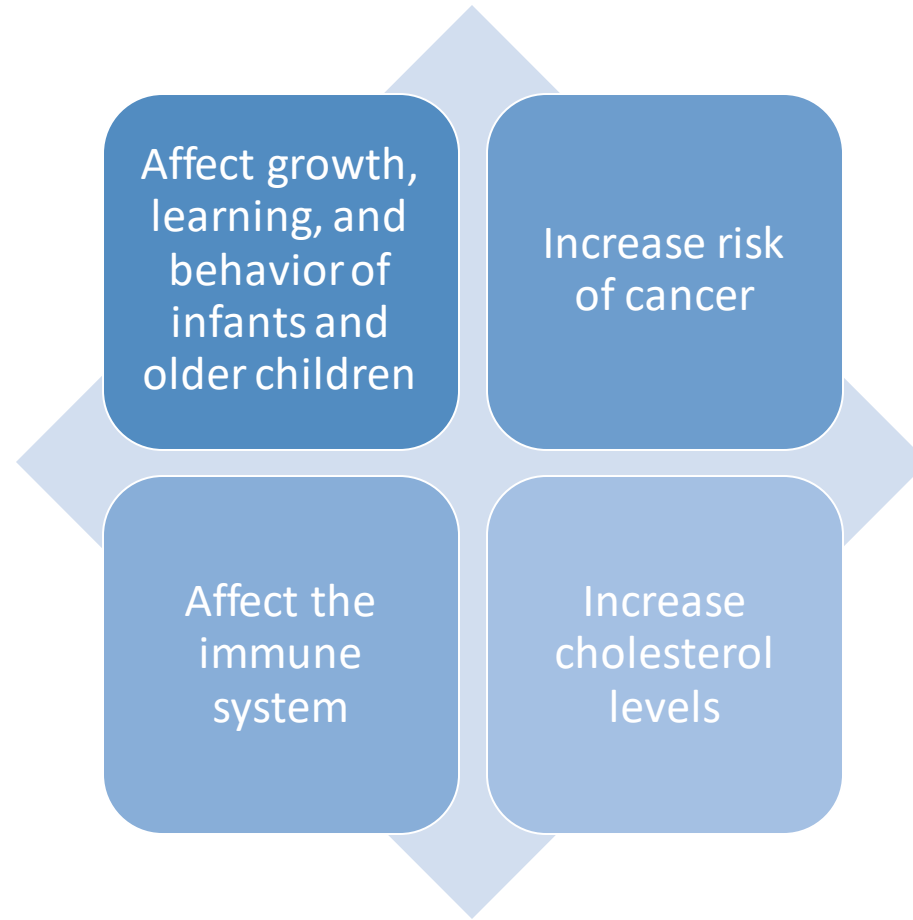
Cookware

Food
Packaging

Electronics

Paint

Health Concerns



Content source: [Agency for Toxic Substances and Disease Registry](#)

Regulations

Federal Regulation	EPA Health Advisory*	Washington State
• None**	• 70 PPT***	• None**

*According to the EPA: Health advisory levels are not regulatory standards. They are health-based concentrations which should offer a margin of protection for all Americans throughout their life from adverse health effects resulting from exposure to PFOS and PFOA in drinking water.

**State and federal drinking water health advisory and regulatory limits for PFAS compounds continue to evolve

*** For individually or combined PFOA and PFOS

USEPA Method 537.1

Testing for 18 PFAS constituents

November 2018

Analyte^a

Hexafluoropropylene oxide dimer acid

N-ethyl perfluorooctanesulfonamidoacetic acid

N-methyl perfluorooctanesulfonamidoacetic acid

Perfluorobutanesulfonic acid

Perfluorodecanoic acid

Perfluorododecanoic acid

Perfluoroheptanoic acid

Perfluorohexanesulfonic acid

Perfluorohexanoic acid

Perfluorononanoic acid

Perfluorooctanesulfonic acid

Perfluorooctanoic acid

Perfluorotetradecanoic acid

Perfluorotridecanoic acid

Perfluoroundecanoic acid

11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid

9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid

4,8-dioxa-3H-perfluorononanoic acid

Acronym

HFPO-DA

NEtFOSA^A

NMeFOSA^A

PFBS

PFDA

PFDoA

PFHpA

PFHxS

PFHxA

PFNA

PFOS

PFOA

PFTA


PFTTrDA

PFUnA

11Cl-PF3OU

9Cl-PF3ON

ADONA

A photograph of firefighters in full protective gear applying a thick, white foam to a large, dark structure, likely a tank or building, during a training exercise. The scene is outdoors with trees in the background. The image is dimmed to allow text to be overlaid.

Aqueous Film-Forming Foam (AFFF)

- Contains PFAS chemicals
- Fire training
- Emergencies



Coupeville,
WA



Navy
Outlying
Landing
Field

Results

PFOA levels above LHA detected

- 8 private drinking water wells
- 11 residences

PFOA levels near LHA detected

- Town of Coupeville's Keystone Well



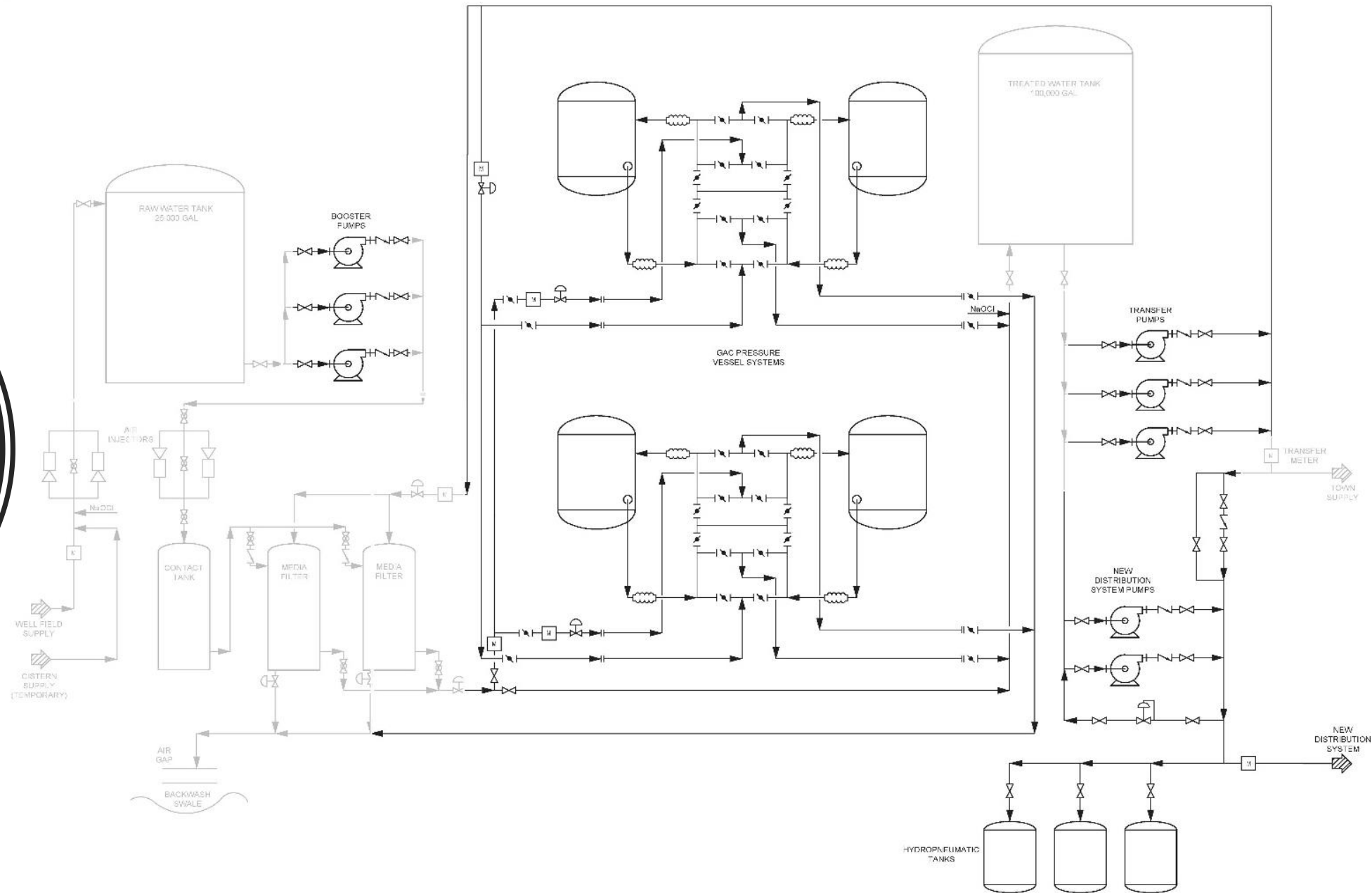
Solutions

- Short-term
 - Bottled water
 - Undersink GAC filters
- Long-term
 - Extend water distribution system to impacted residents
 - Add GAC treatment to Fort Casey WTP

New Distribution System

- Water Main
 - 8" ID
 - 7,500 LF
 - AWWA C906 HDPE restrained joint piping
- Water Service
 - Up to 12 connections
 - Double Check Valve Assembly
 - Reduced Backflow Pressure Assembly
- Fire Flow Delivery
 - Upgrade pumps
 - Add hydropneumatics tanks
 - 5 Fire hydrants at 900 ft spacing

Treatment Process Schematic



Treatment Alternatives

Granular Activated Carbon

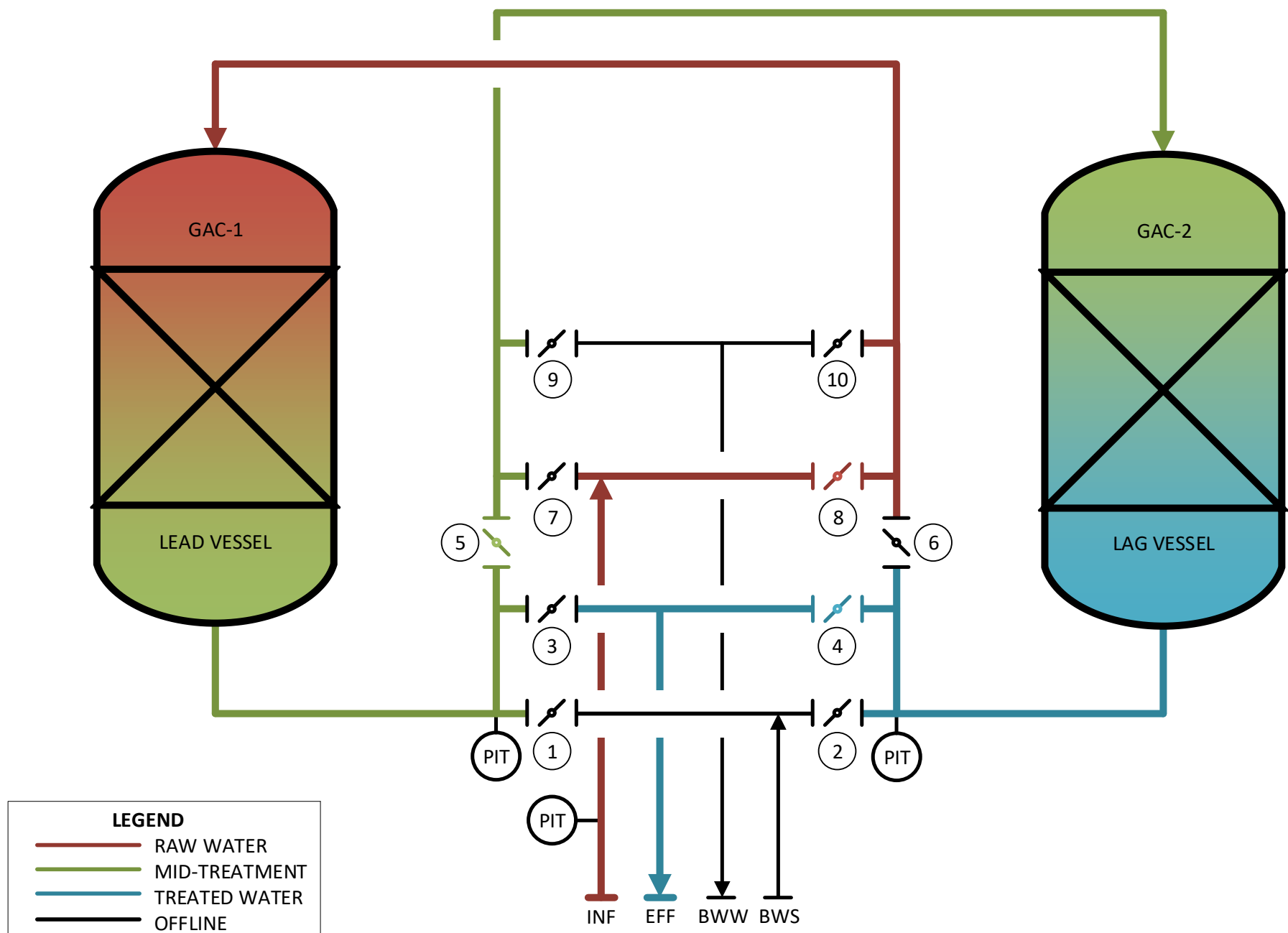
- High PFOA and PFOS removal
- Wide history of use for PFOA, PFOS removal

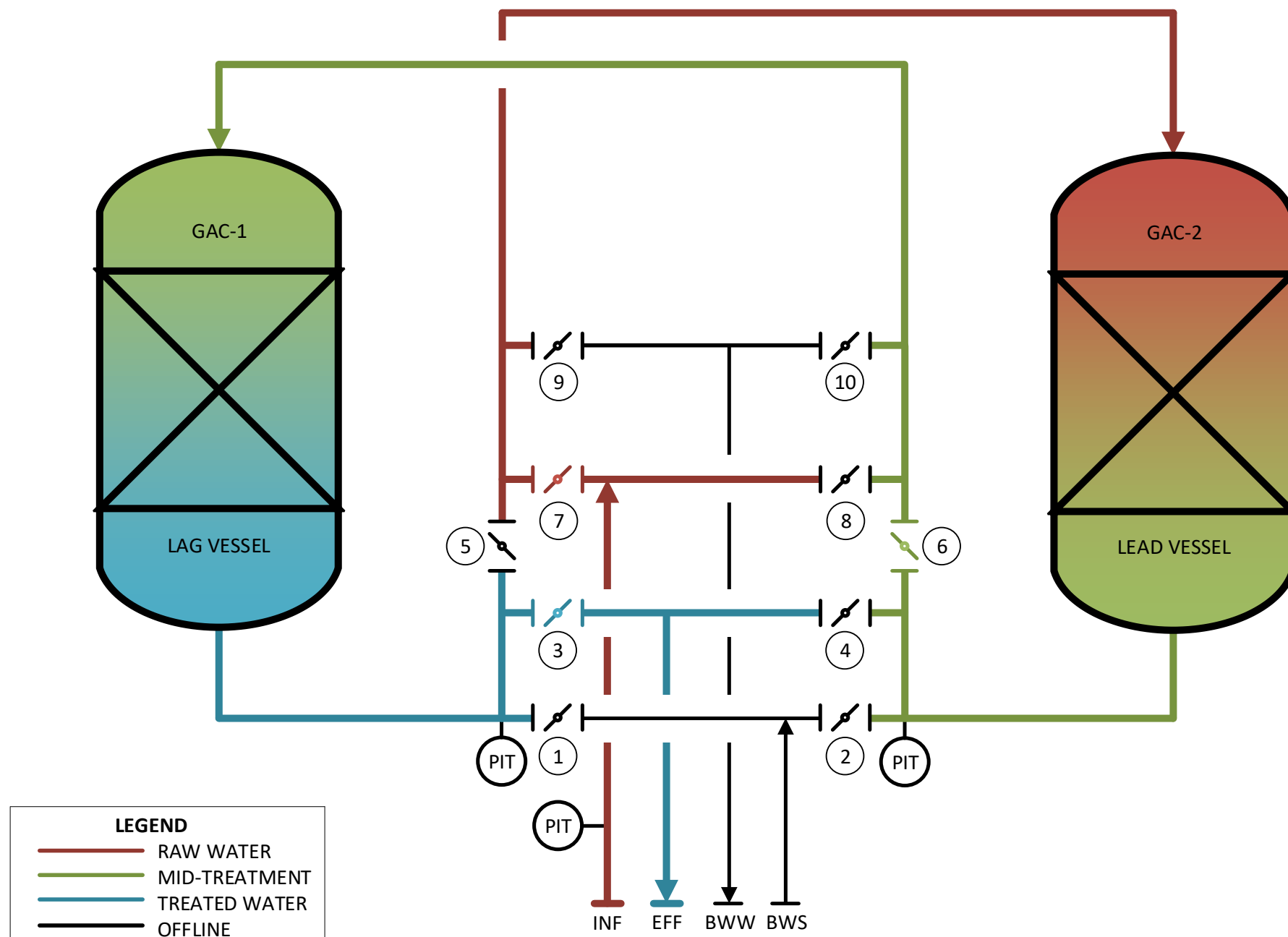
Anion Exchange

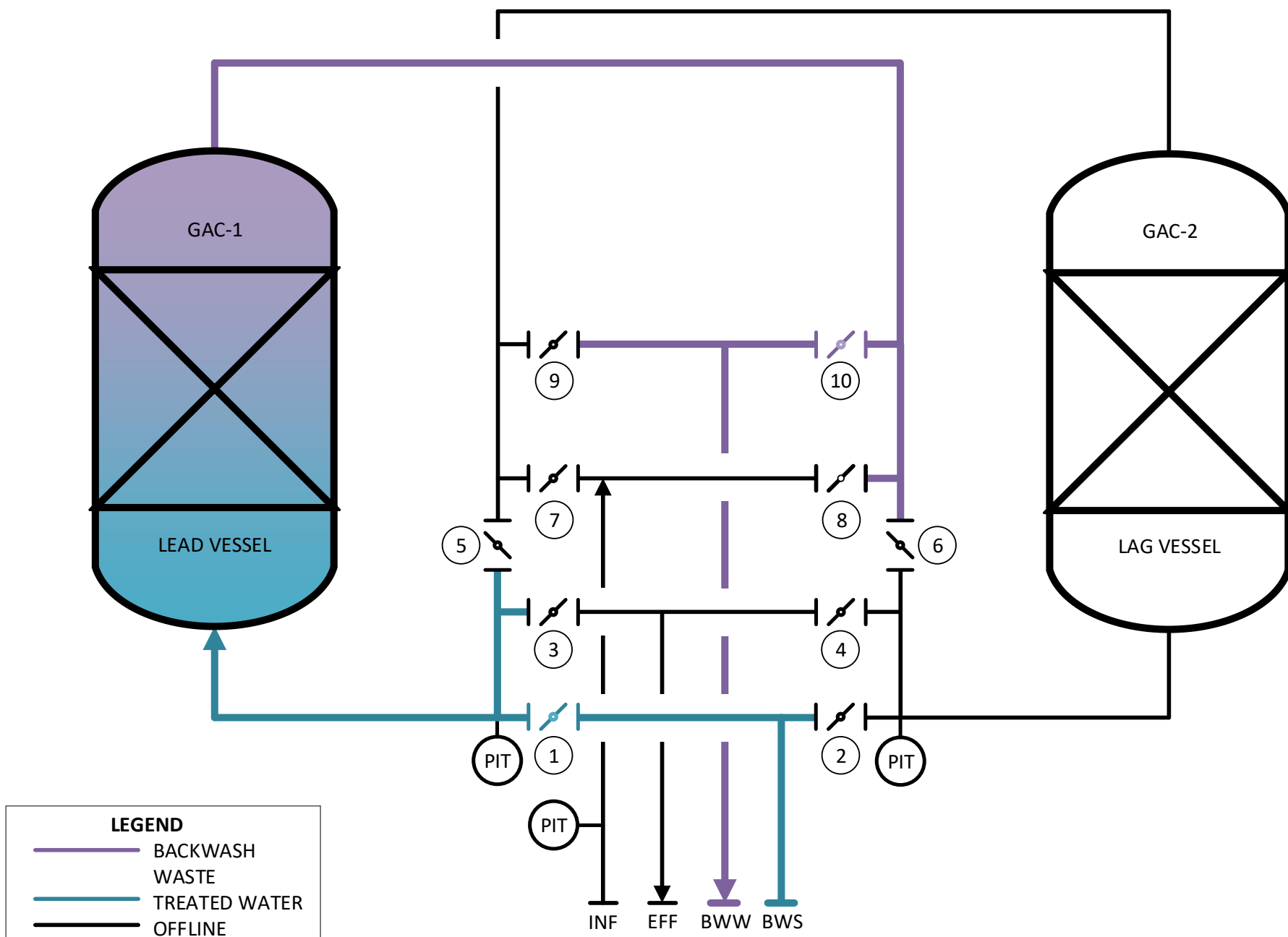
- High short and long chain PFAS removal
- Relatively new technology in this market

Membrane Separation (RO, NF)

- High system complexity, cost
- Concentrated liquid waste stream







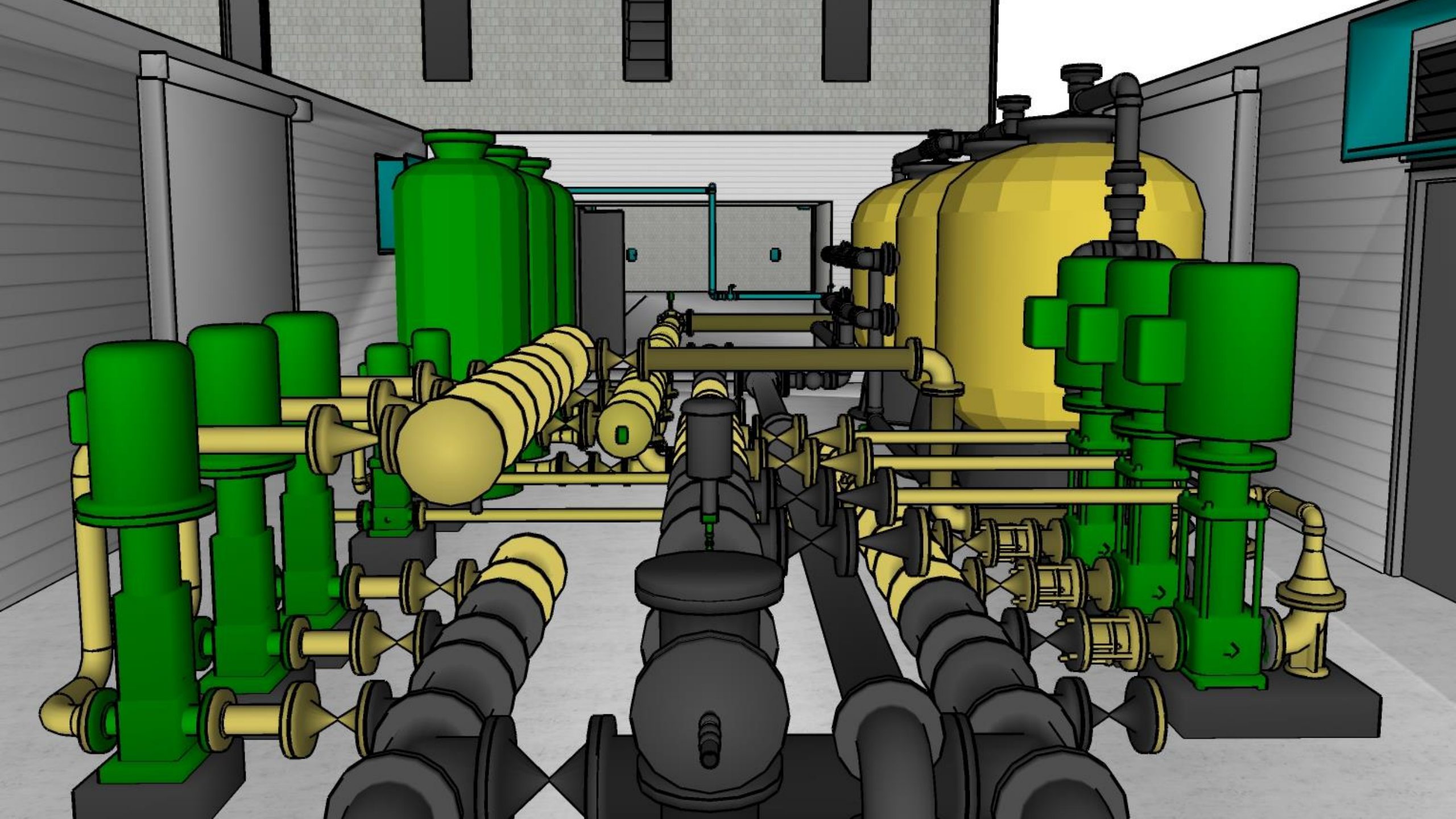


Fort Casey
Water
Treatment
Plant

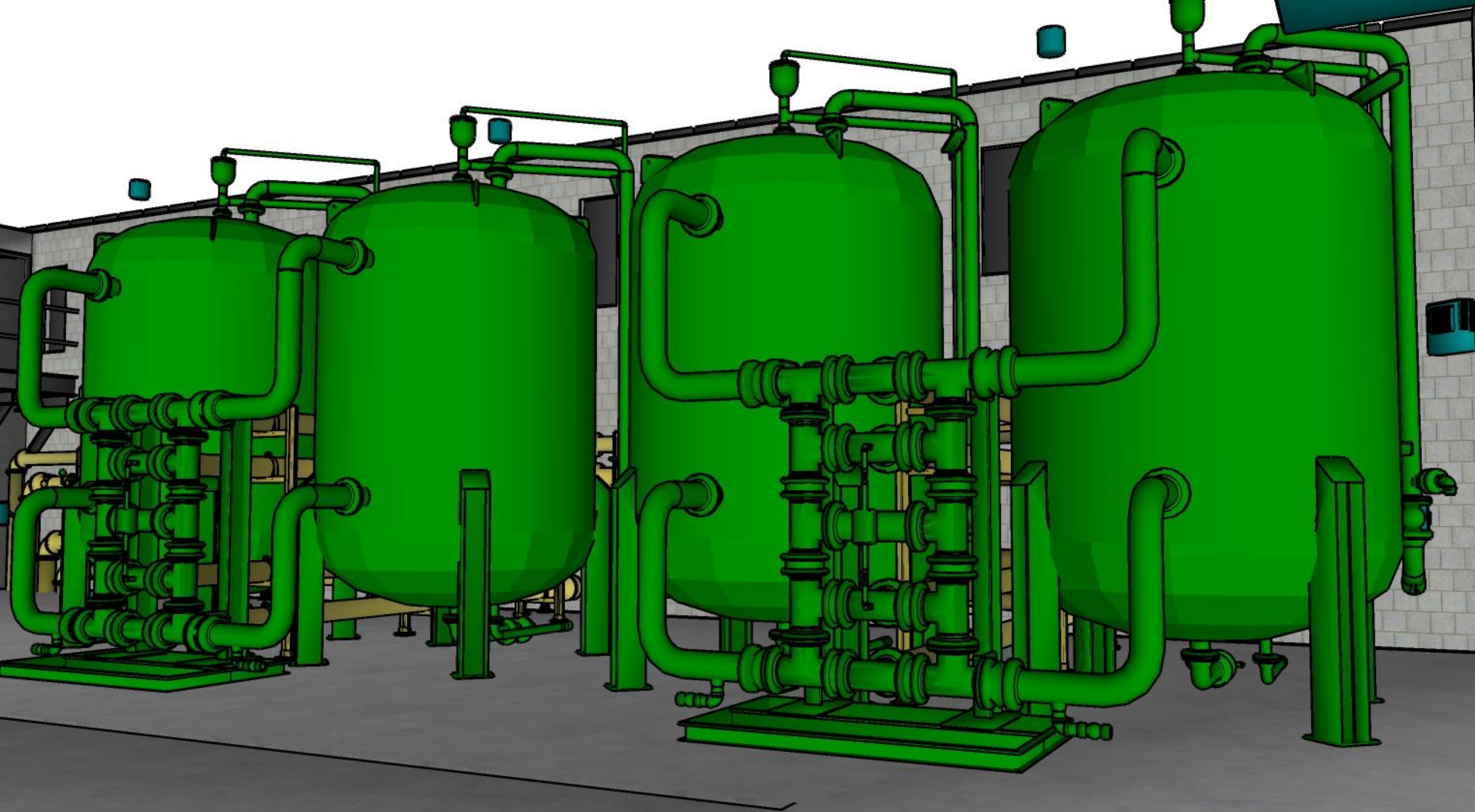


Fort Casey
Water
Treatment
Plant











Lessons Learned

Balancing various interests
for this complex system

Aggressive schedule

TCRA: Permit or no permit

Acknowledgements

US Navy

- Kendra Leibman
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Town of Coupeville

- Mayor Molly Hughes
- Joe Grogan
- Kelly Riepma

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- Bob James
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Questions?