

Combating Algae – Startup of the Bellingham DAF Facility

Joshua Kennedy, PNWS-AWWA Conference



May 2, 2019

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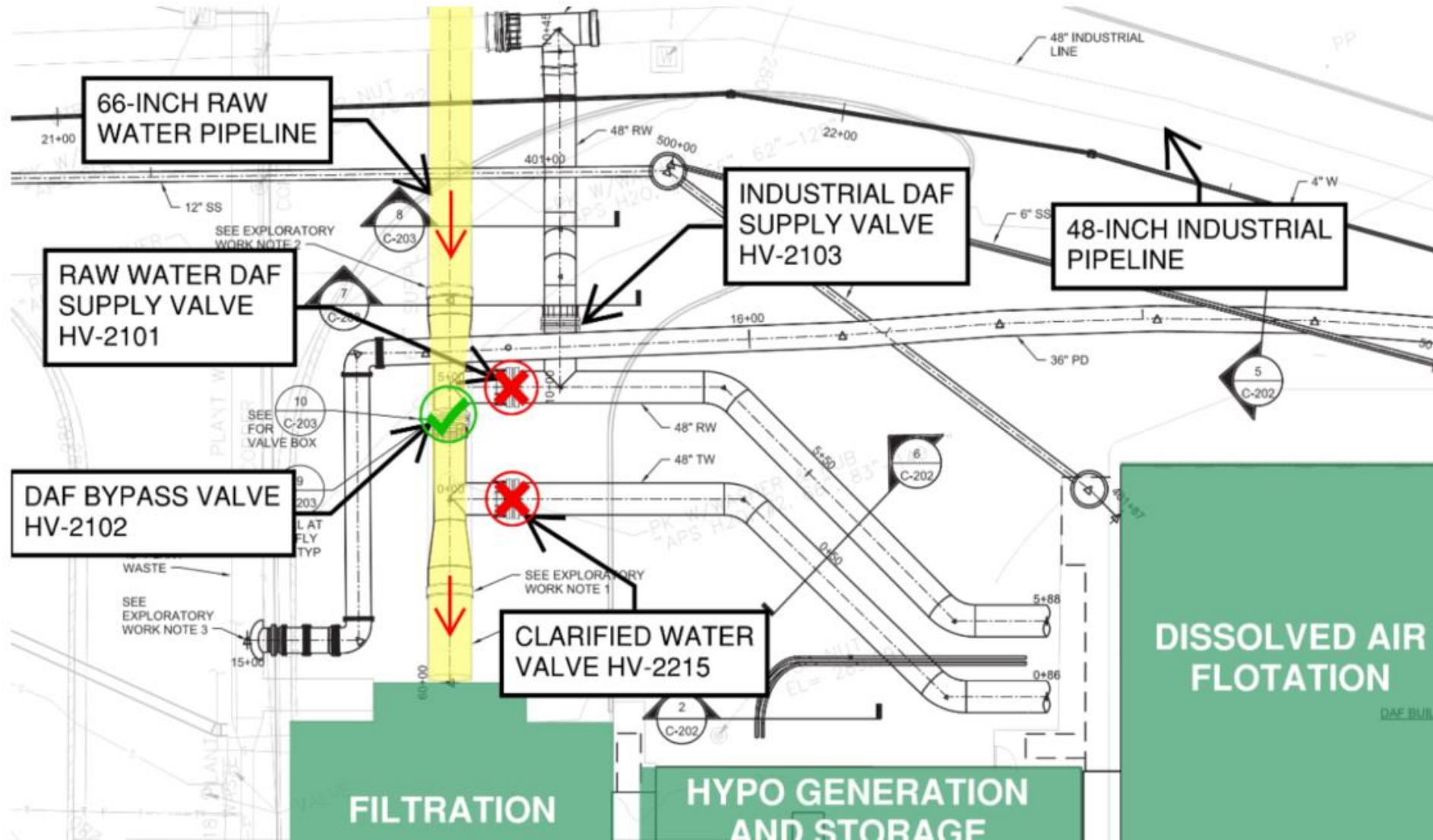
Agenda

1. Safety Minute
2. Project Overview
3. Startup and Commissioning
4. Full Scale Results

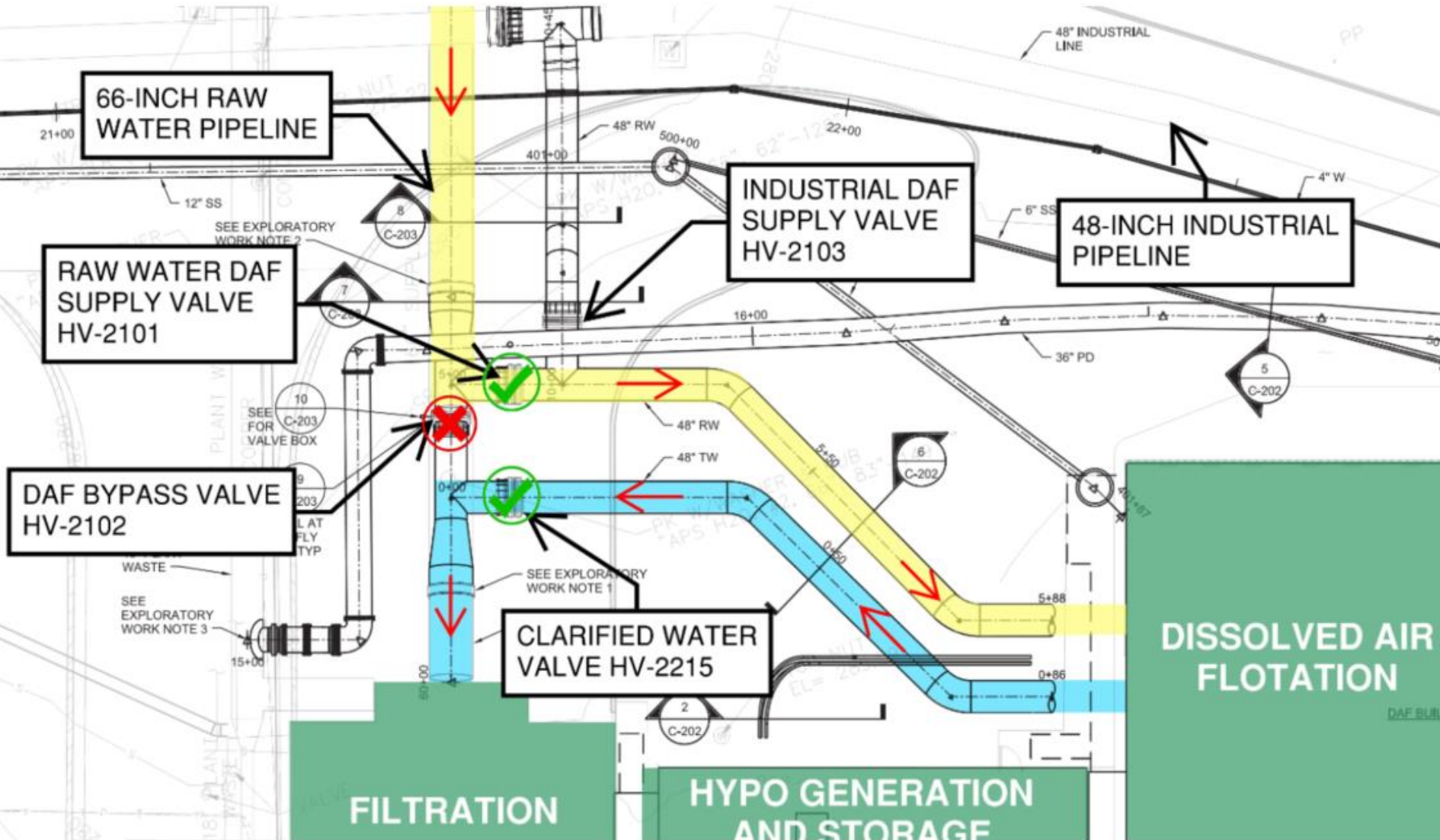
Safety Minute

Safety Minute – Communication during startup

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Safety Minute – Communication during startup

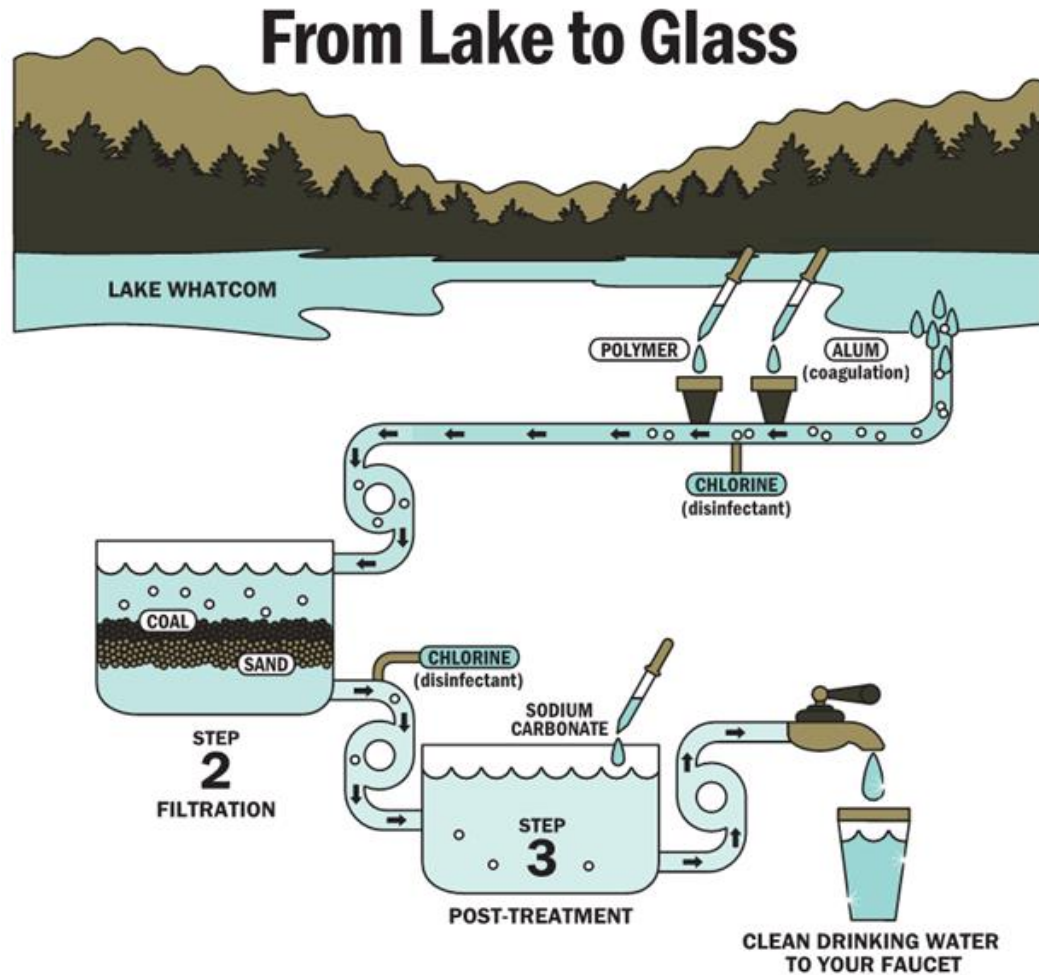


Safety Minute – Communication during startup

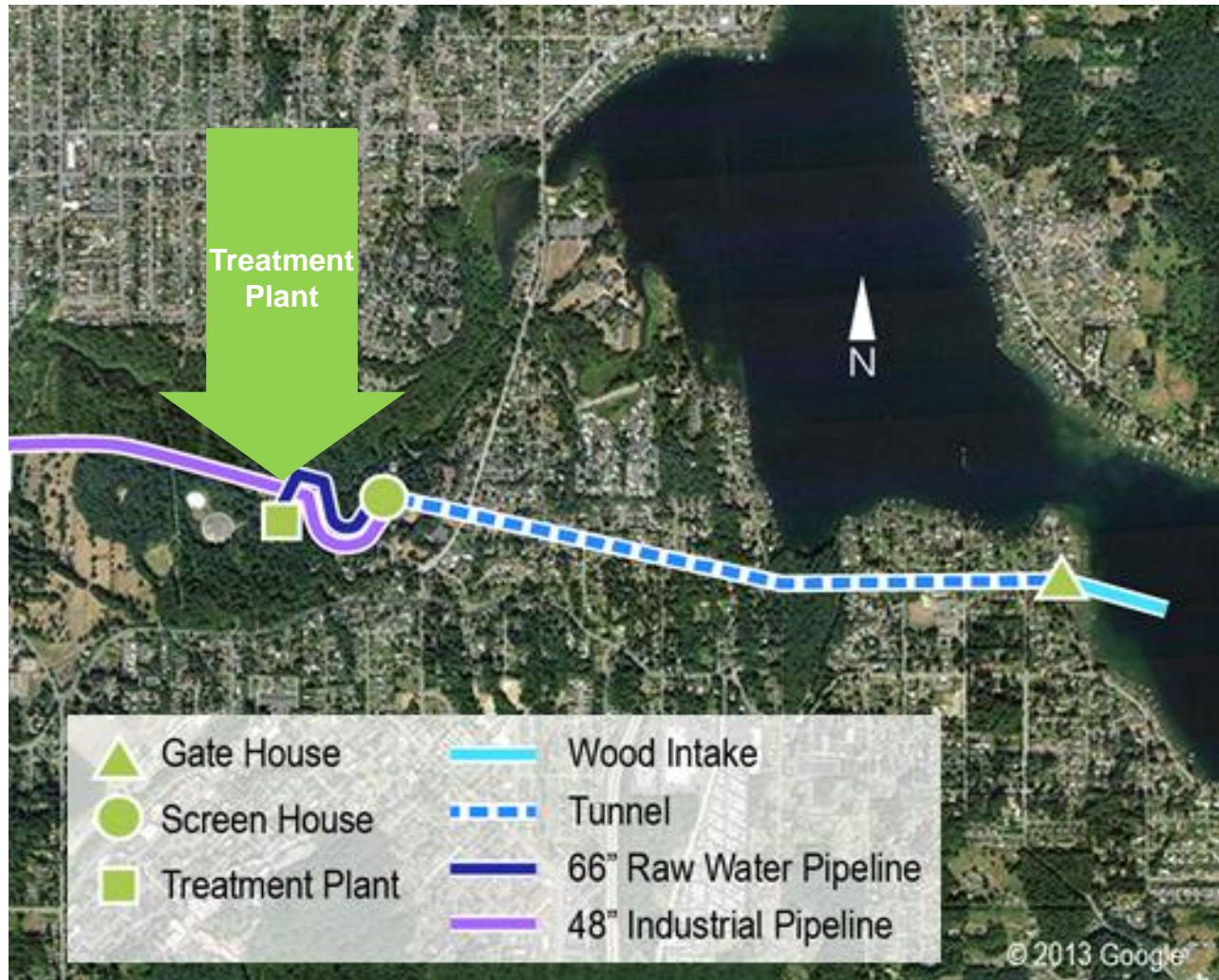


Project Overview

Whatcom Falls Treatment Plant background



Whatcom Falls Treatment Plant background



Treatment Plant History

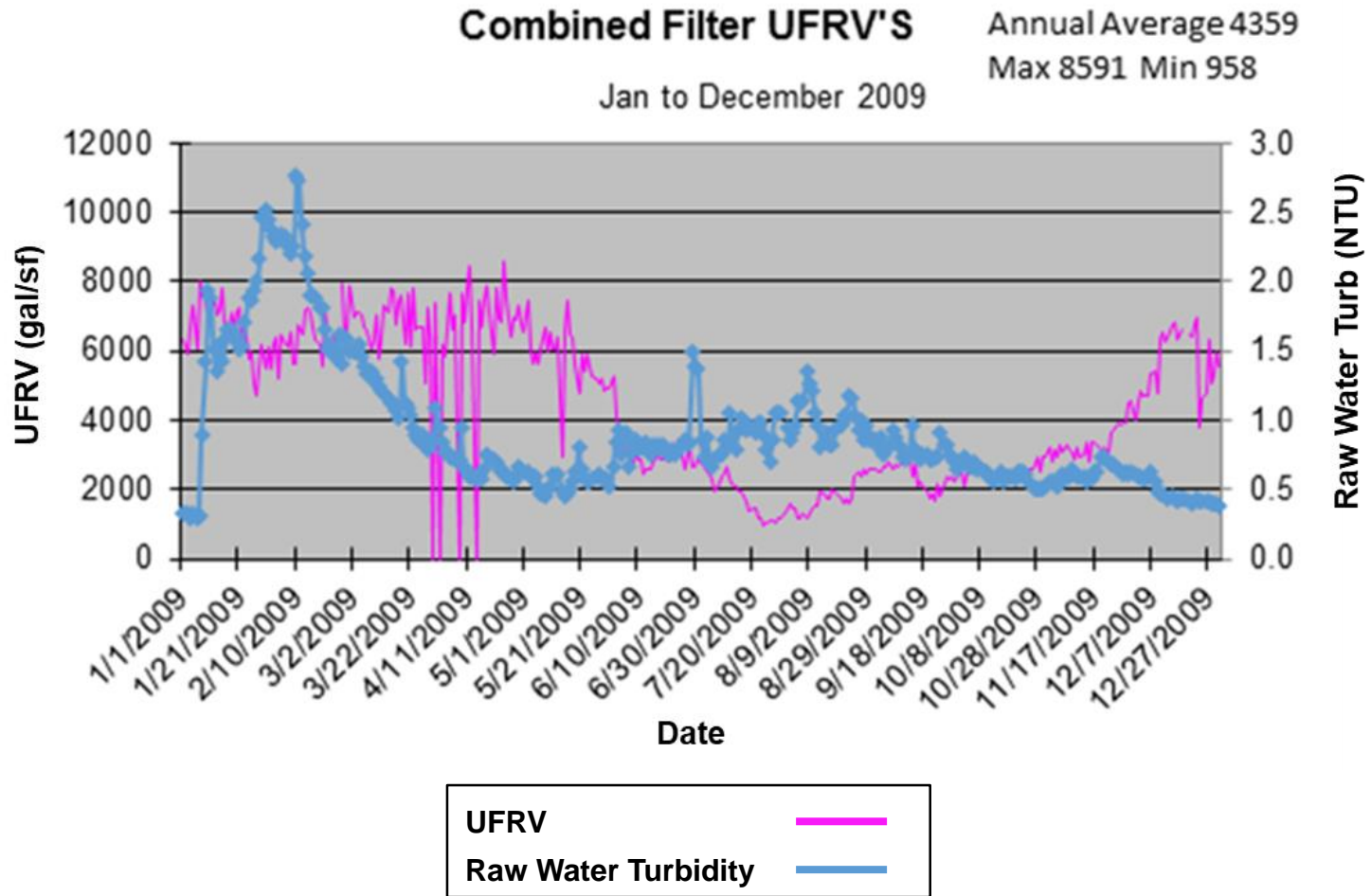
Constructed
in 1968

Treatment
Issues in 2009

Decrease in
water demands

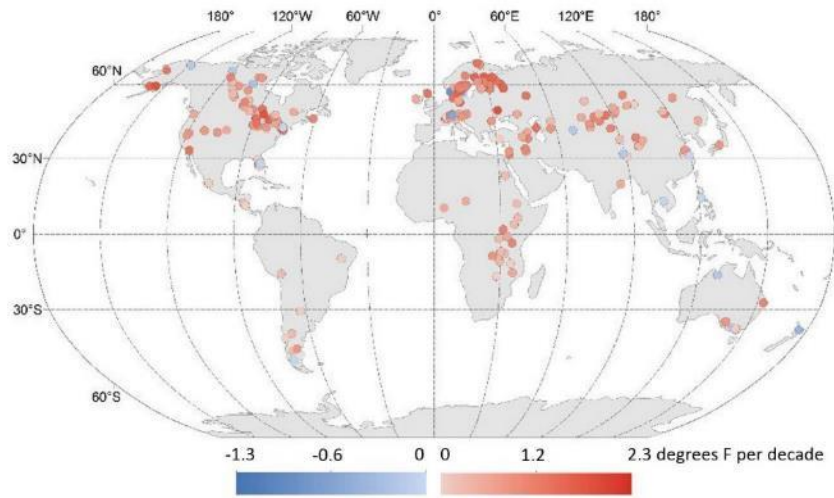


Whatcom Falls Treatment Plant background: 2009 algae event



Climate change and algal blooms

- Increased temperatures result in rising lake temperatures
- Increased Proliferation of Algae & Algal Toxins



Worldwide Lake Warming 2015, Source: NASA

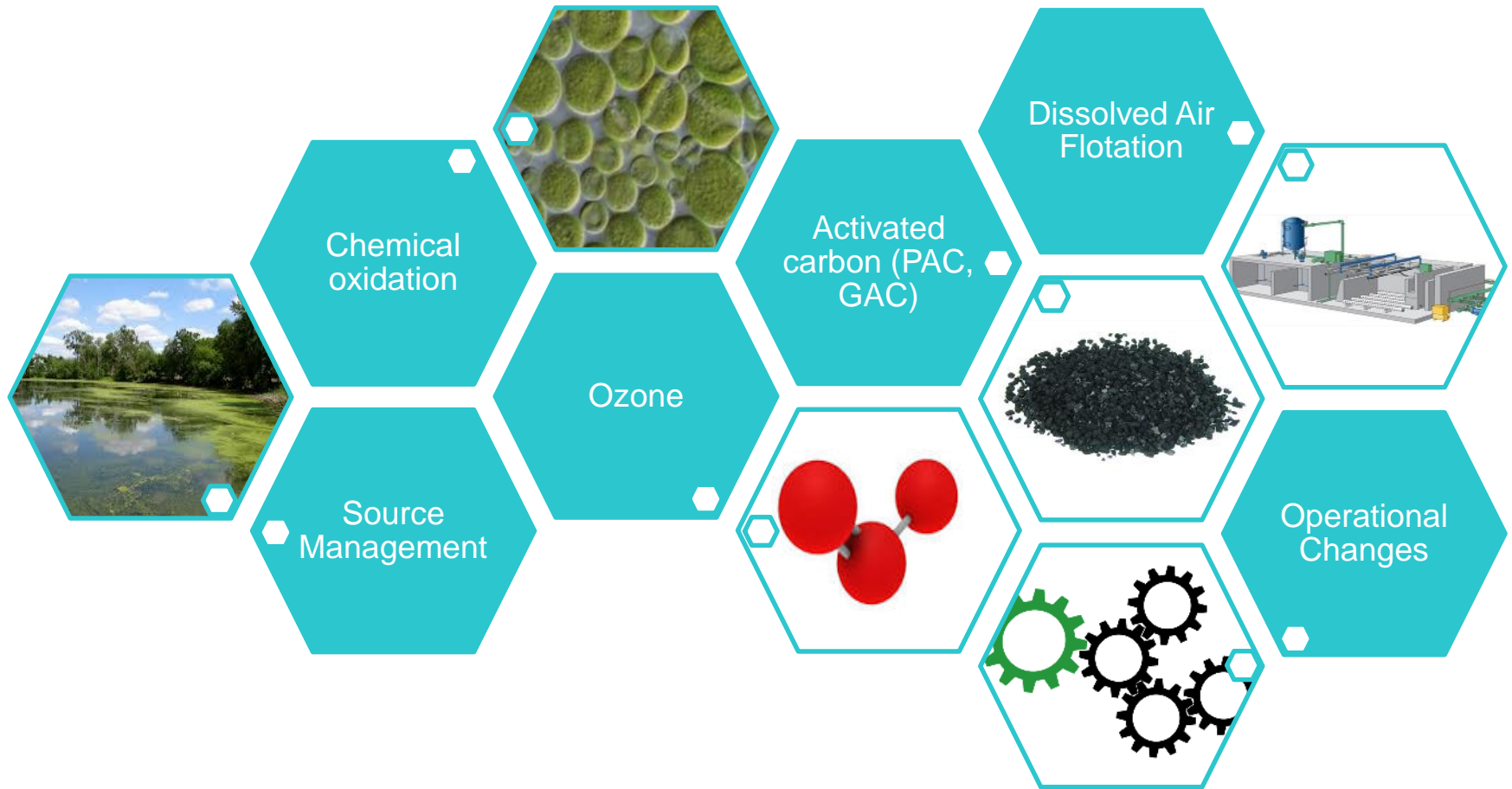


Lake Erie Algal Bloom, 2012, Source: NOAA

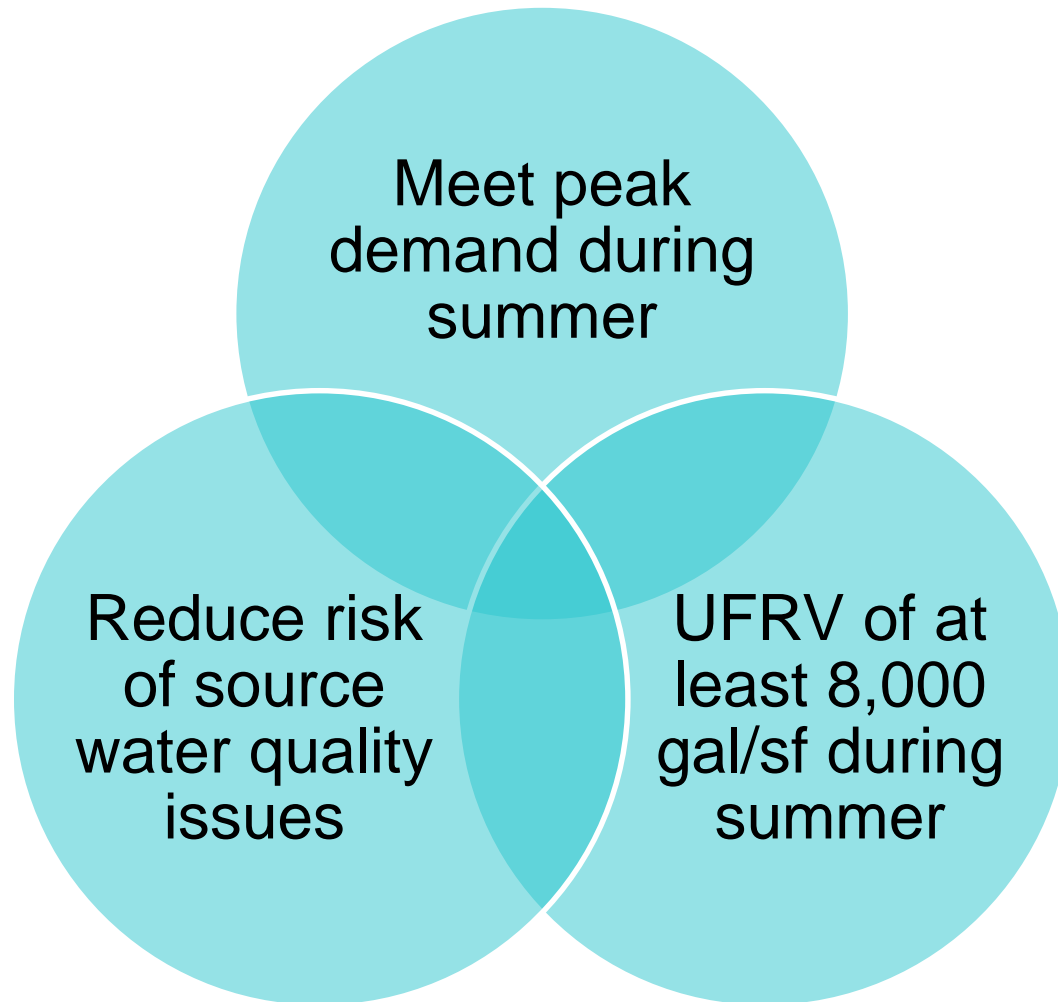
Impacts from algae



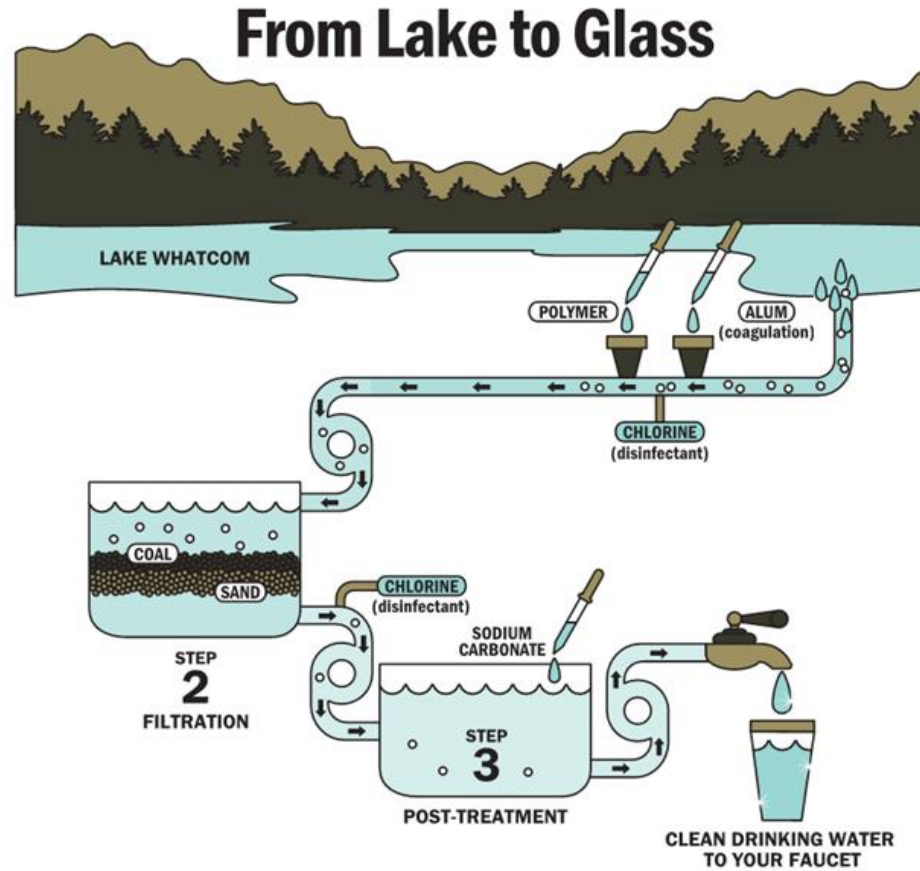
Common algae mitigation strategies



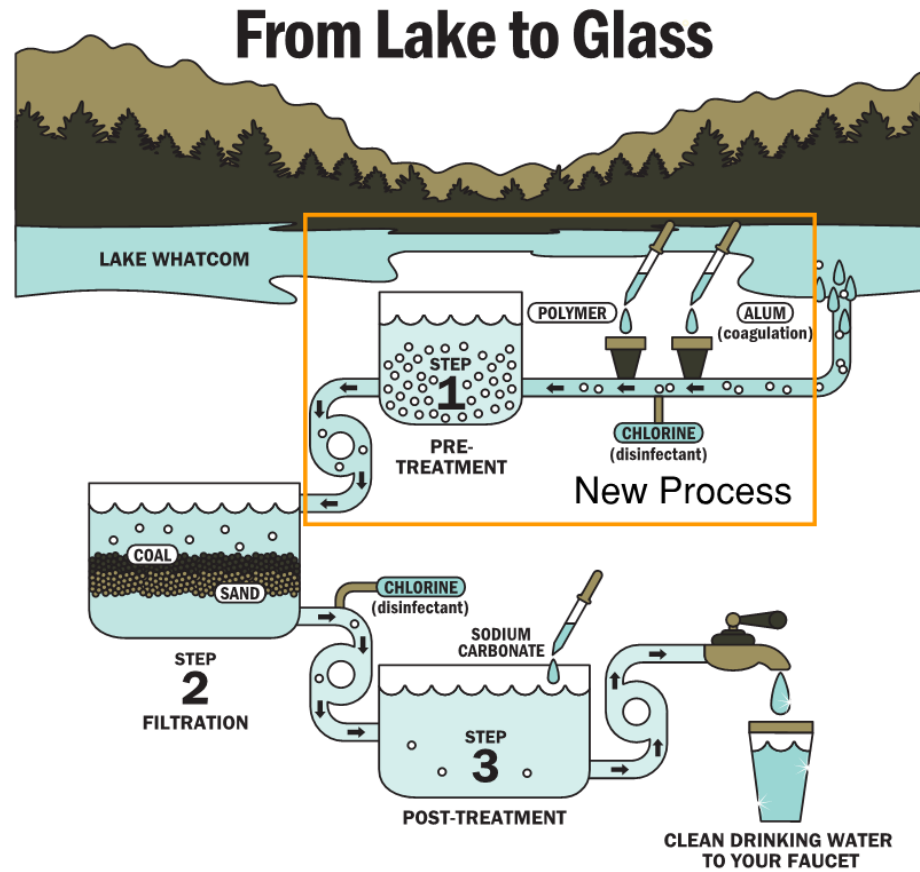
Goals



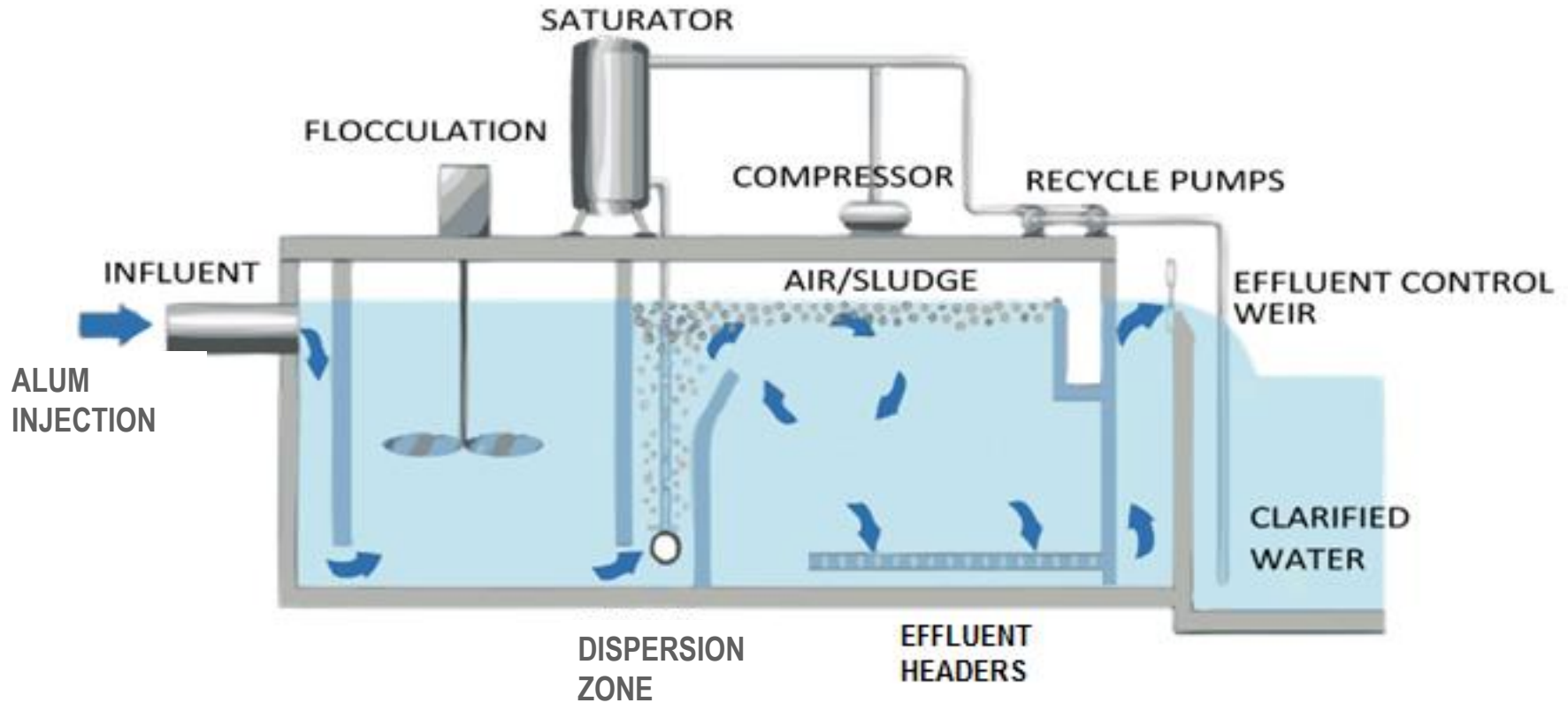
Chosen alternative



Chosen alternative



What is Dissolved Air Flotation (DAF)?





RECYCLED WATER →





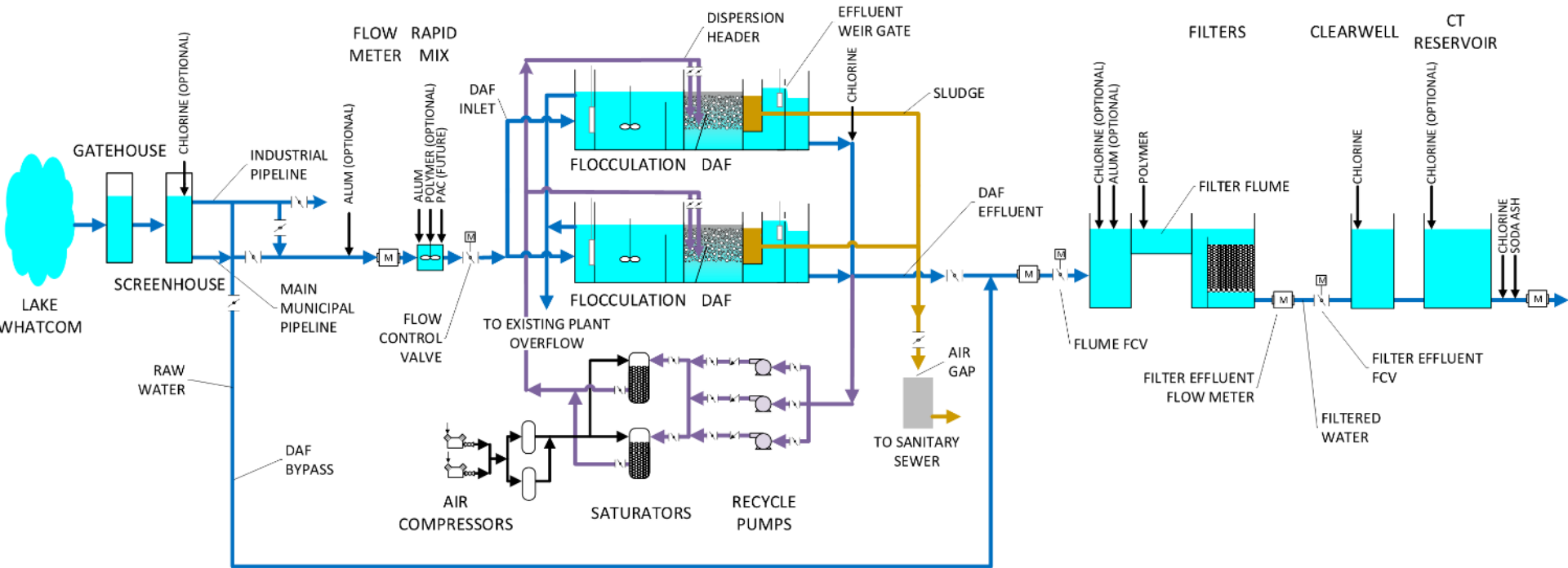
Design Concept



Design Concept



Overall Treatment Plant



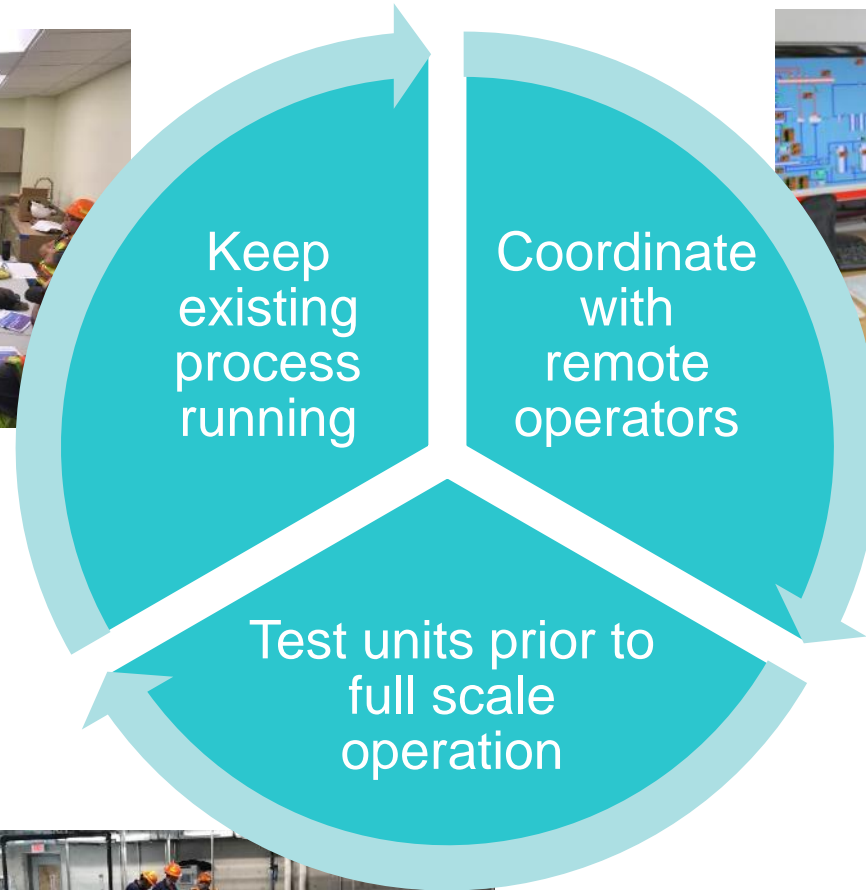






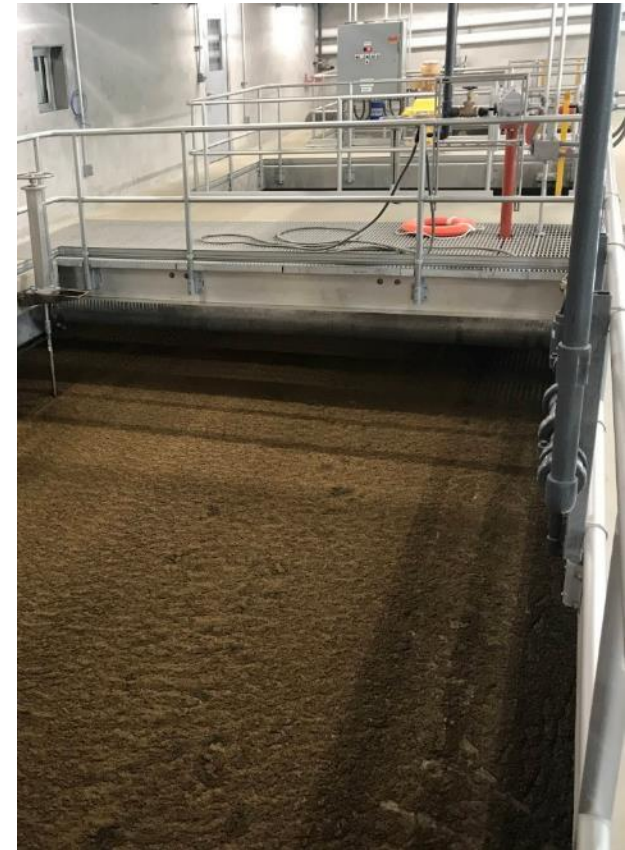
Startup and Commissioning

Goals for Startup



DAF Startup

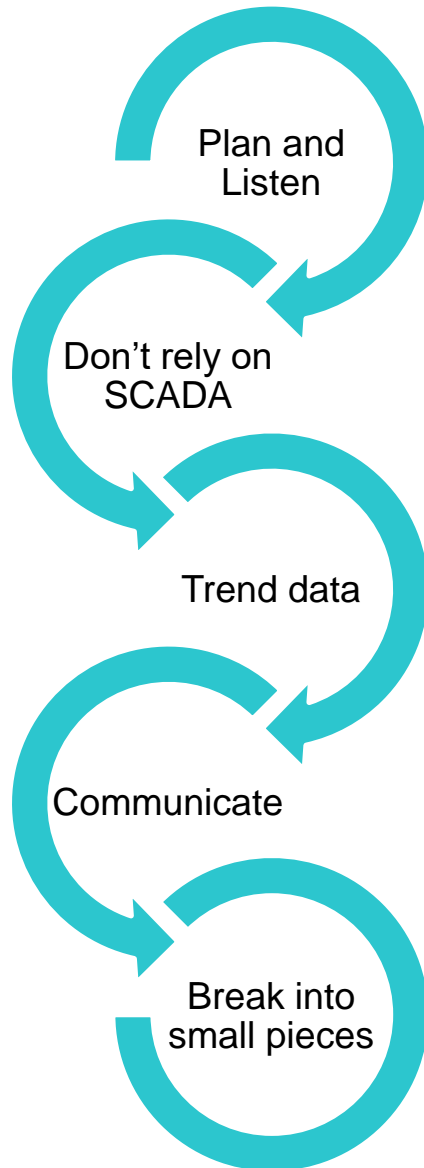
- How do we take a DAF basin full of raw water and make it ready to be filtered?



DAF Desludge



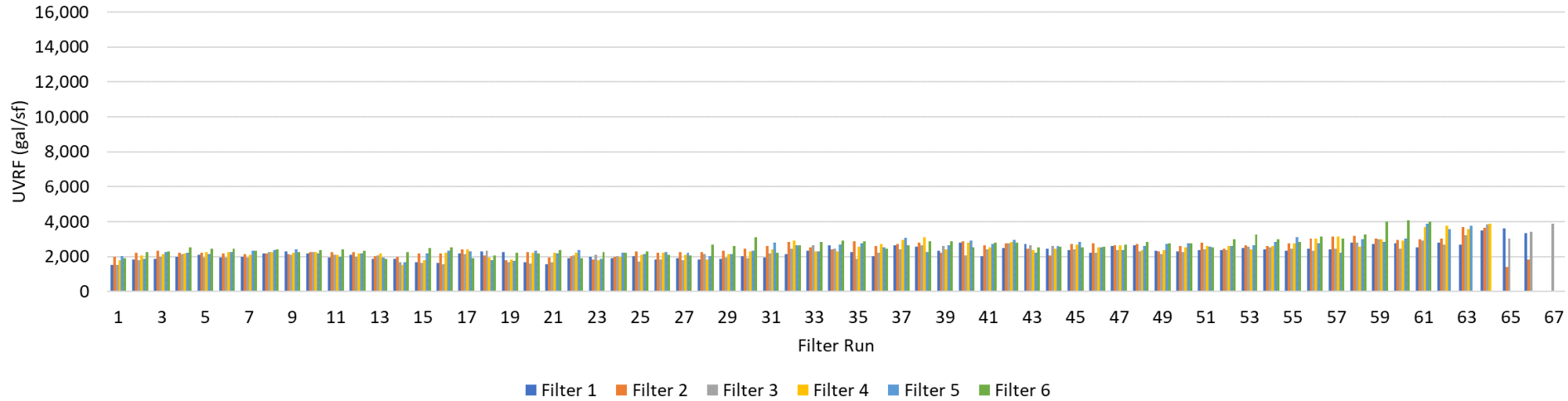
Lessons Learned



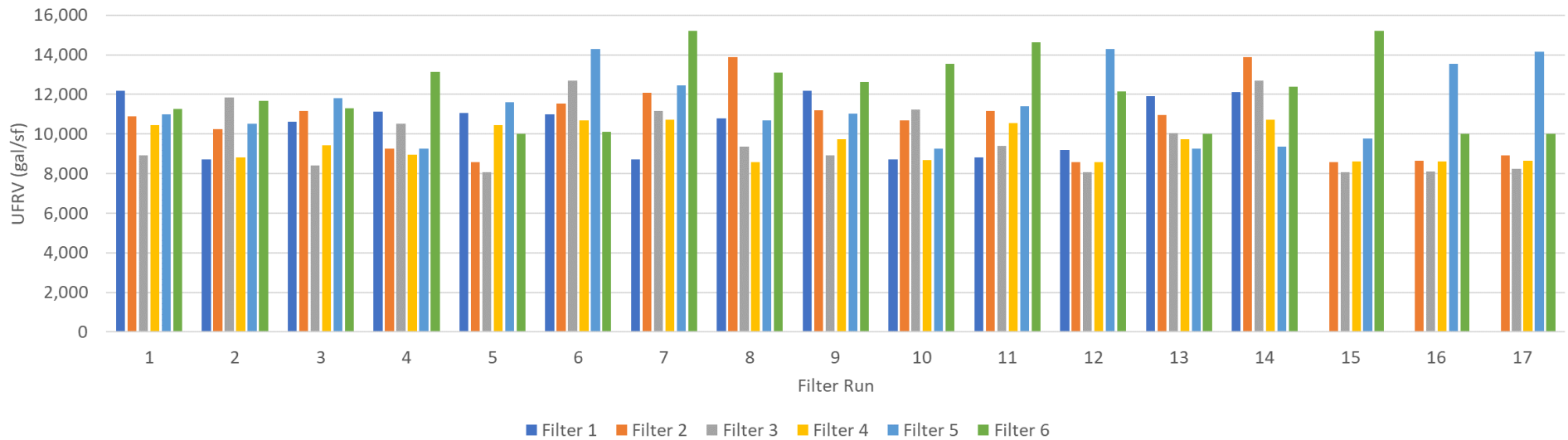
Full Scale Results

Filter Run Data

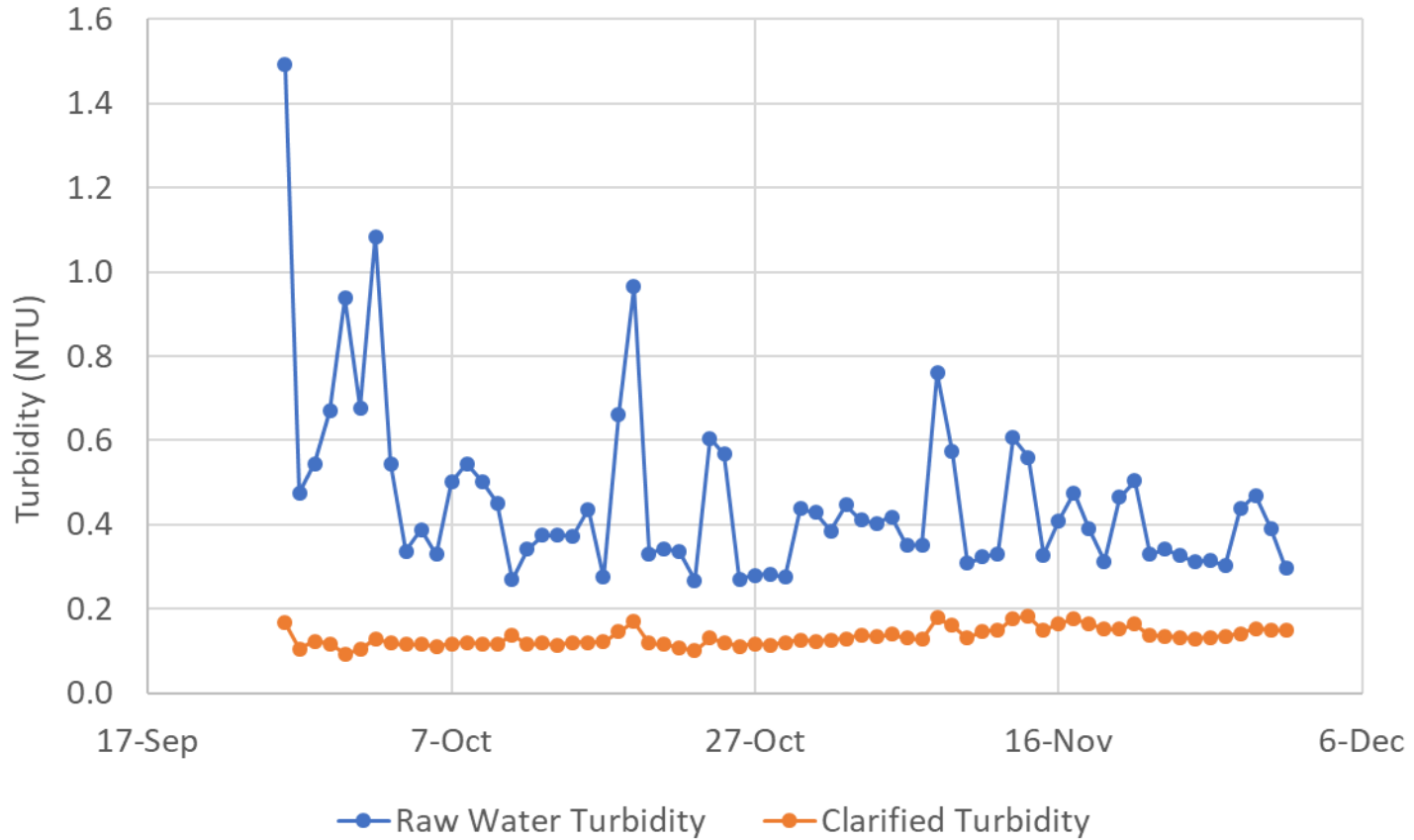
Fall 2017 Filter Runs



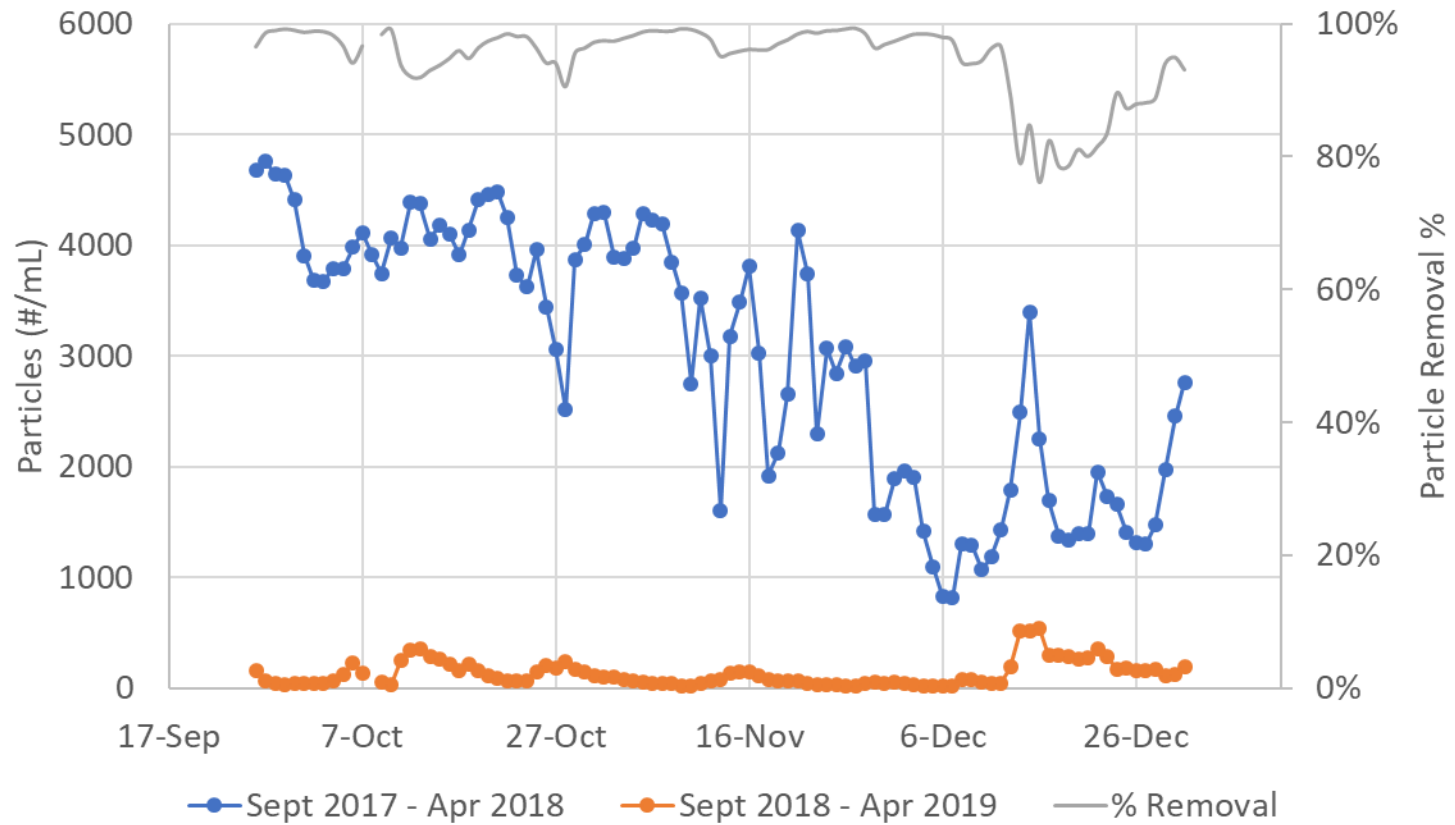
Fall 2018 Filter Runs



DAF Turbidity Removal



DAF Particle Removal



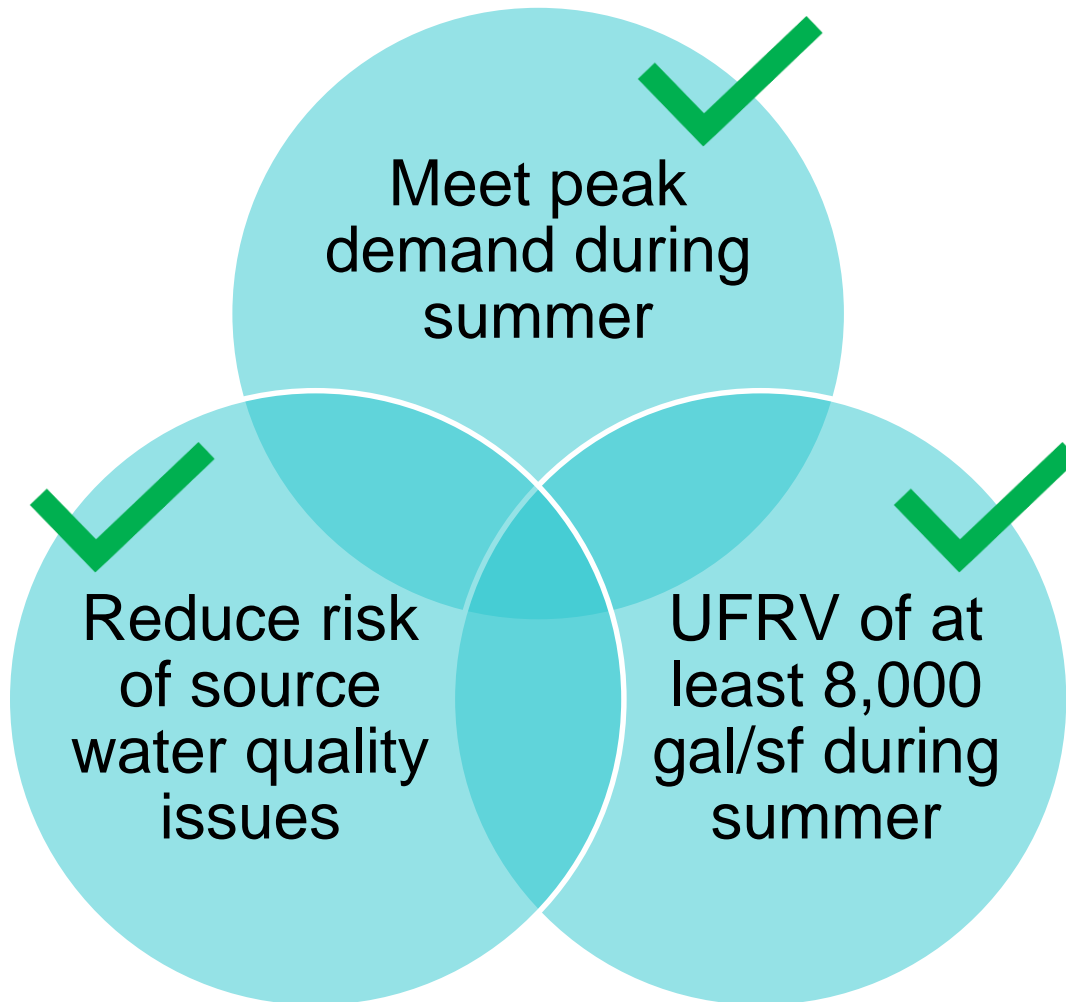
DAF Performance to Date

	Fall 2017	Winter 2018	Fall 2018	Winter 2019
Average UFRV	2,400 gal/sf	4,900 gal/sf	10,900 gal/sf	8,500 gal/sf
Average Filter Run	12 hrs	24 hrs	53 hrs	42 hrs
Filter Flume Turbidity	0.48 NTU	0.39 NTU	0.1 – 0.2 NTU	0.2 – 0.5 NTU
Filter Flume Particle Counts	3,640 #/mL	2,310 #/mL	100 #/mL ¹	600 #/mL ²
Backwash Water Saved	N/A	N/A	300,000 gpd	50,000 gpd

¹ Data represents 97% (1.5 log) particle removal across DAF

² Data represents 70% particle removal across DAF

Goals



Questions?



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