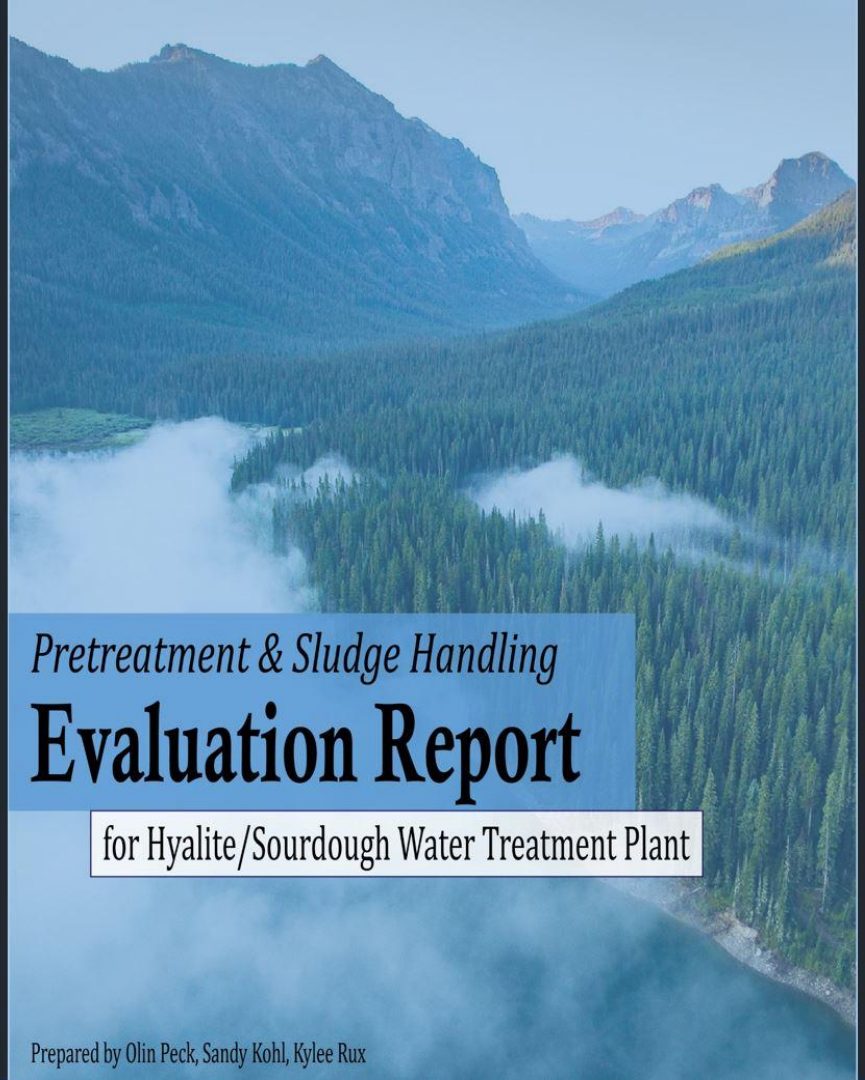


Pretreatment & Sludge Handling

Evaluation Report

for Hyalite/Sourdough Water Treatment Plant

Prepared by Olin Peck, Sandy Kohl, Kylee Rux

Hyalite/Sourdough Water Treatment Plant

- Can treat a total of 22 million gallons per day of raw water
- Plant is known for its pretreatment along with the use of microfiltration membranes

Figure 1. Hyalite/Sourdough Water Treatment Plant

"Hyalite/Sourdough Water Treatment Plant." *HDR Foundation*, https://www.hdrinc.com/portfolio/hyalitesourdough-water-treatment-plant.

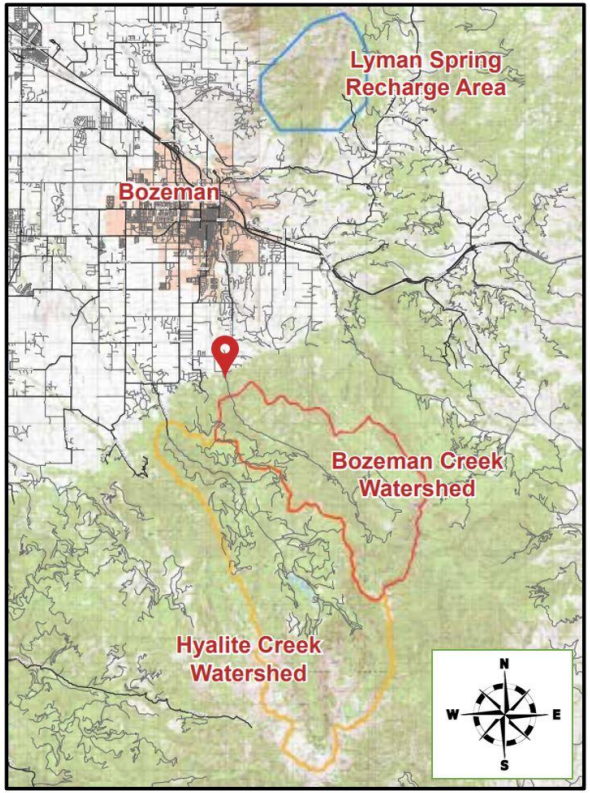
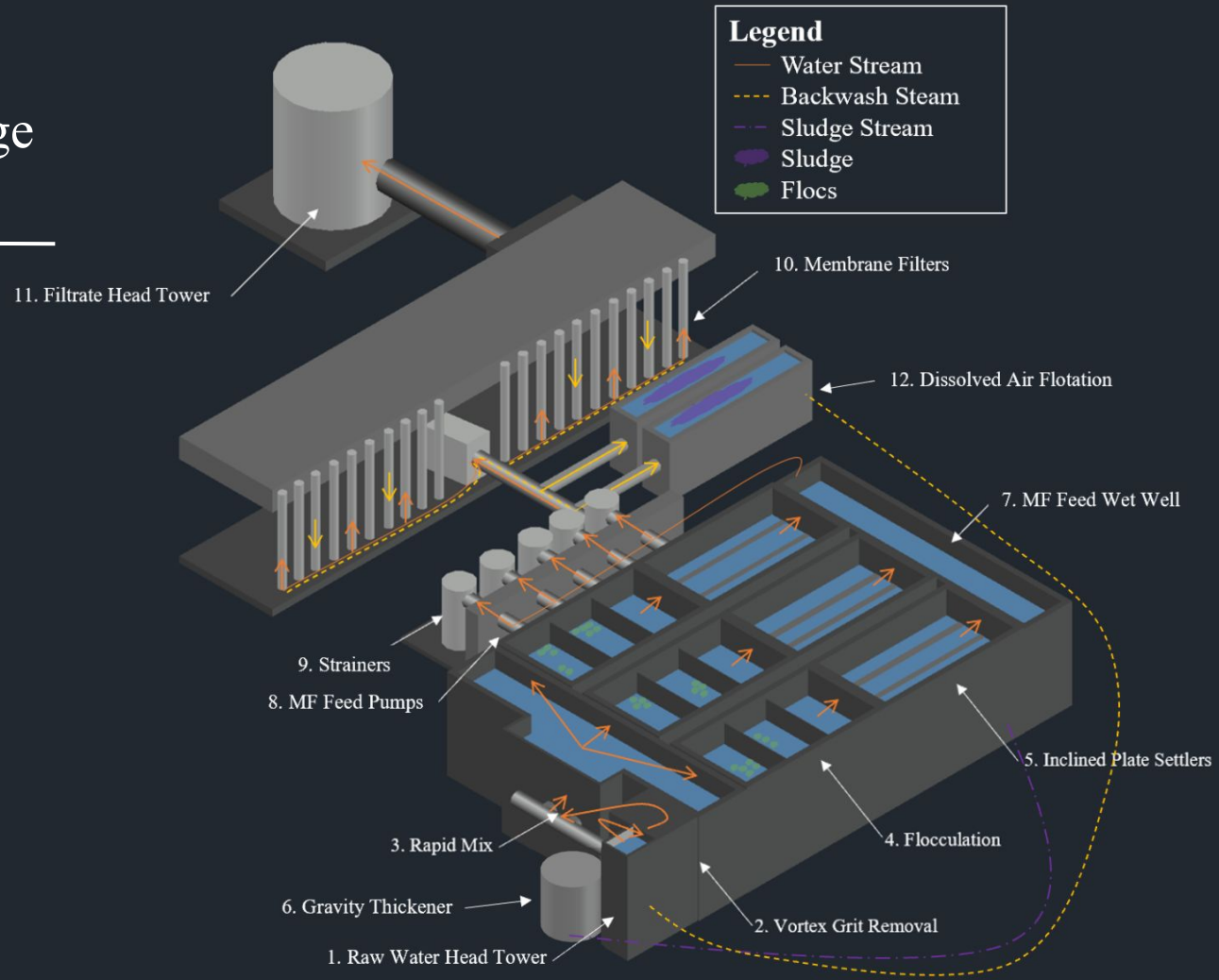


Figure 2. Bozeman Watershed

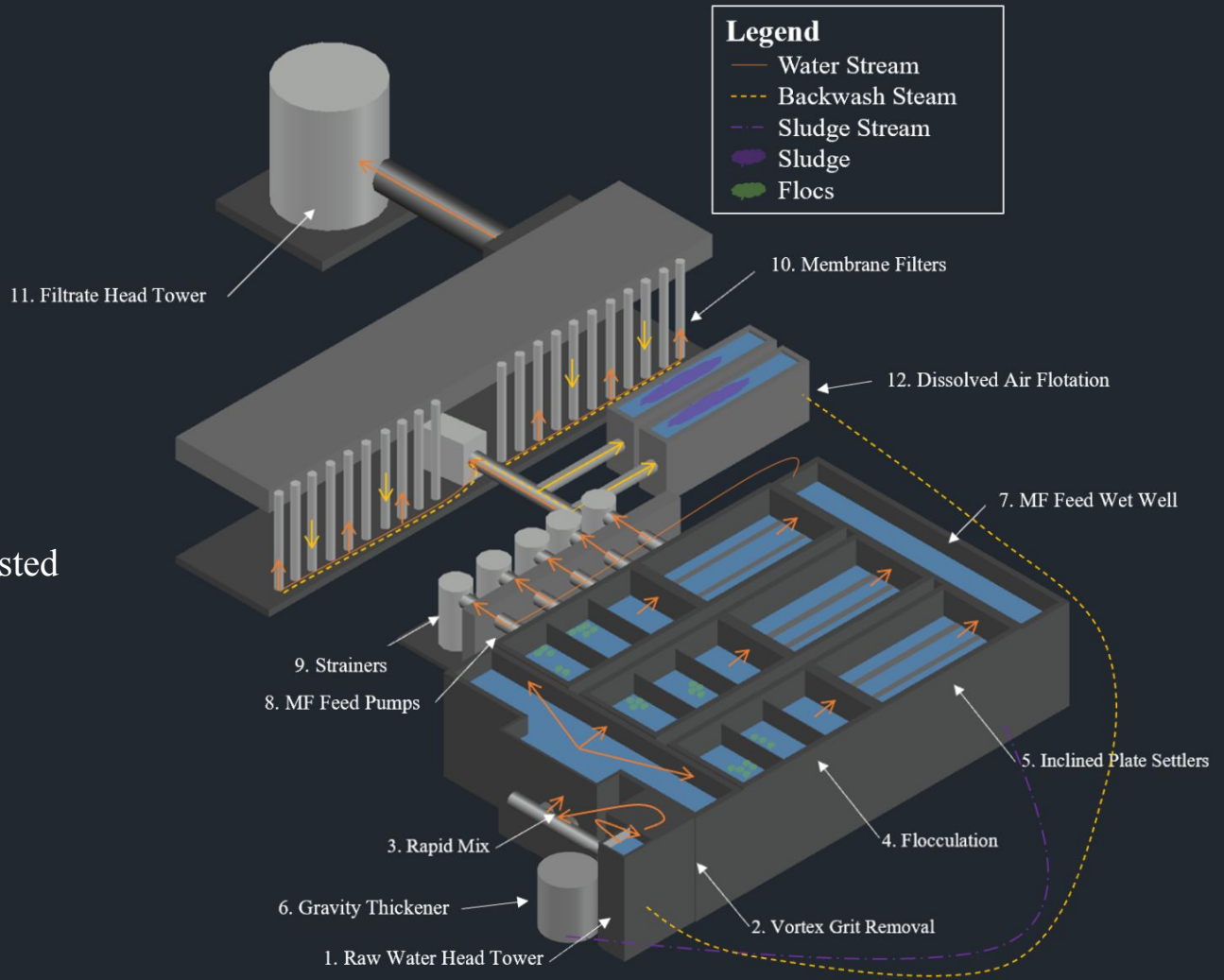
Treatment W. Water Quality Report The City of Bozeman is Pleased to Present our Where Does Your Water Come. 2018;

Water Treatment Process and Sludge Handling of Plant



Objective 1

Determine an optimal dose of coagulant under the conditions tested



Purpose

- Removal of solids in the water
- These particles make water more difficult to disinfect if not removed

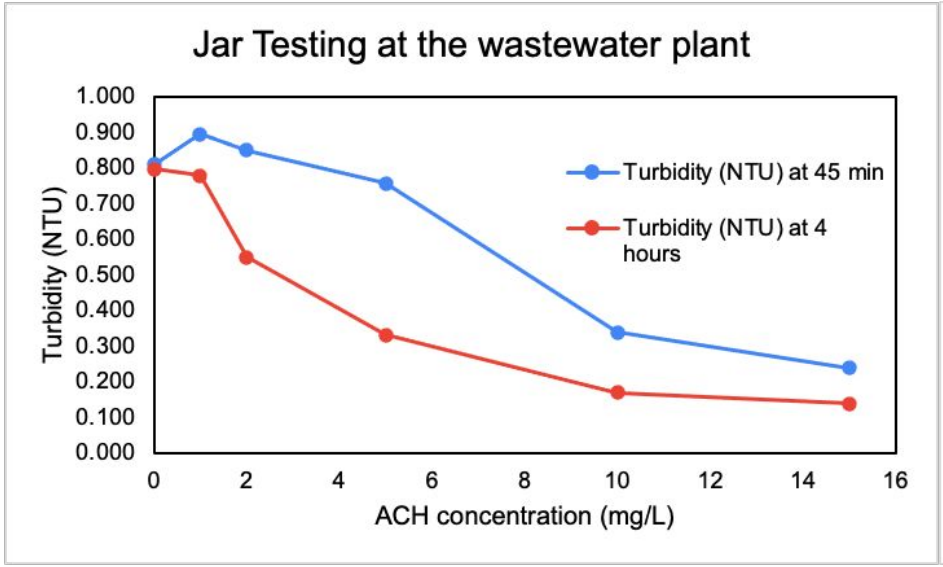
Previous Findings

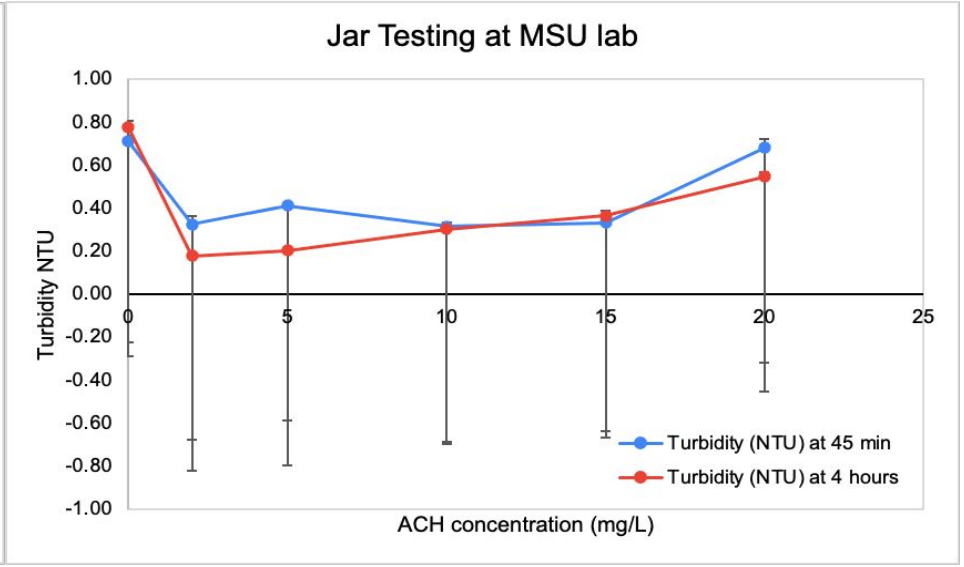
- The amount of aluminum chlorohydrate (ACH) added ranges from 40 lbs to 220 lbs per day.

Methods

- Jar tests
  - Simulates processes of coagulation, flocculation and sedimentation
  - Performed in lab and in the cold room
  - Coagulant was added at different doses
  - Measure turbidity of samples before and after treatment

Data & Analysis





Recommendations

Should backwash be recycled into pretreatment water?

Concentration:

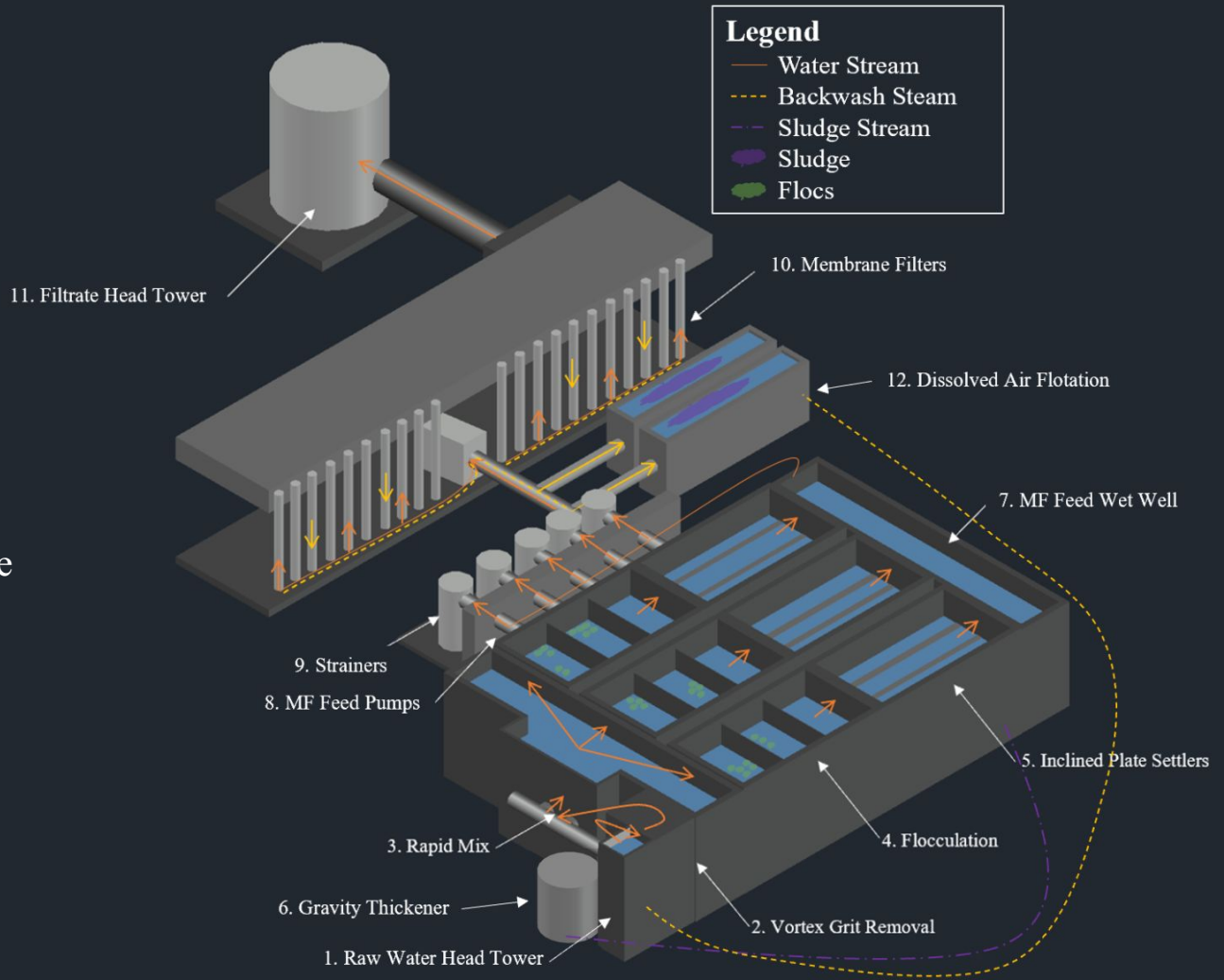
5-15 mg/L ACH *for 4% backwash

Benefits:
Increase yield per inlet mass.
Less wastewater.
Better for environment.

Technical feasibility?

Objective 2

Determine whether recycling backwash water to the front of the plant impacts pretreatment



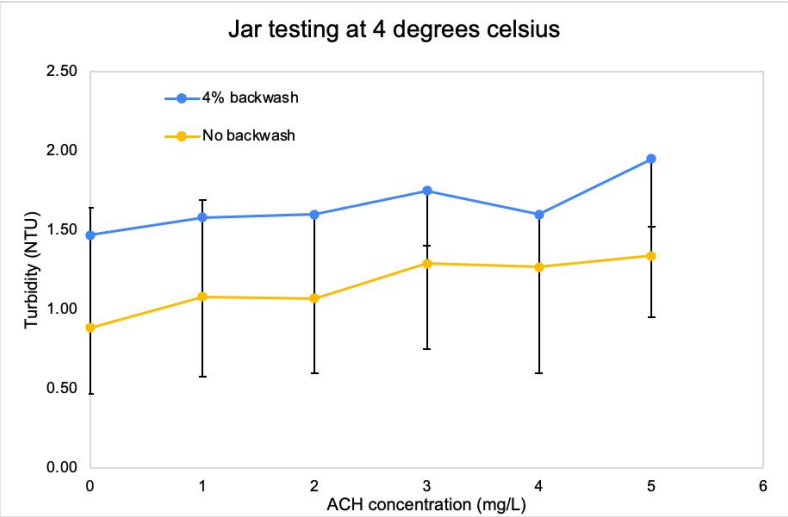
Purpose

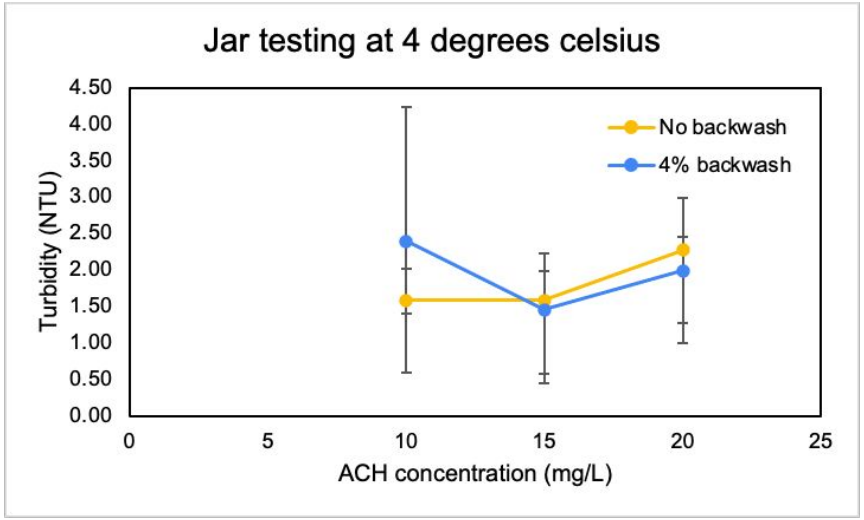
- Recycle water
- Increase the effectiveness of the pretreatment process

Methods

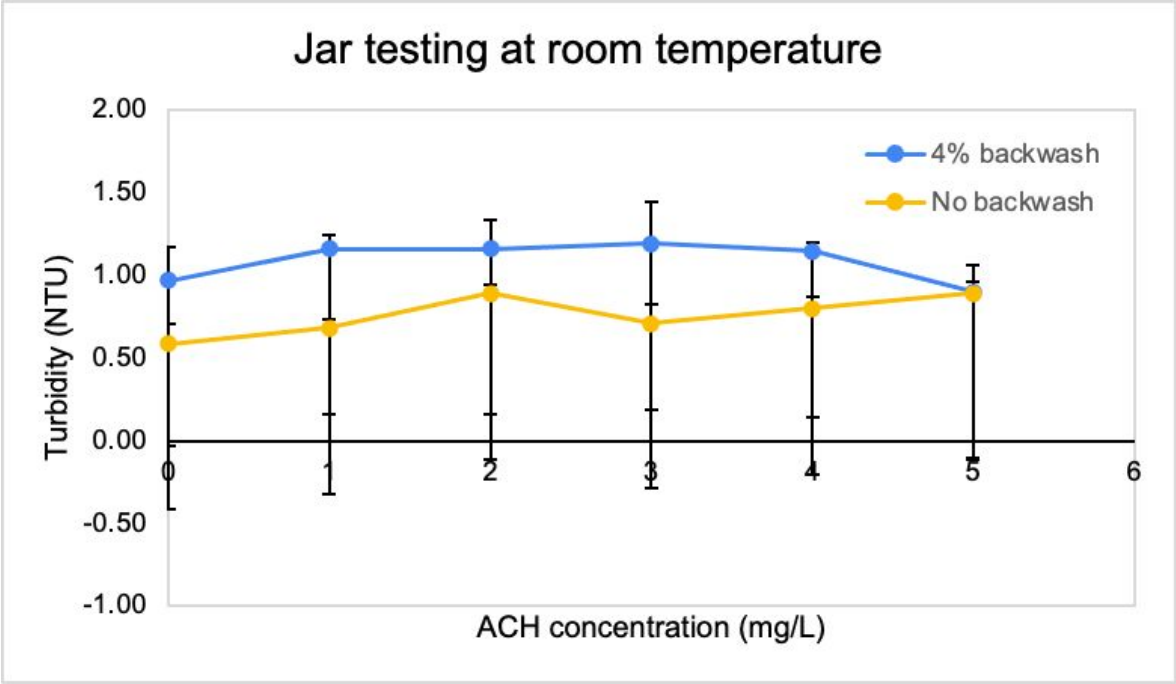
- Jar tests
  - Mixture of influent water and 4% backwash water
  - Measure turbidity of samples before and after treatment

Data & Analysis





Data & Analysis



Further Experimental Recommendations

-Temperature

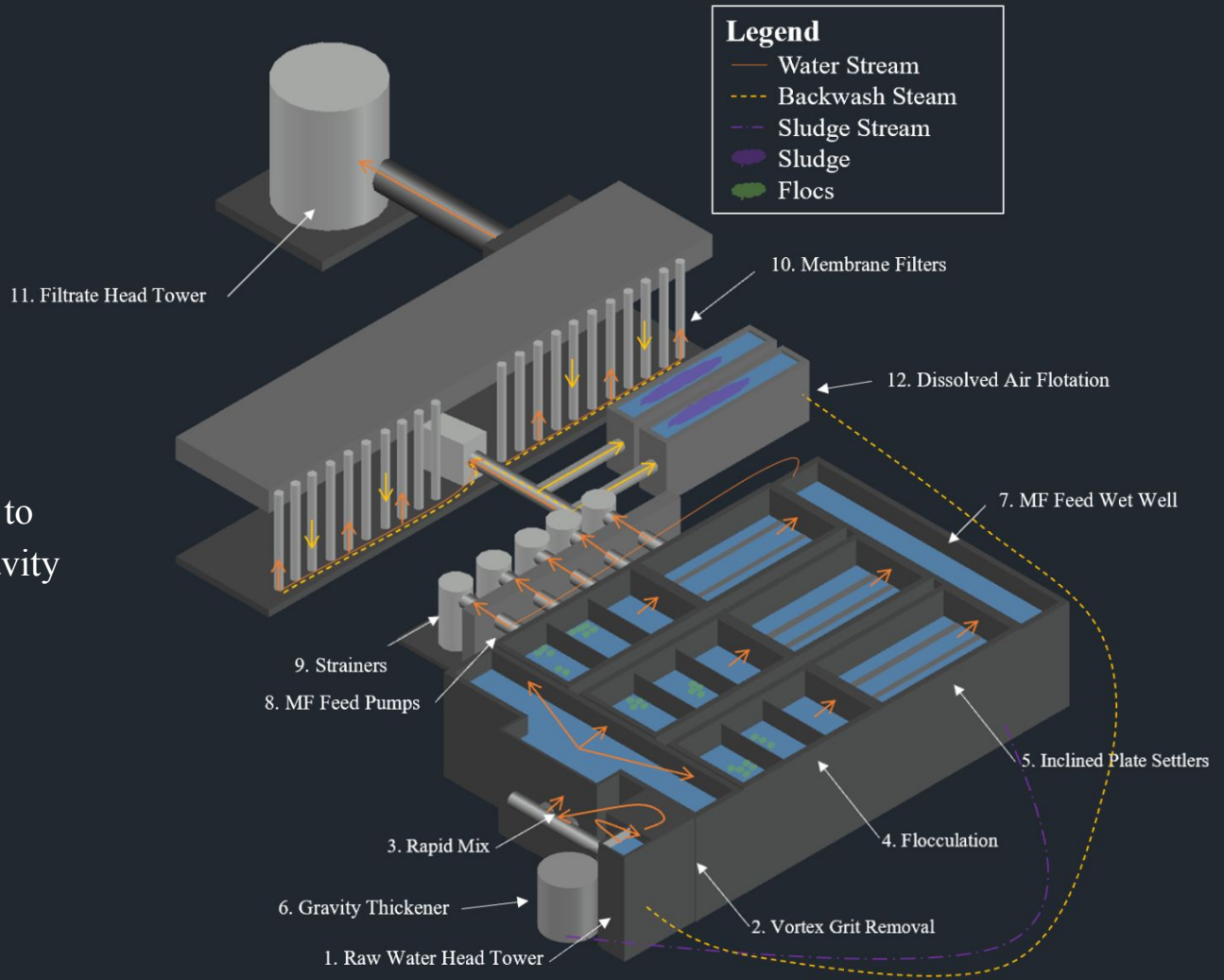
-Inlet Turbidity

-Backwash concentration

-Other coagulant concentrations

Objective 3

Determine optimal polymer dose to enhance sludge settling in the gravity thickener



Purpose

- Polymer increases sedimentation rate
- The polymer dose with the most compact sludge cake leads to easier management and disposal

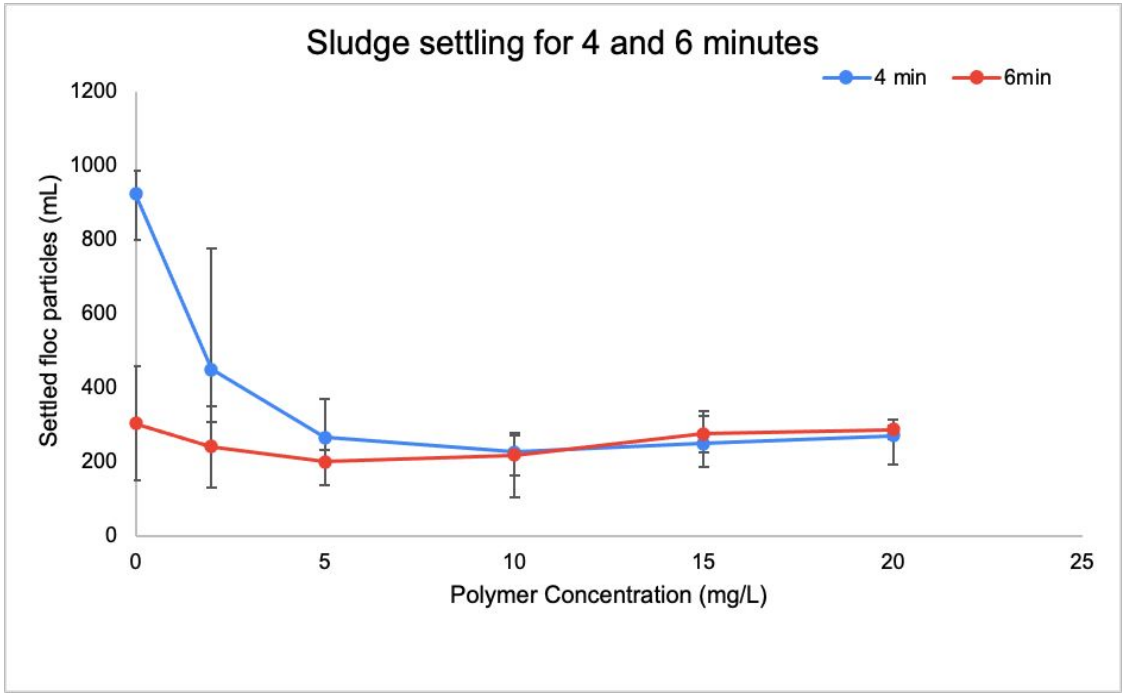
Previous Findings

- The water treatment plant has been fairly consistent this month in dosing with 4 mg/L of polymer

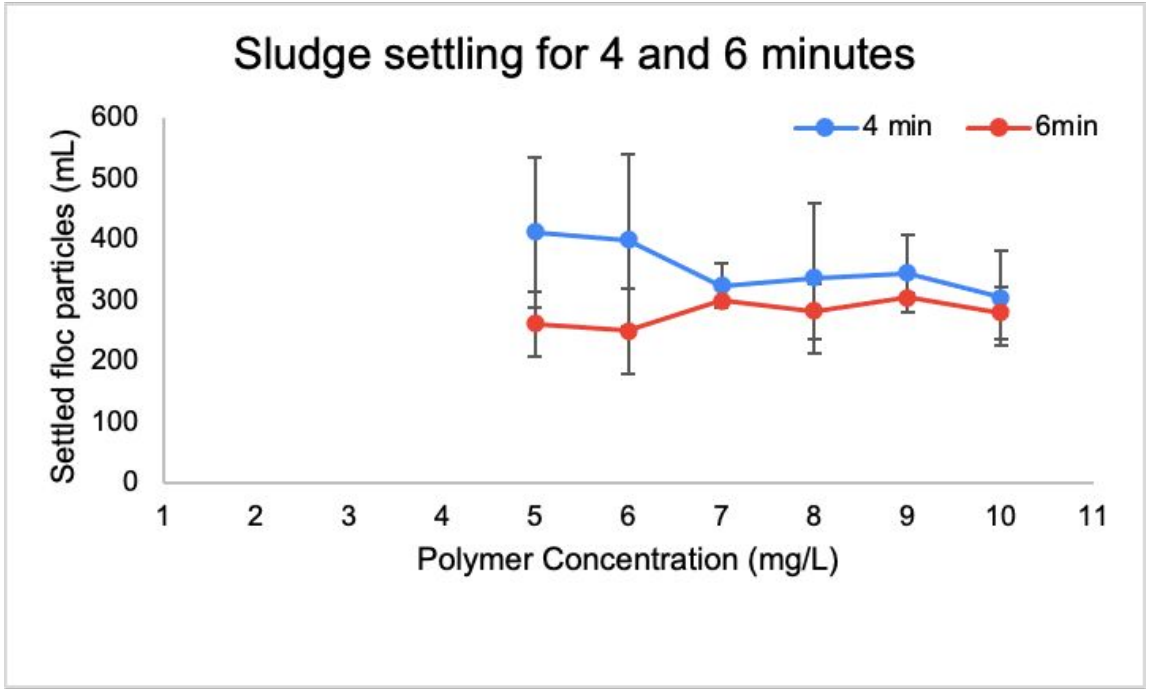
Methods

- Sludge Settling Tests
  - Measure and add doses of polymer to sludge samples from the plant
  - Sludge must settle at least 50% in four minutes
  - Redo test for range between best two doses, and inspect beakers for most compact sludge cake

Data & Analysis



Data & Analysis



Recommendations

Concentration:

Around 5 mg/L Polymer

Benefits:
Faster settling.
Dense sludge puck.
Simple design.
More efficient, better for the sourdough ecosystem.

Additional tests:

- Temperature
- Other Polymers