



High Rate Filtration Pilot Testing and Polymer Bench Testing at Joint Water Commission WTP

PNWS-AWWA Conference 2018

April 27, 2018

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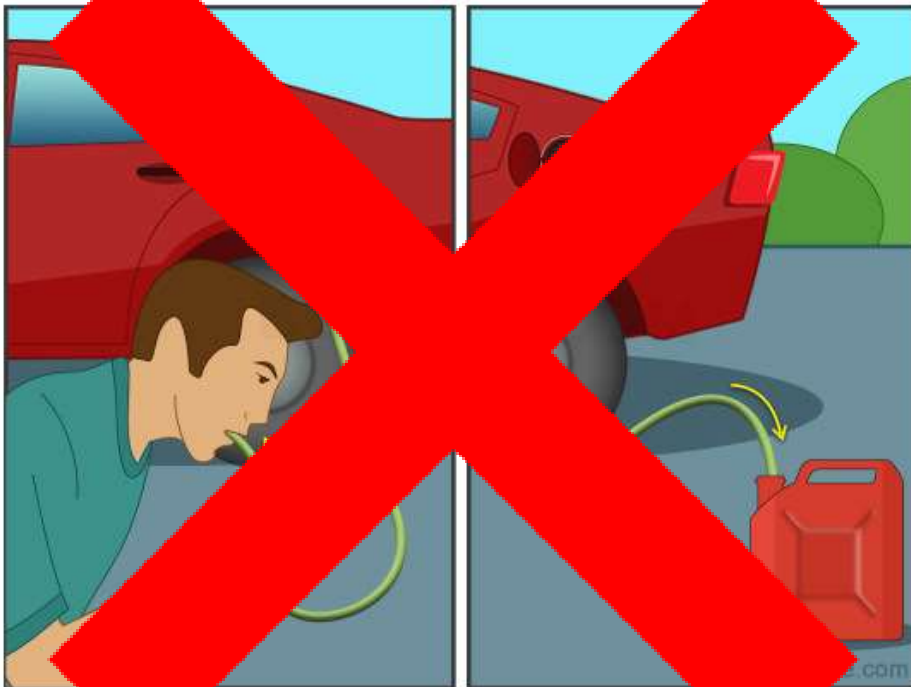
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Agenda

1. Safety Minute
2. Overview of JWC WTP Project
3. High Rate Filter Pilot Testing
4. Polymer Bench Testing
5. Conclusion

Safety Minute

- Proper way to siphon



Siphoning Gas using Mouth

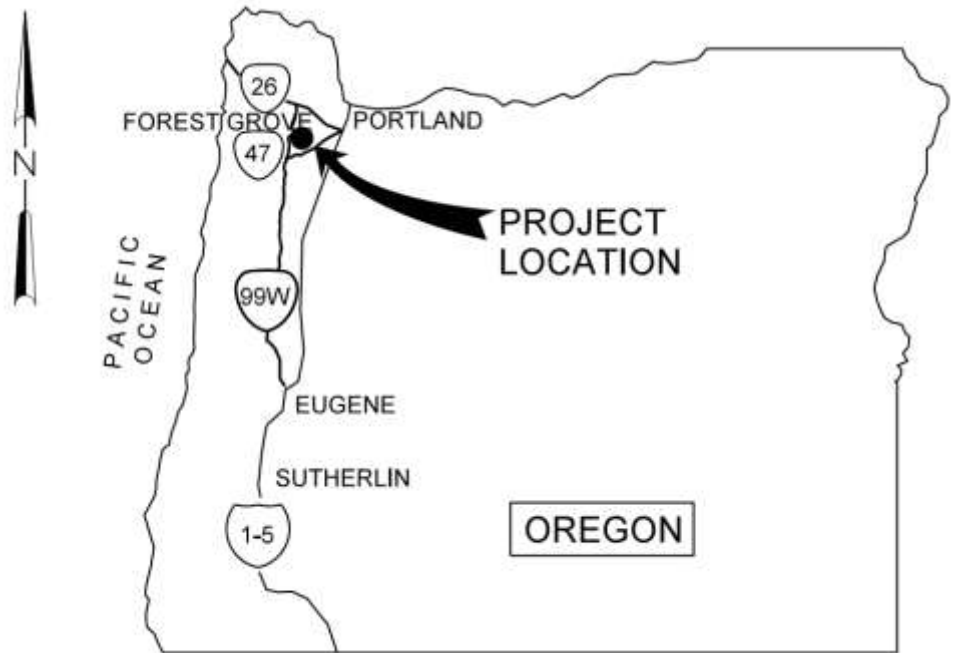
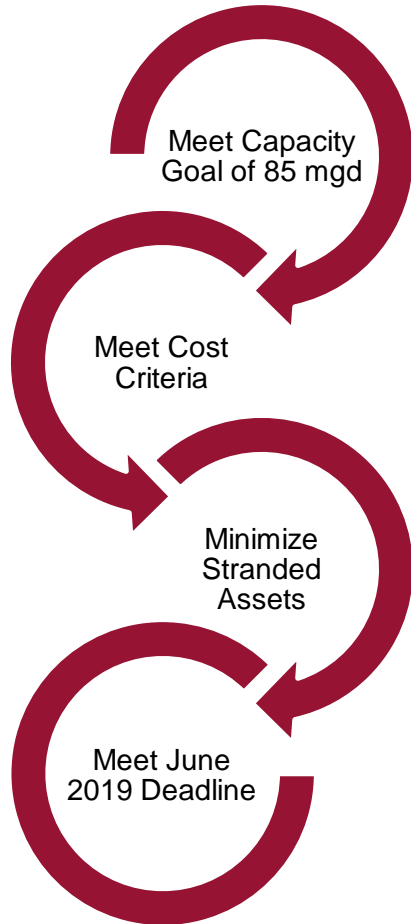


Overview of JWC WTP Project

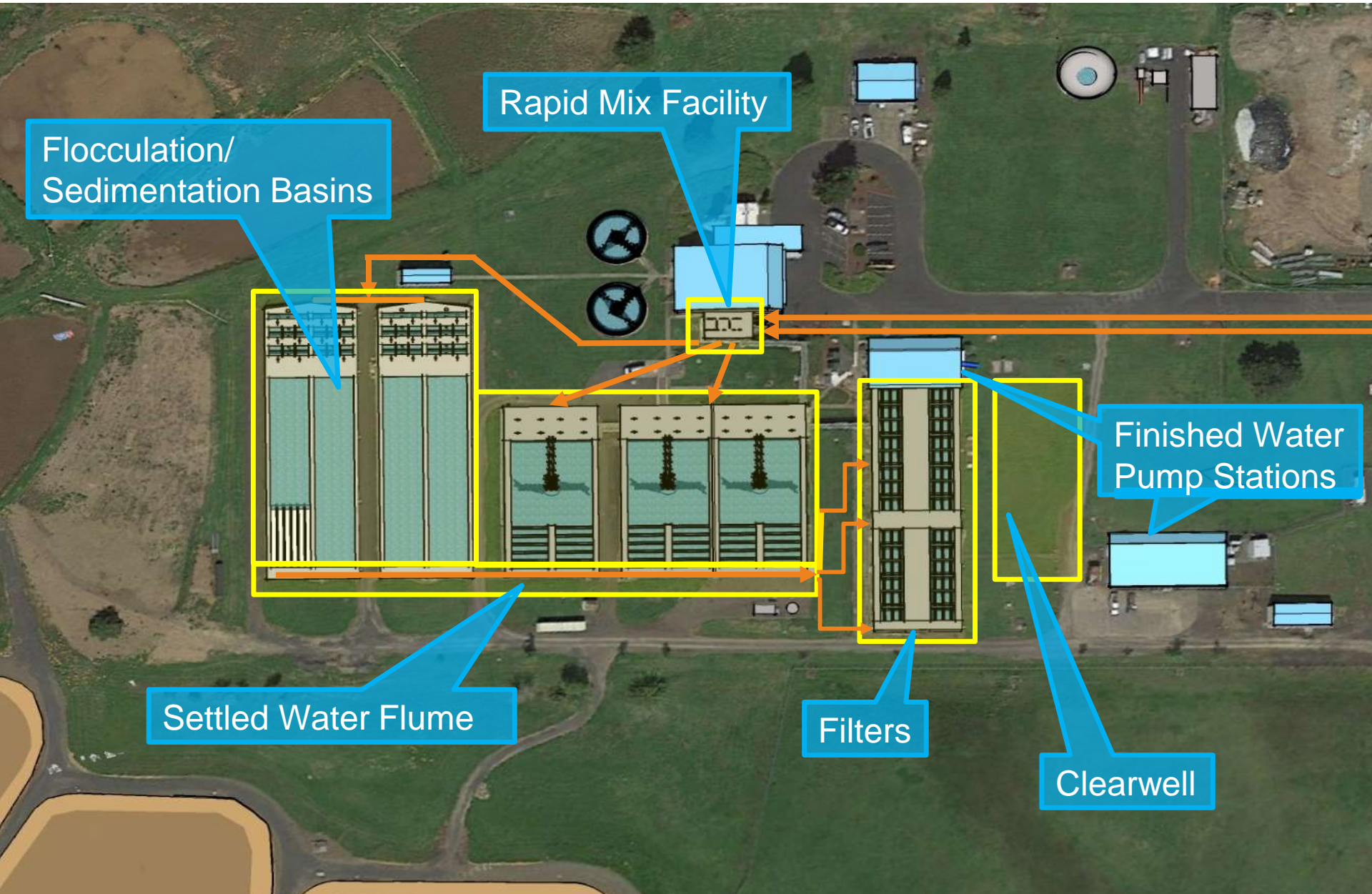


Overview of JWC WTP Project

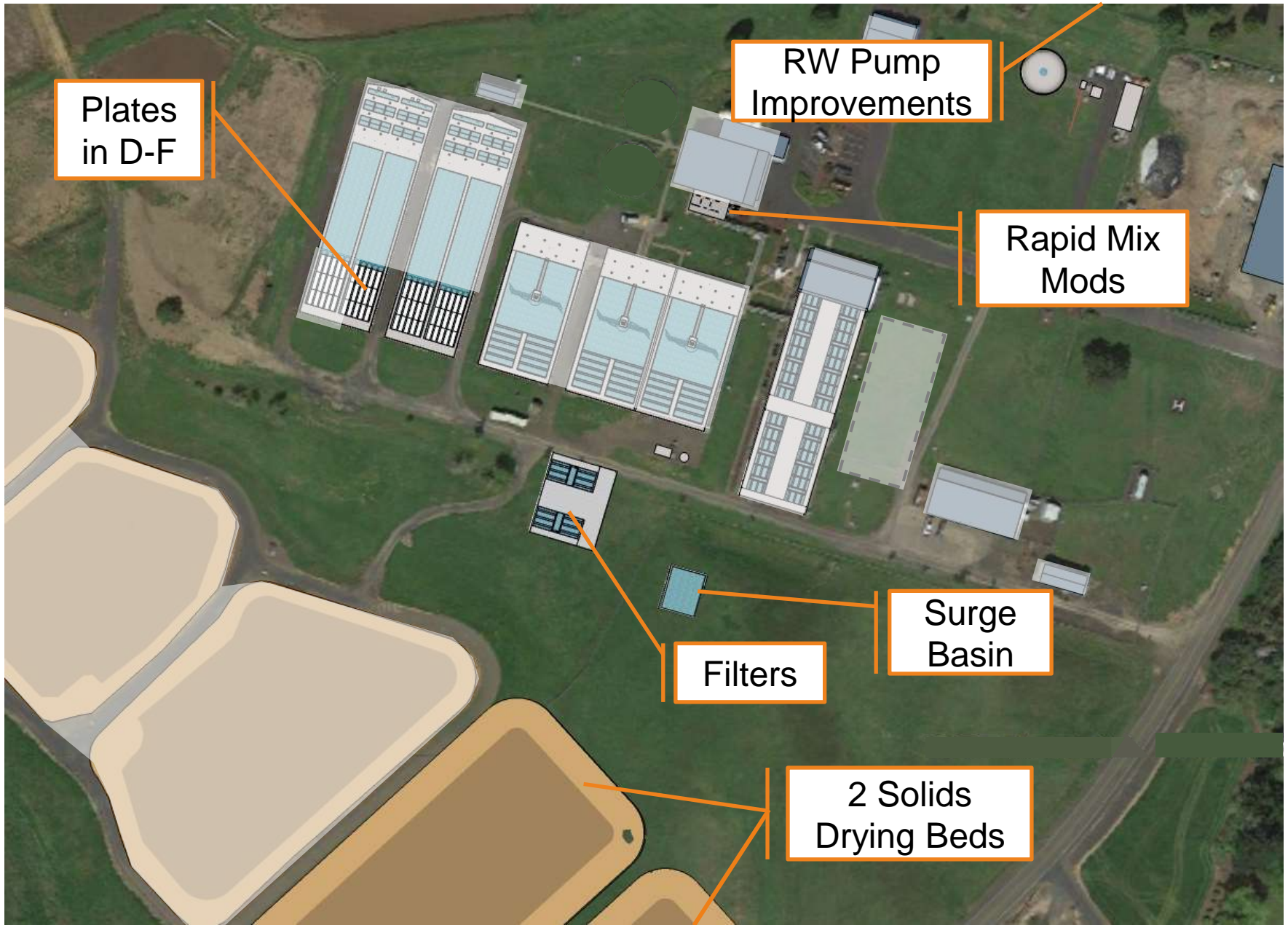
Project Goals:



Overview of JWC WTP Project

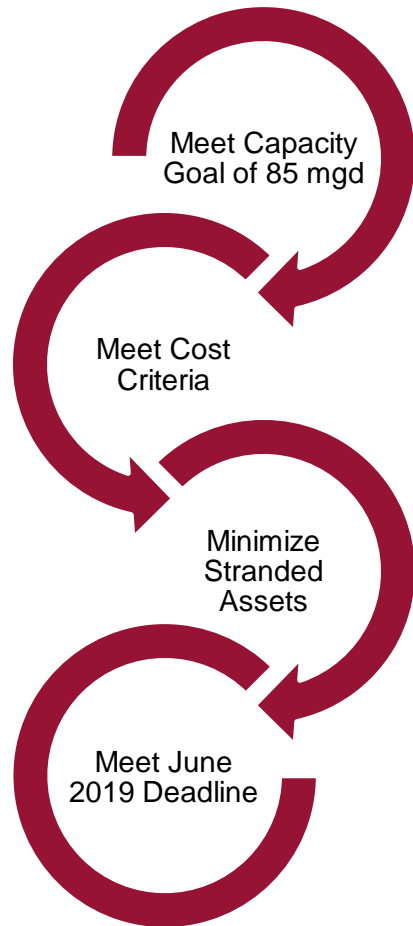


Overview of JWC WTP Project



Overview of JWC WTP Project

Project Goals:



Project Summary:

- Expansion from 68 mgd to 85 mgd
 - Improve seismic resiliency
- Construct new deep-bed filters
 - ★ Pilot test up to 12 gpm/sf
- Install plate settlers
- Upgrade solids handling system
 - Construct new solids drying beds
 - Construct new surge basin and pump station
- ★ Test polymer for solids settling
- Upgrade chemical processes for alum, caustic, chlorine, and polymer

High Rate Filter Pilot Testing



High Rate Filter Pilot Testing

Purpose

- Existing filter media design not optimized for loading rates above 8 gpm/sf
- Required by OHA for loading rates over 6 gpm/sf

Opportunities

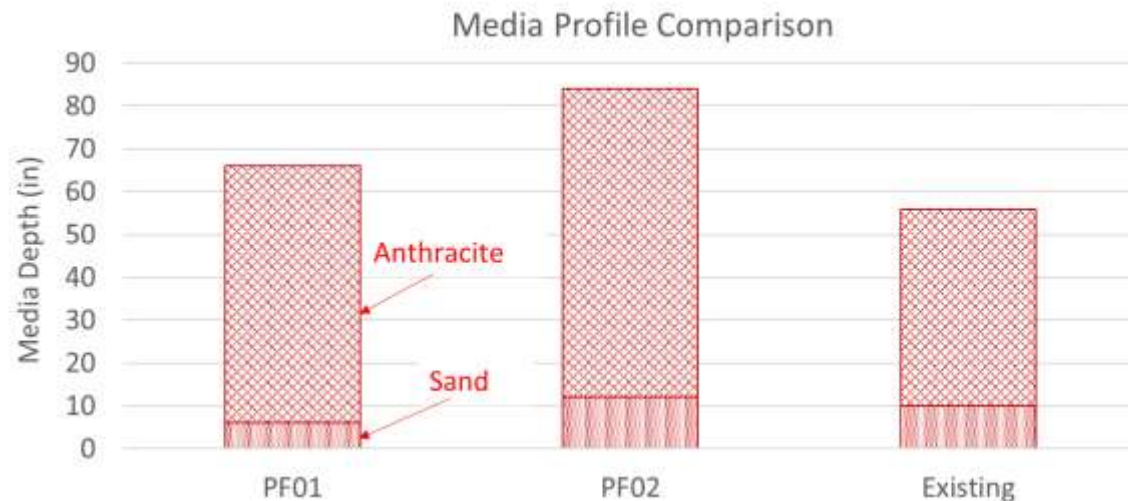
- Construction of new filters
- Foundation for future filters

Goals

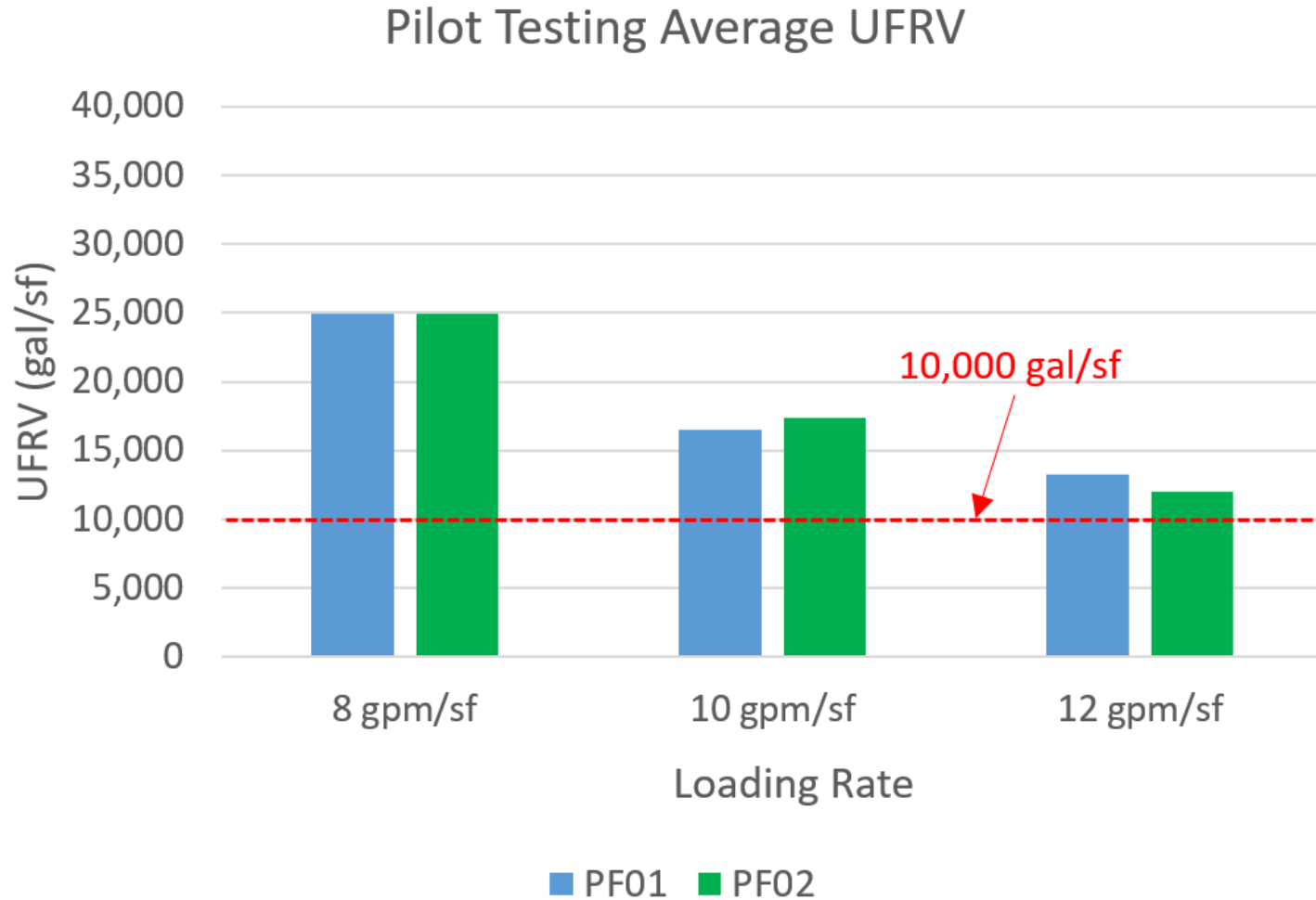
- Unit filter run volume (UFRV) > 10,000 gal/sf
- Turbidity breakthrough goal of 0.1 NTU
- Terminal headloss of 12 ft
- Filter run times of 18-24 hours

High Rate Filter Pilot Testing

Parameter	Column 1 (PF01)	Column 2 (PF02)	Existing Media
Anthracite Depth	60-inches	72-inches	46-inches
Anthracite Effective Size	1.4-mm	1.5-mm	1.2-mm
Sand Depth	6-inches	12-inches	10-inches
Sand Effective Size	0.6-mm	0.6-mm	0.6-mm
Total Media Depth	66-inches	84-inches	56-inches
L/D Ratio	1343	1727	1397

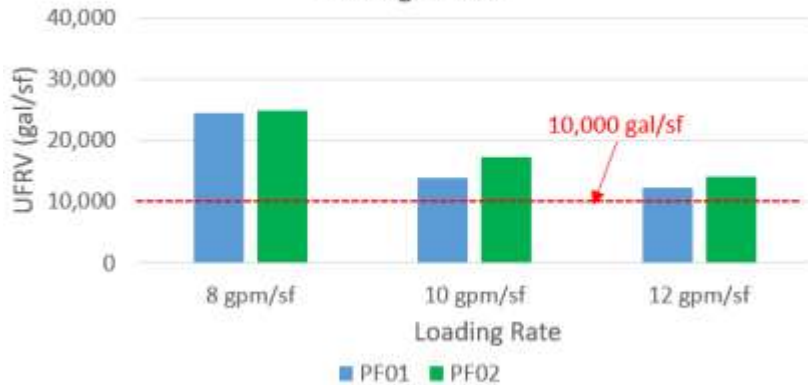


High Rate Filter Pilot Testing

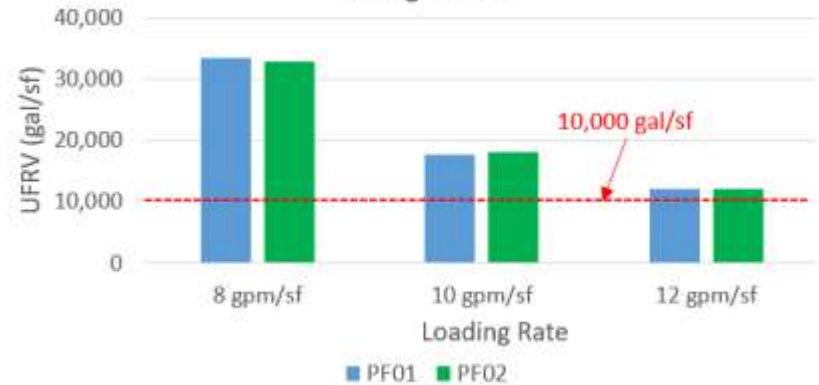


High Rate Filter Pilot Testing

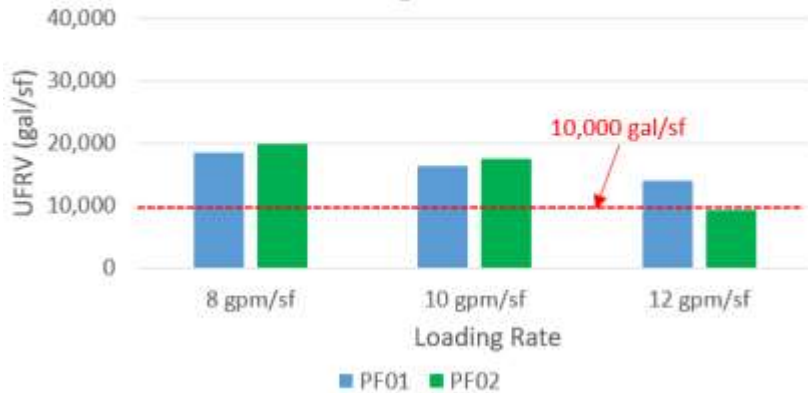
Summer 2016 Pilot Testing
Average UFRV



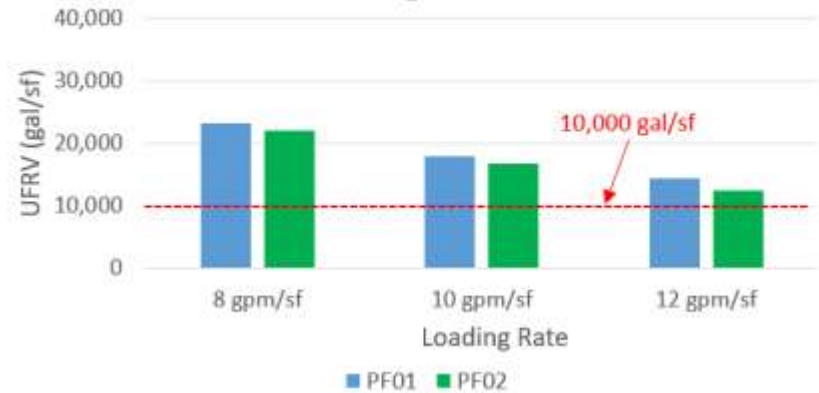
Fall 2016 Pilot Testing
Average UFRV







Winter 2017 Pilot Testing
Average UFRV



Spring 2017 Pilot Testing
Average UFRV

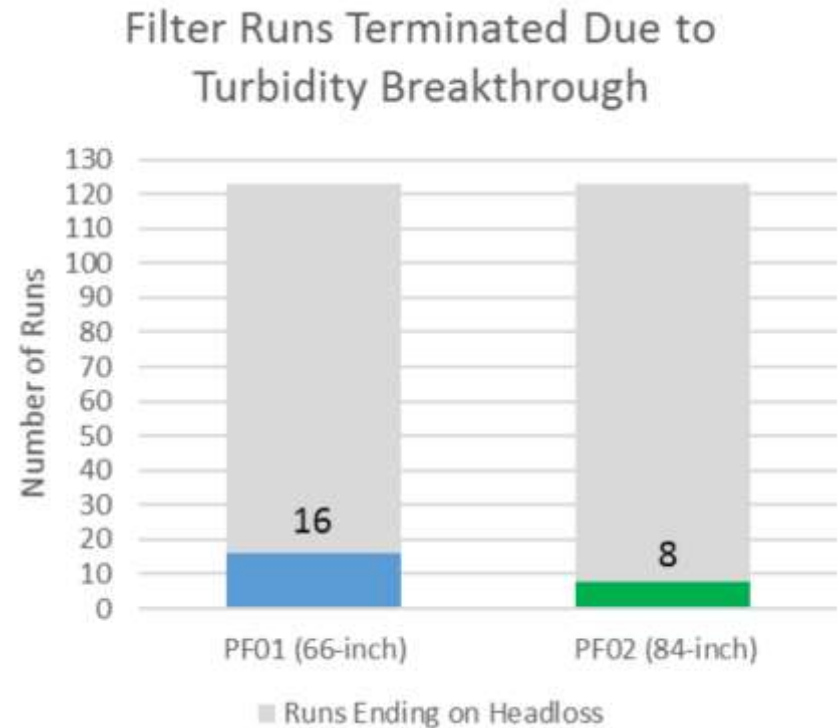


High Rate Filter Pilot Testing

Goal	Met Goal
UFRV > 10,000 gal/sf	
Filter run times of 18-24 hours	
Turbidity breakthrough goal of 0.1 NTU	
Terminal headloss goal of 12 ft	

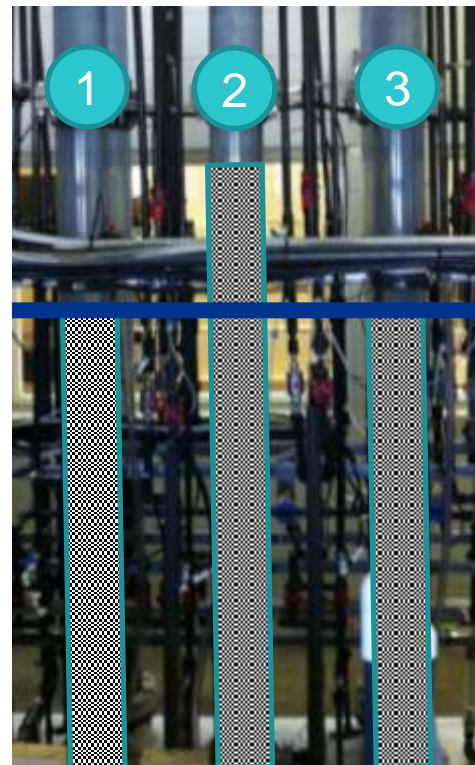
High Rate Filter Pilot Testing

- Pilot filter 2 media (PF02) chosen
 - Less affinity for turbidity breakthrough
 - Lower effluent turbidity
 - Lower unit filter maturation volume (UFMV)

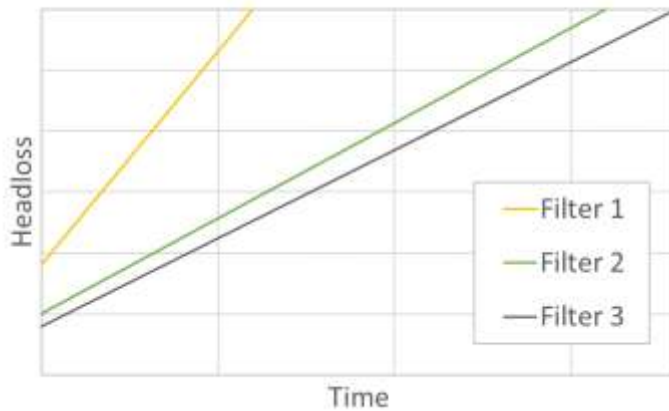


High Rate Filter Pilot Testing

- Lessons learned



Headloss Development



Solids Polymer Bench Testing



Solids Polymer Bench Testing

Purpose

- History of turbid decant
- Risk of solids recycle to rapid mix
- Determine optimal polymer and dose

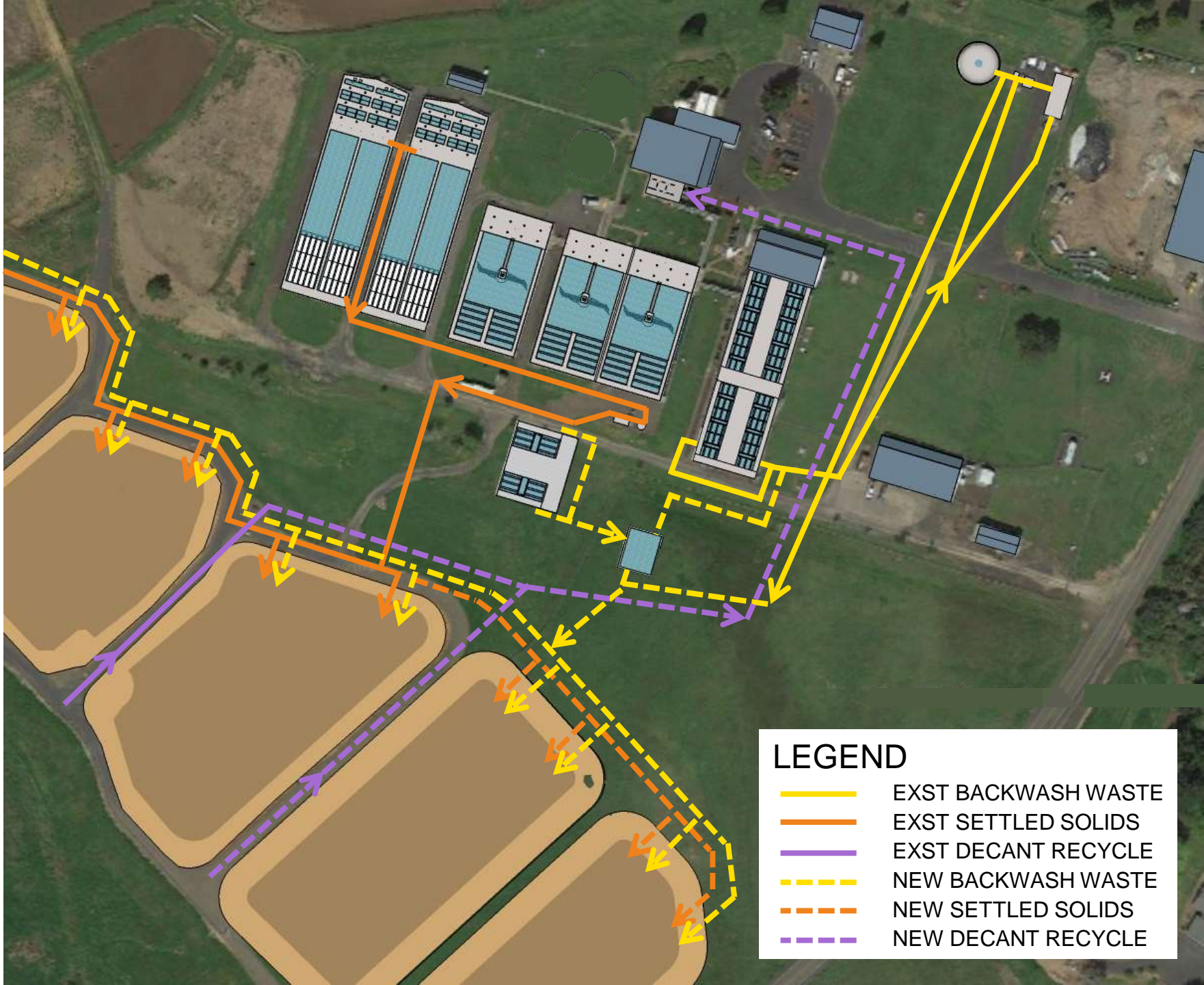
Opportunities

- New solids drying beds
- Improved solids handling system

Goals

- Enhanced solids settling
- Settling of waste washwater (backwash waste)
- Reduce decant recycle turbidity

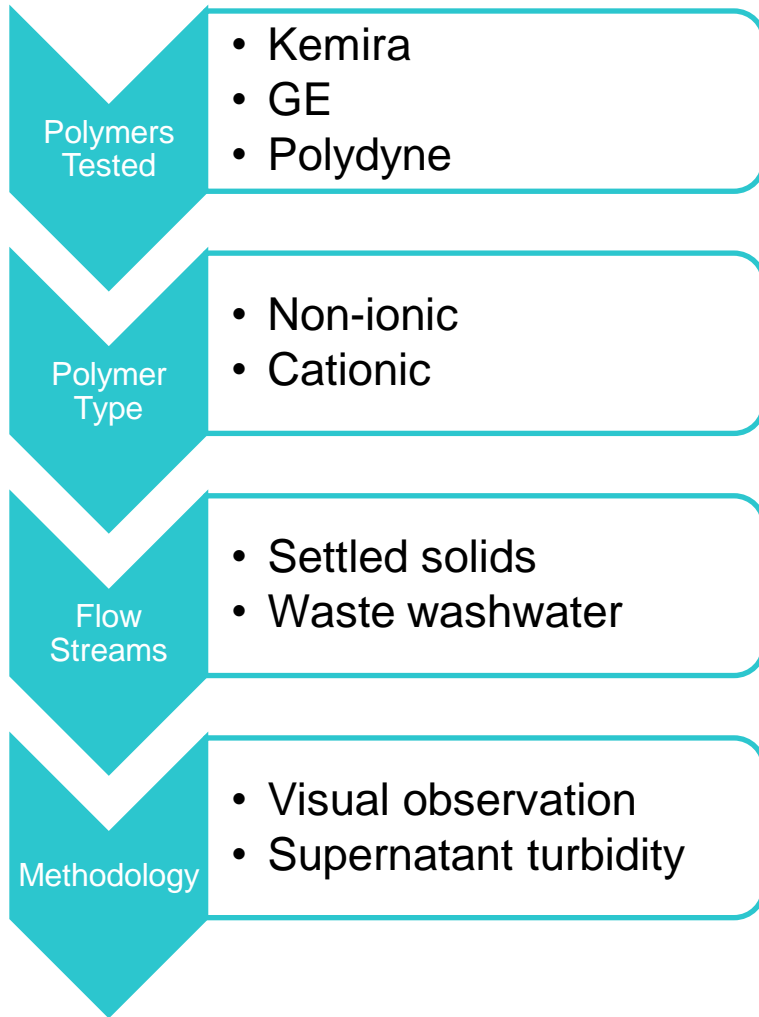
Solids Handling



LEGEND

- EXST BACKWASH WASTE
- EXST SETTLED SOLIDS
- EXST DECANT RECYCLE
- - - NEW BACKWASH WASTE
- - - NEW SETTLED SOLIDS
- - - NEW DECANT RECYCLE

Solids Polymer Bench Testing

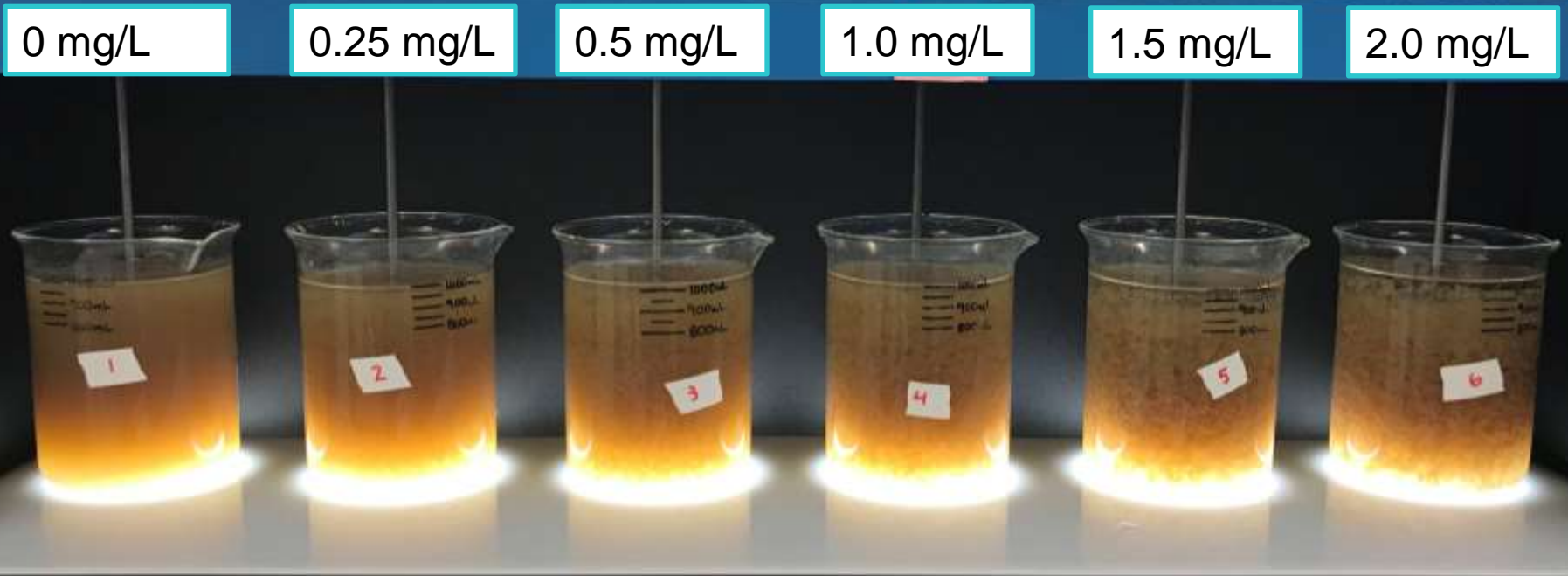


Solids Polymer Bench Testing



Solids Polymer Bench Testing

- Kemira N1986 non-ionic polymer
- Settled solids
- T = 30 sec



Solids Polymer Bench Testing

- Settled solids
- Kemira N1986 non-ionic polymer
- T = 2 min

0 mg/L

0.25 mg/L

0.5 mg/L

1.0 mg/L

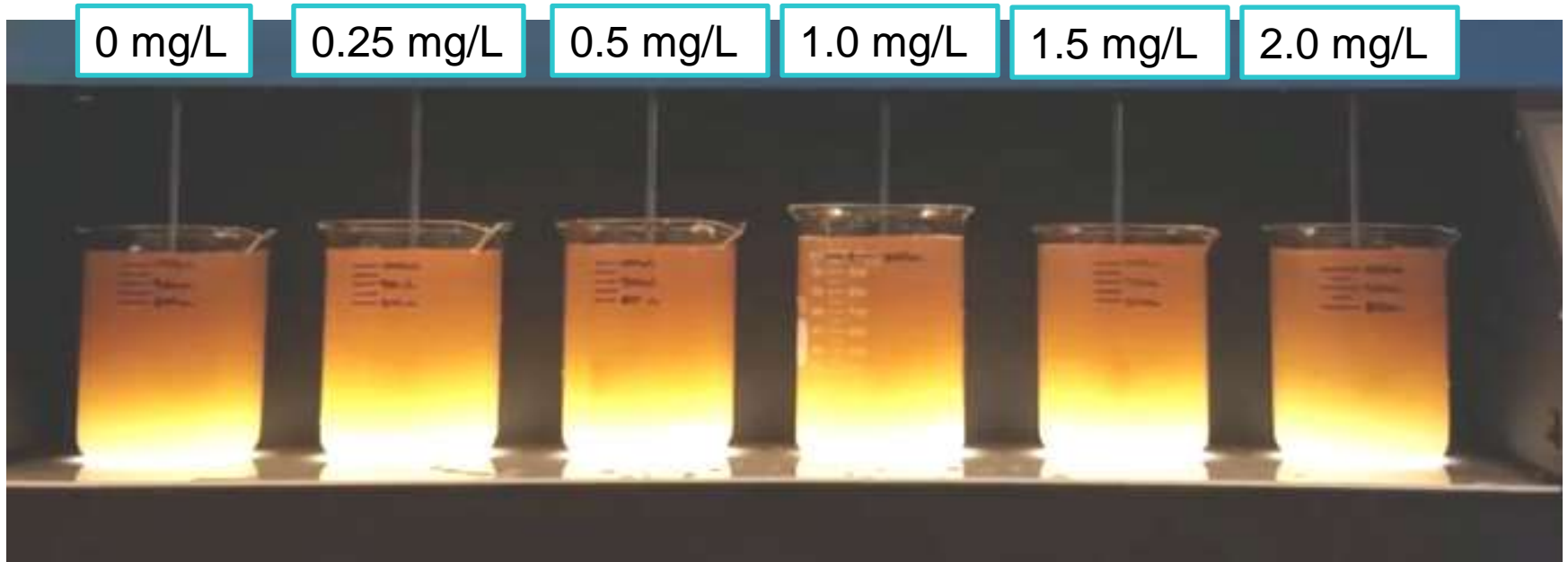
1.5 mg/L

2.0 mg/L





















Solids Polymer Bench Testing

- Waste washwater video
- Polydyne C6240 cationic polymer
- T = 0 - 5 min



Solids Polymer Bench Testing

- Waste Washwater Results

Polymer	Settling Speed	Supernatant Turb	Overall
None			
Kemira N1986 non-ionic, 0.5 mg/L			
Kemira C581 cationic, 1.5 mg/L			
GE AE1141P cationic, 1.0 mg/L			
GE CE1161P cationic, 1.0 mg/L			
Polydyne C6240 cationic, 1.0 mg/L			

Conclusions

Conclusions

- Filter approval to operate from OHA
- Polymer bench testing showing benefits to recycle water quality
- Additional coagulant aid polymer testing, may be able to use same polymer



Thank You

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May 2, 2018

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