

# **CHAMBERS CREEK REGIONAL WASTEWATER TREATMENT PLANT AND BIOLOGICAL NUTRIENT REDUCTION (BNR)**

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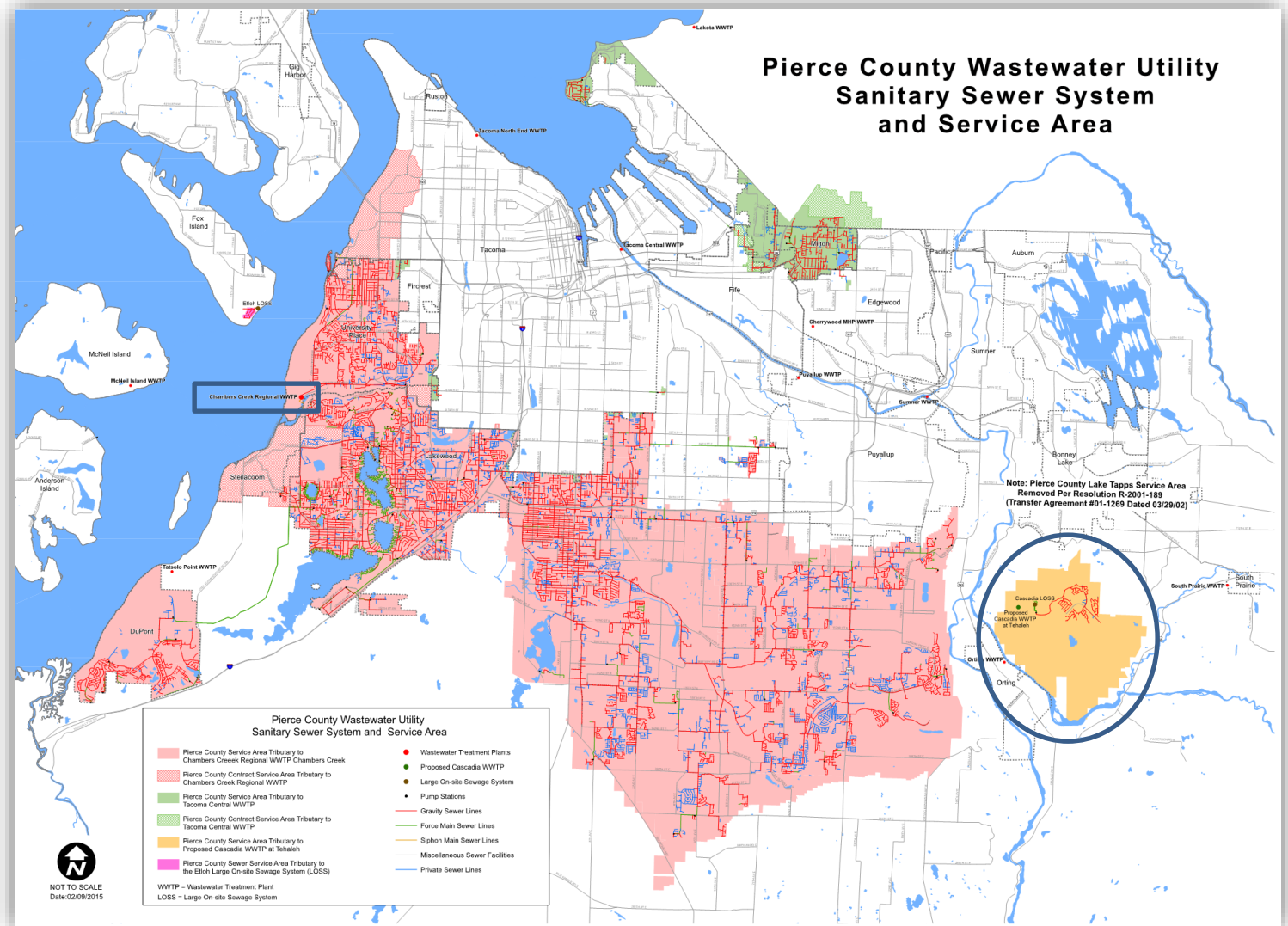
Pierce County Planning & Public Works—Sewer Division

- Chambers Creek Regional WWTP
  - Conventional Activated Sludge Secondary Treatment
  - Max Month Average Flow of 28.7 MGD
  - SoundGRO® Fertilizer
  - Gravity Flow
- Cascadia WWTP at Tehaleh
  - Advanced Secondary Treatment with Nitrogen Removal
  - Max Month Average Flow of 1 MGD
- Collections System



# Pierce County Sewer Service Area

- 117 Square Miles
- 66,539 Sewer Accounts

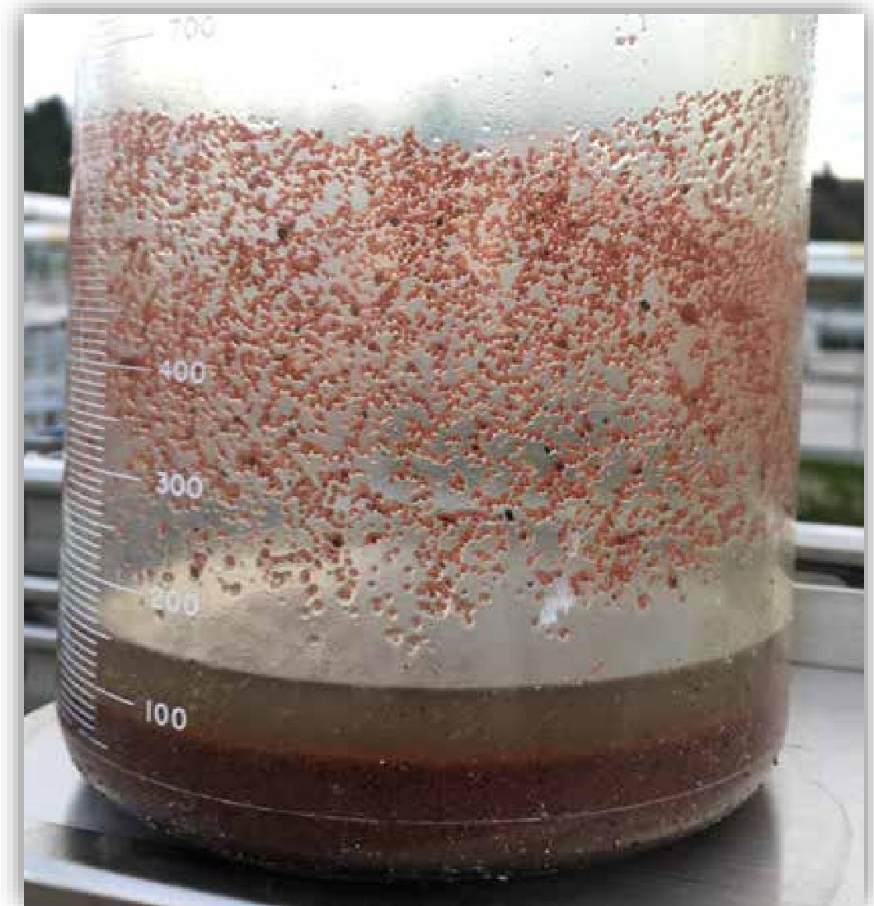


# Chambers Creek Regional WWTP Expansion

- Facilities Plan (2010-2040)
  - Phased Expansion
  - Capacity Driven
  - Phased Nitrogen Reduction
- Phase 1 Expansion (2015-2030)
  - Planning for the Future
  - Favorable Market Conditions
  - Construction Completed 2018
  - Increased Capacity ~15 MGD
  - Sidestream Treatment
- Phase 2 Expansion and Beyond

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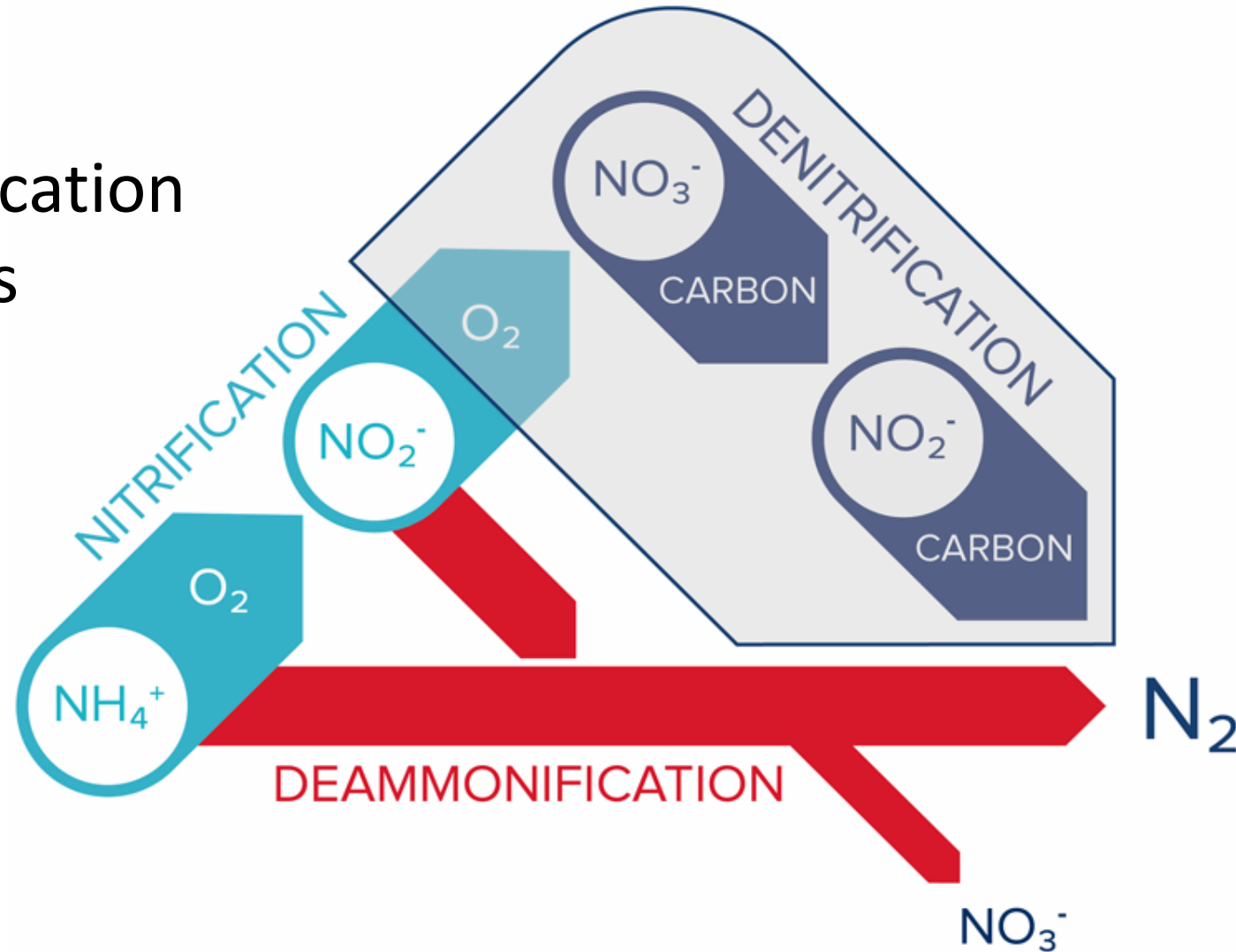
# Chambers Creek Regional WWTP Expansion – Ph 1



- Aeration Basin Construction
- Methanol System
  - Dilution System
  - Pump
  - Storage Tank
  - Distribution Panel
- Foam Fire Suppression System
- Additional Probes
  - Ammonia
  - Nitrate
  - pH
- Sidestream Treatment



## Deammonification Process





## Deammonification Process

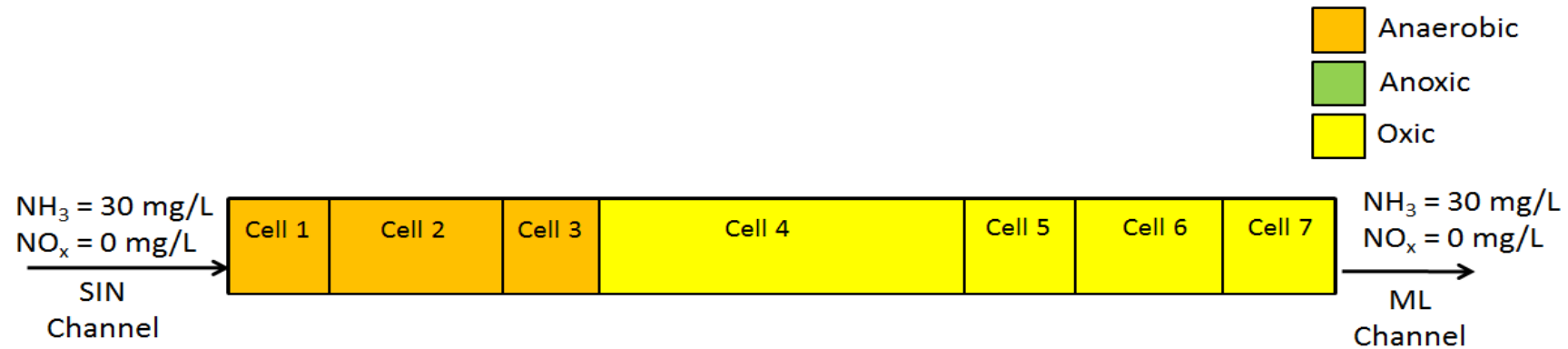




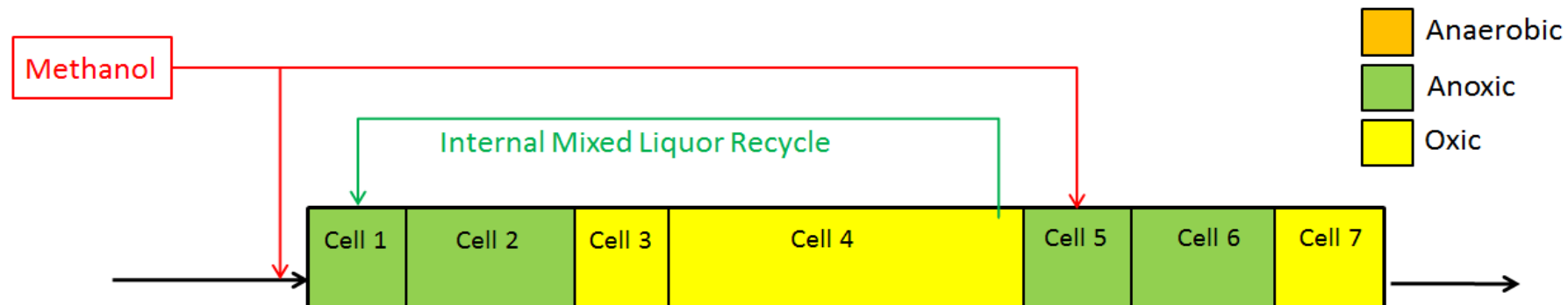
- The 2018 Effort Ended Prematurely
- The 2019 Effort is Currently Underway

- Strategy/Plan/Timeline
- Equipment
- Safety
- Purchasing
- Meetings
  - Process Control Workshops (Monthly)
  - Coordination Meetings (Weekly)
  - Morning Pass-Down Meetings (Daily)

## TSS & BOD Removal



## Nutrient Removal



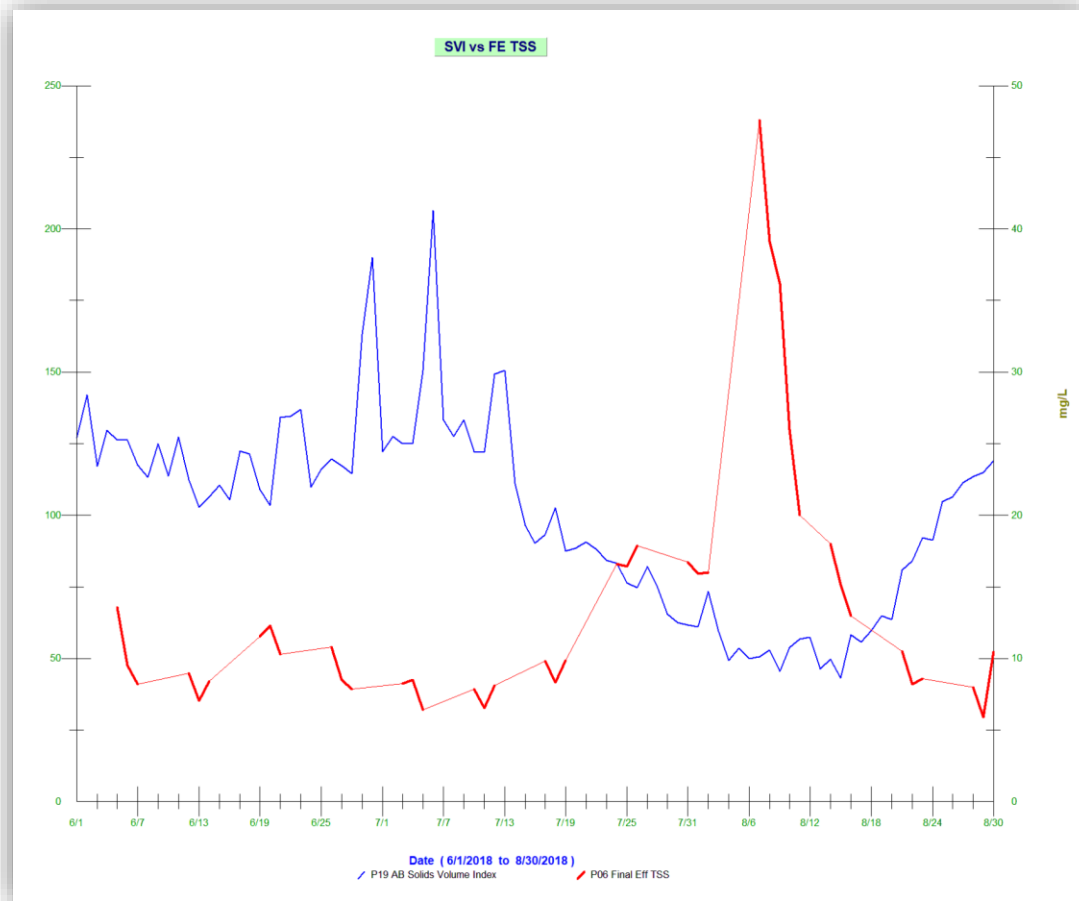
# Methanol Planning Effort 2018

- Fire Department
- Delivery and Spill SOP (LOTT)
- Dosing/Location
- Testing System
- Staff Perception
- Safety Meetings



# Conclusion of 2018 Effort

## August 9, 2018



	Suspended solids		BODs	Aeration Basins		
	3921	3923	3911	23051	20710	3429
DATE	SS mg/L	SS % REM	CBOD mg/L	SVI	30 Min SSV	MLSS (ops)
08/01	15.9	94.9	11.0	61	100	1,640
08/02	16.0	94.0	10.2	73	110	1,500
08/07	<b>47.6</b>	<b>83.9</b>	<b>20.9</b>	<b>51</b>	<b>90</b>	<b>1,780</b>
08/08	<b>39.1</b>	<b>89.8</b>	<b>20.1</b>	<b>53</b>	<b>90</b>	<b>1,700</b>
08/09	<b>36.2</b>	<b>86.6</b>	<b>18.7</b>	<b>45</b>	<b>80</b>	<b>1,760</b>
08/10	26.0	92.1	19.0	54	115	2,140
08/11	20.0	92.9	16.0	57	160	2,820
08/14	18.0	94.2	17.0	50	150	3,020
08/15	15.2	95.8	12.5	43	140	3,240
08/16	13.0	93.7	11.6	58	140	2,400
08/21	10.5	96.5	13.8	81	160	1,980
08/22	8.2	97.0	9.5	84	180	2,140
08/23	8.6	96.9	8.8	92	190	2,060
08/28	8.0	97.6	10.1	113	245	2,160
08/29	5.9	97.6	9.8	115	260	2,260
08/30	10.5	95.4	11.3	119	255	2,140

# Concerns

- Permit No. WA0039624
- Total Suspended Solids
  - 45 mg/L Weekly
  - 30 mg/L Monthly
- Methanol to Cell 3
- Polymer to MLSS
- Baby Step-Feed



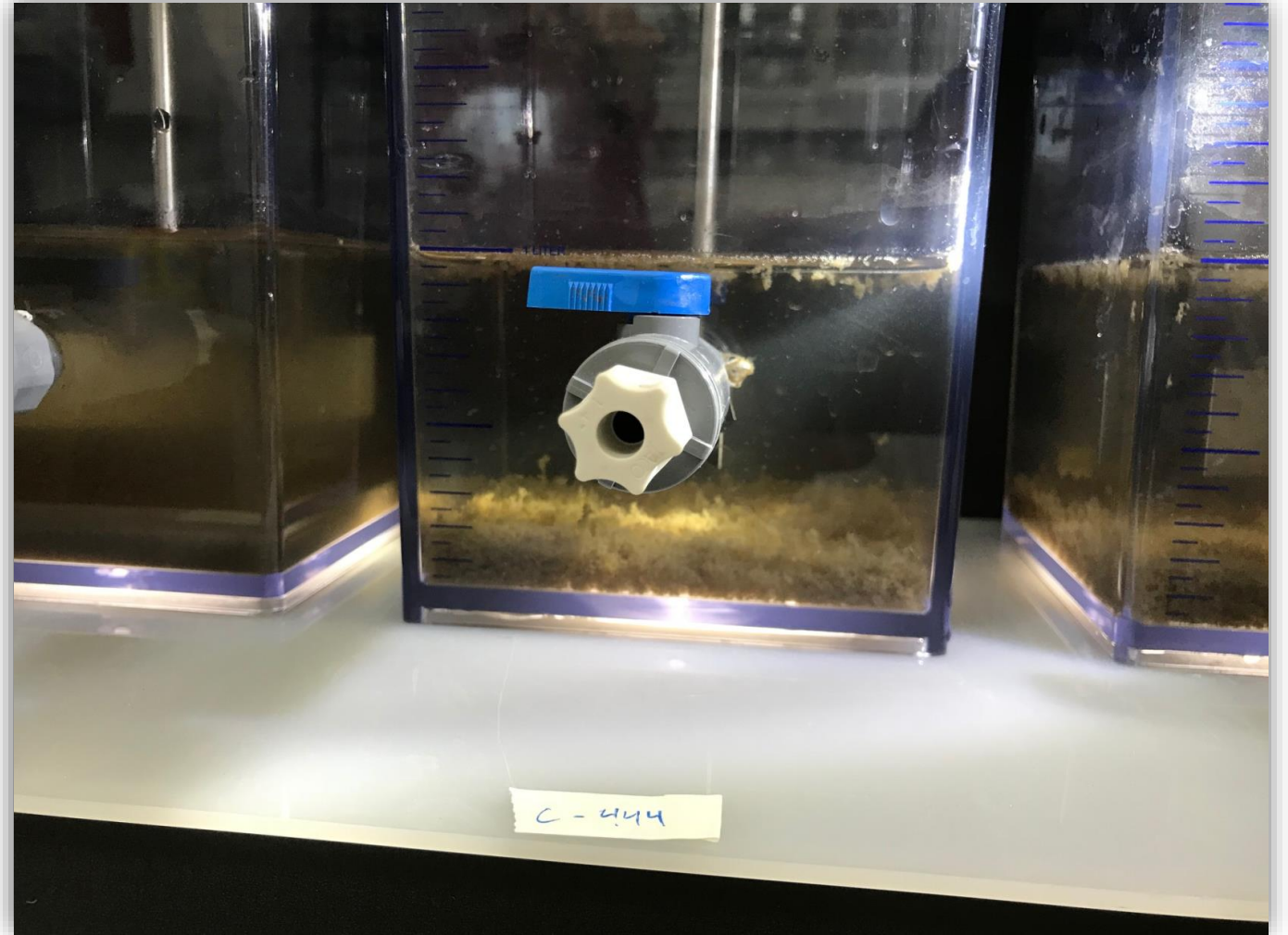
- Primary Clarifiers
- Polymer/Pac System
- Probes and Nitrate Interference
- Rotary Drum Thickener (RDT) “**Junk Pounds**” – Registered Trademark
- Phosphorous Accumulating Organisms (PAOs) – Lost Solids
- Biosolids Impacts
- Methanol Pump Turndown



# Primary Clarifiers



# Polymer/PAC System



# Probes and Nitrate Interference

## Nitrate Probe Method



## Colorimetric Nitrate Method

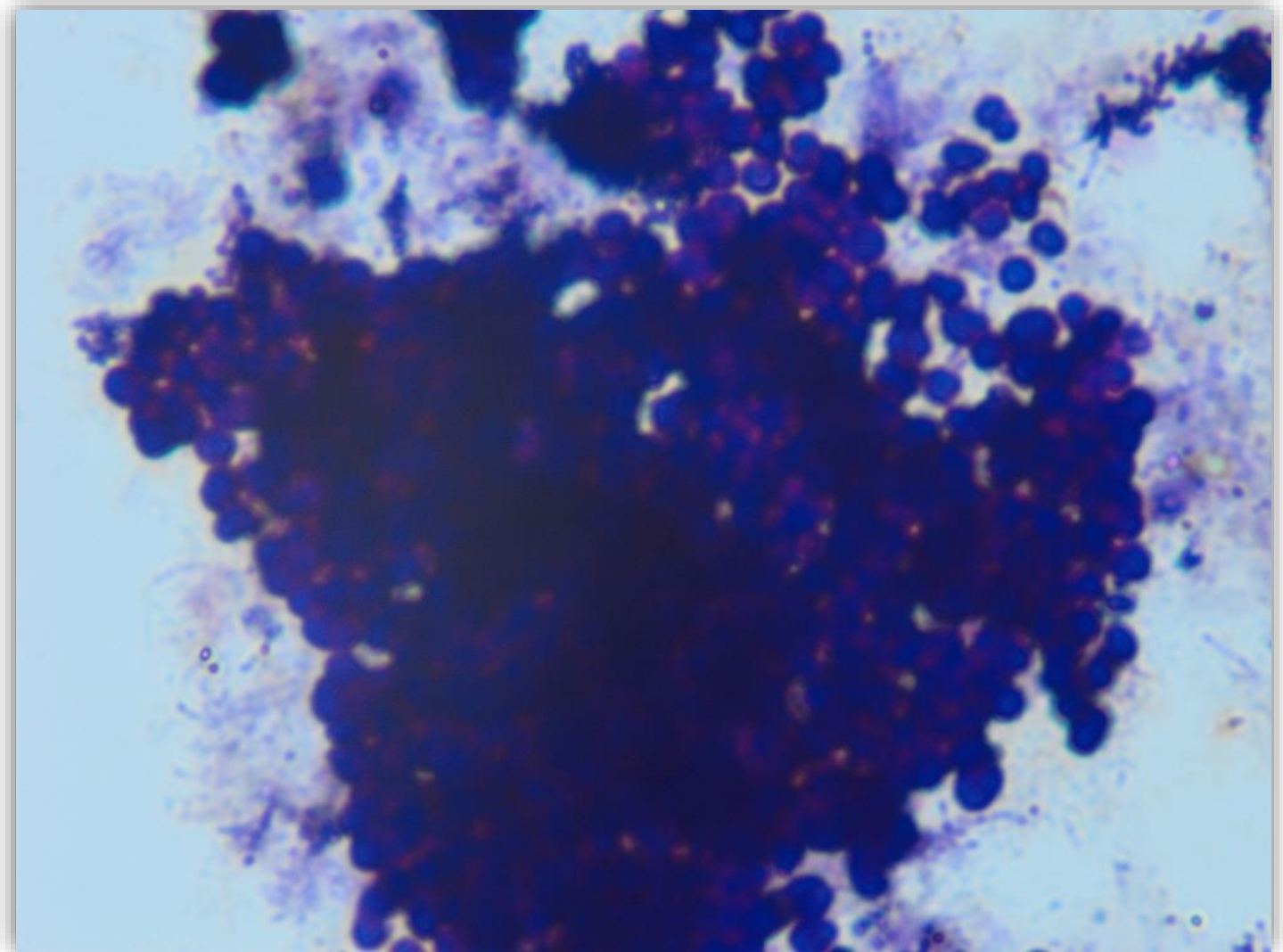


# Rotary Drum Thickeners



# Phosphorus Accumulating Organisms

- Biological Phosphorus Removal
- Anerobic Conditions
- SoundGRO<sup>®</sup>  
Guaranteed Values



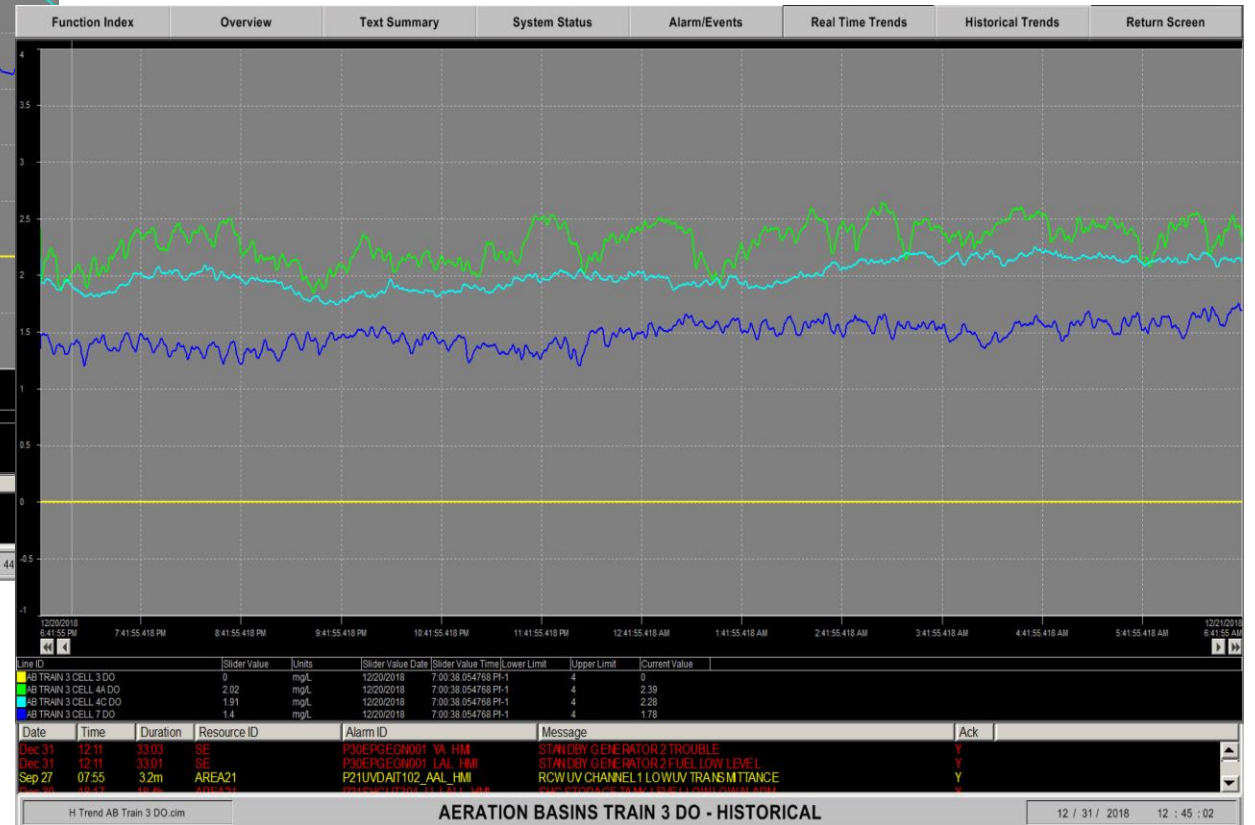
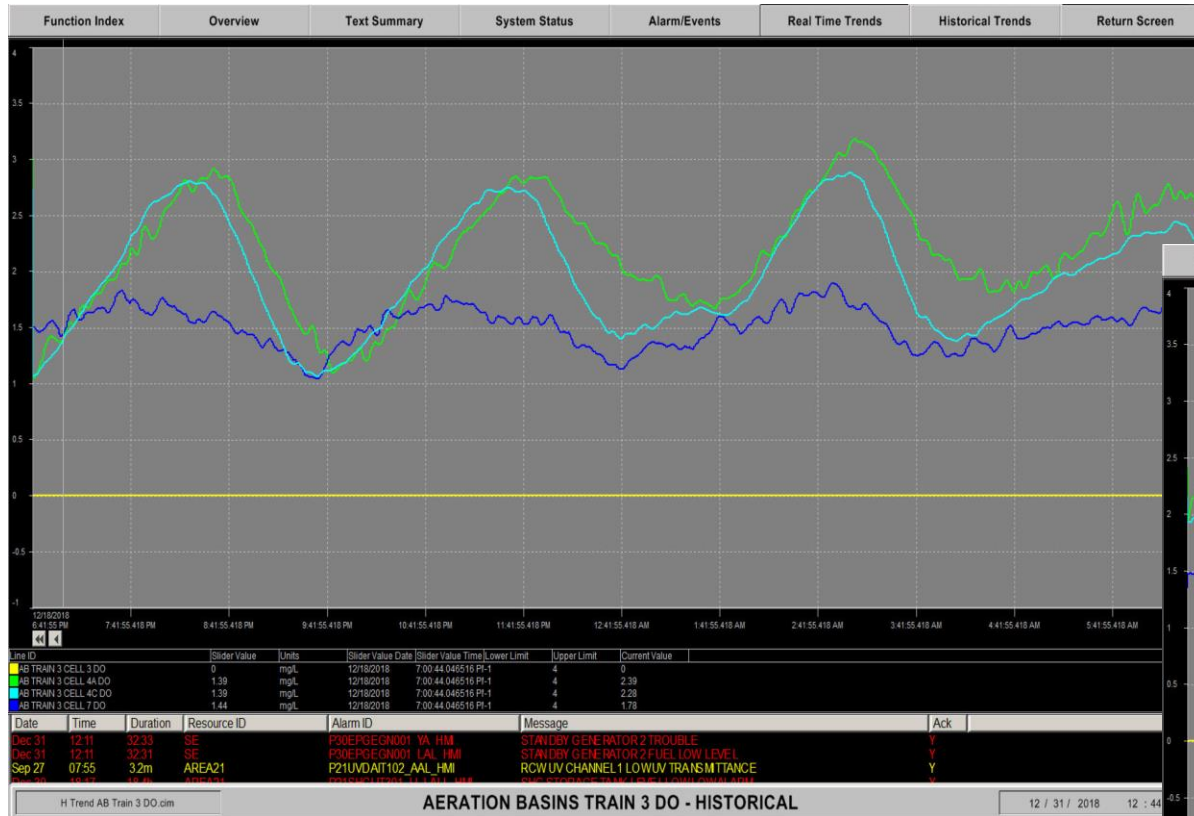
# Projects for 2019 Study

- Off-Gas Testing
- Air-Flow Control Programming
- Equipment Changes
- Hauling Biosolids

# Off-Gas Testing



# Air Flow Control Strategy

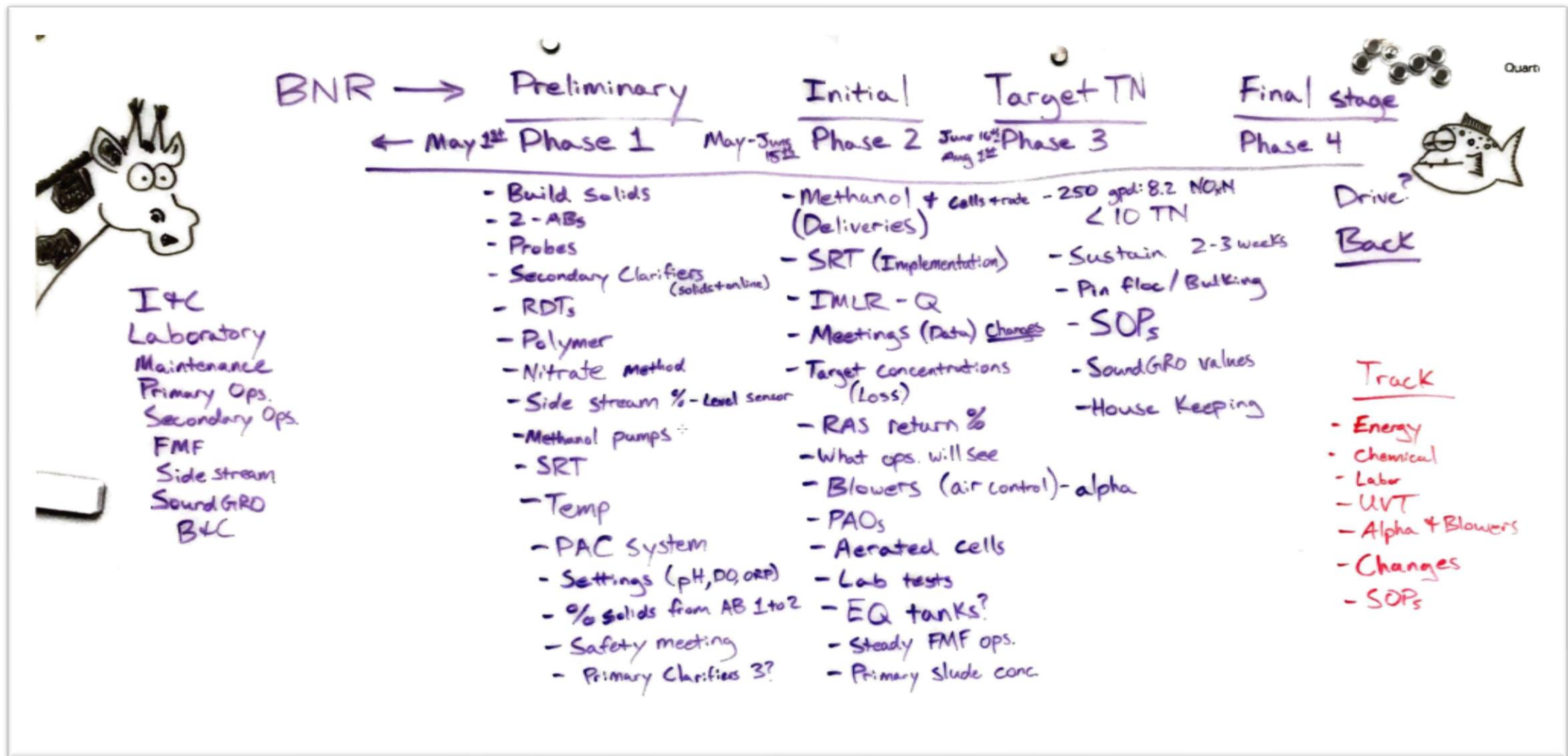


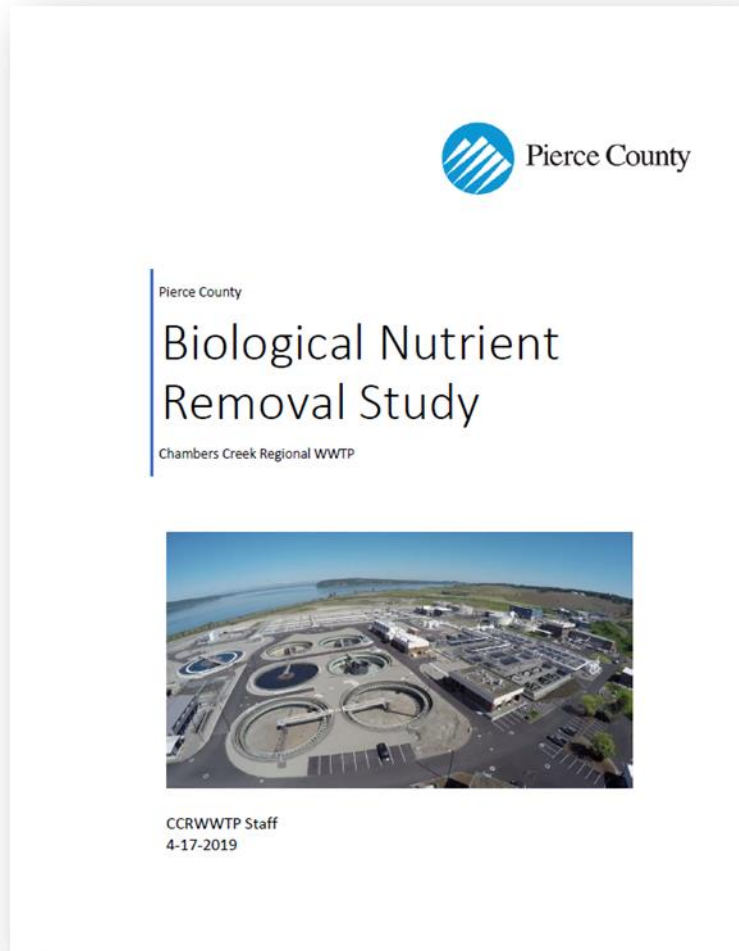


# Air Flow Control Valve Adjustments

- Programming Changes
- Response Time
- DO Setpoints







- Phase 1 – Preliminary Actions  
(Before May 1, 2019)
- Phase 2 – Implementation  
(May 1<sup>st</sup> – June 15, 2019)
- Phase 3 – Target Total Nitrogen  
(June 15<sup>th</sup> – August 1, 2019)
- Appendix A – Roles and Responsibilities
- Appendix B – Contact List
- Appendix C – Tracking Parameters
- Appendix D – Biosolids Management Plan

# Phase 1 – Preliminary Actions (Before May 1<sup>st</sup>)

- Build Solids Concentration
- Bring AB # 1 Online (Programming)
- Sludge Retention Time
- Resolve Issues
- Tanks Online (Primary and Secondary)
- Test Equipment  
(Probes, Methanol System, Poly/PAC, IMLR Pumps, Valves, Diffusers)
- Class B Hauling



## Phase 2 - Implementation

- Dosing Rates/Location  
(SIN Channel and Second Anoxic)
- Operational Setpoints/Probes/Equipment
- Chemical Delivery Schedule
- Additional Laboratory Testing
- Conditional Troubleshooting
- Internal Return Pumping
- SoundGRO<sup>®</sup> Customers
- Anammox Receiving 100% of Centrate  
(Alkalinity Concerns)



# Phase 3 – Target Total Nitrogen

- Target Total Inorganic Nitrogen Level of 10 mg/L
- Sustain Levels for 2 - 3 Weeks



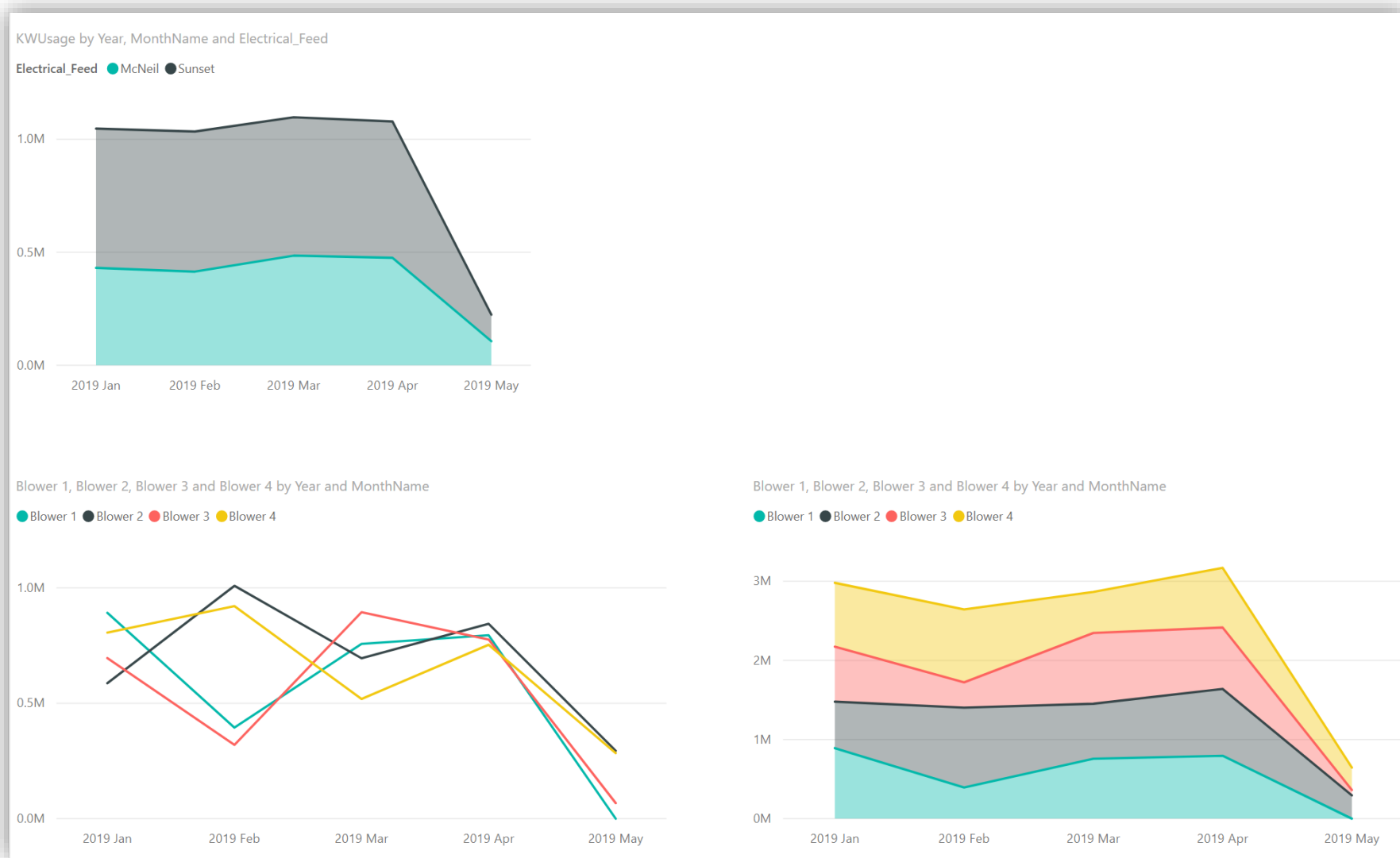
- Operations Manager/Supervisors
- Operations Staff (fixed positions)
- Maintenance Staff
- Laboratory Staff
- Engineering (County and Brown and Caldwell)
- Planning Staff

# Tracking Parameters/Goals

- Create a Repeatable Process
- Develop Standard Operating Procedure (SOPs)
- Track Costs (Power, Labor, and Chemicals)
- Chemical Usage for Contracting (Mag, Polymer, Methanol)
- Testing



# Power Business Intelligence (BI) Reports (Metrics)



# Power Business Intelligence (BI) Reports (Metrics)



# Chemical Addition

## Polymer



## Methanol



## Magnesium Hydroxide



Planned as part of the expansion project

Unplanned

# Biosolids Management- SoundGRO®

- Customer Impacts
- Guaranteed Values
  - Total Nitrogen .....5%
  - Total Phosphorus .....5%
  - Total Potassium .....0%



## SoundGRO® Uses

1 pound of SoundGRO® = approximately 3 cups



Trees - Apply 5 lbs for every inch of the tree's diameter measured 4 feet from the ground. Apply under drip line or outer circumference of the tree.



Shrubs- Spread 4 lbs per 100 square feet on shrub beds.



Vegetable Gardens - Mix 3 lbs per 100 square feet into bedding soil in spring.



Annuals - Mix 3 lbs per 100 square feet into flower bed soils in spring.



Perennials - Mix 5 lbs per 100 square feet into the flower bed soils in spring.



Grass - When planting new grass or repairing lawns, apply 20 lbs per 1,000 square feet during the first growing season.

# Class B Hauling

## Kissler Trucking



## Boulder Park Project



# Current Challenges of 2019 BNR Effort

- Chemical cost
- Methanol concerns
- Capital/Operational Cost
- Safety
- Technical Expertise (Staff)
- Level of Lab Needs
- Permit Violation
- Process/Product Impacts



***Not as easy as turning on a light switch***

# Next Steps

- Ongoing phased improvements to the facility
- Update to the Unified Sewer Plan
- Biosolids/Biogas/Biological Nutrient Reduction Planning

## Understanding the Ripple Effects





## Key concepts and Continuing Analysis



# THANK YOU

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