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

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Pierce County Planning & Public Works—Sewer Division
Pierce County Sewer System

• 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
Chambers Creek Regional WWTP Expansion

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Chambers Creek Regional WWTP Expansion – Ph 1
BNR Infrastructure

- 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

NITRIFICATION

O₂

NO₂⁻

NH₄⁺

DENITRIFICATION

O₂

NO₂⁻

NO₃⁻

DEAMMONIFICATION

N₂

CARBON

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6/4/19
Sidestream Treatment

Deammonification Process
Chambers Regional WWTP Nutrient Reduction Efforts

• The 2018 Effort Ended Prematurely
• The 2019 Effort is Currently Underway
Planning Effort 2018

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

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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
Lessons Learned 2018

• 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® Guaranteed Values
Projects for 2019 Study

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

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Air Flow Control Valve Adjustments

- Programming Changes
- Response Time
- DO Setpoints
BNR Kickoff Meeting 2019

I+K
Laboratory Maintenance
Primary Ops.
Secondary Ops.
FMF
Side stream
SoundGRO
B+L

BNR → Preliminary

Initial Phase 2
May 3rd
- Build Solids
- 2-ABs
- Probes
- Secondary Clarifiers (solidation)
- RDTs
- Polymer
- Nitrate method
- Side stream % level sensor
- Methanol pumps
- SRT
- Temp
- PAC system
- Settings (pH, DO, etc)
- % solids from AB 1 to 2
- Safety meeting
- Primary Clarifier 3?

Target TN Phase 3
May 3rd
- Methanol + cells (Deliveries)
- SRT (Implementation)
- IMLR-Q
- Meetings (Task) Changes
- Target concentrations (losses)
- RAS Return %
- Blowers (air control) - Alpha
- PAOs
- Aerated cells
- Lab tests
- EQ tanks?
- Steady FMF Ops.
- Primary sludge conc.

Final Stage
- Drive
- Back

Final Stage
- SOPs
- SoundGRO values
- House Keeping

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BNR PLAN

• Phase 1 – Preliminary Actions
  (Before May 1, 2019)

• Phase 2 – Implementation
  (May 1st – June 15, 2019)

• Phase 3 – Target Total Nitrogen
  (June 15th – 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 1st)

• 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® 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
BNR Team

• 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.

- Shrub: 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
Next Steps

Understanding the Ripple Effects
Next Steps

Key concepts and Continuing Analysis
THANK YOU

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