Optimization of Oxidation Ditch Aeration for Nutrient Removal and Energy Efficiency
Today’s Topics

• Wastewater Aeration Optimization
  – Mussels & Mel
  – Proof of Concept
  – System Design
  – Results
Mussel Matters

Photo courtesy of Jon vanDommelen
How is Nitrate Removed from Water?
Nitrate Removal
Energy Usage Reduction

Monitoring System Deployed on Feb. 29

2016
2015

Continuous

Daily

839 kWh / mil. gal.

1,033 kWh / mil. gal.

42.4 kW
38.1
32.8
31.3

26.1% Reduction in Demand
Process Monitoring System
Control System
Aeration Control Strategy

- **Ax Zone**
  - NH$_3$ SP: 14 mg/L

- **Ox Zone**
  - NH$_3$ SP: 0.6 mg/L

- **DO max in Ox zone:** 2.5 mg/L

- **Supersede NH$_3$ SP:** 1.4 mg/L
Daily Operation
High Load Conditions
Final Effluent (Outfall 001)
Energy Usage Reduction

The bar graph shows the billed electricity consumption (kWh) from November to June for two periods: 'After Project' and 'Before Project'. The graph indicates a reduction in energy usage after the project was implemented.
Effluent Quality Improved / Operating Costs Reduced

• Effluent NOx reduced by 40% despite increased loading
• Ox ditch energy consumption reduced by 17%
  – Energy intensity reduced to 900 kWh / MG treated
• Denitrification in clarifiers eliminated
• Automation project cost minimized by doing work in-house - $38,384 Total
• Online monitoring improves decision-making
• Monitoring system O&M: 1 to 3 hr. / week
• Will apply concepts and lessons learned to optimization of extended aeration train
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Photo courtesy of Josh Holton, May 9, 2018