Not your typical fine bubble retrofit: Midwest Cheese producer improves efficiency and performance with an aeration system overhaul.

Wisconsin Wastewater Operators Association
2013 Annual Conference
Stevens Point, WI

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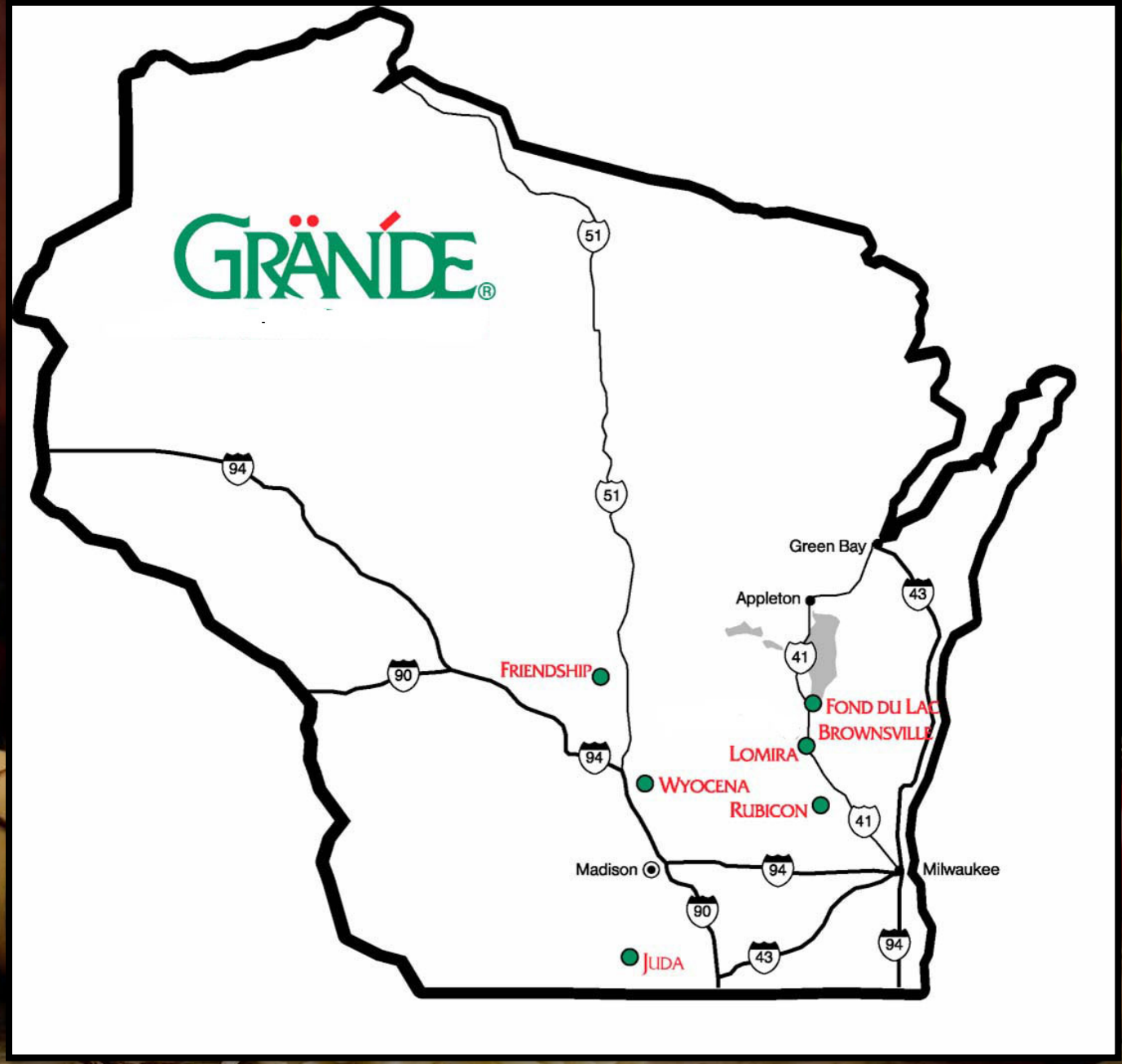
What We Will Be Covering

- Introduction to Grande Cheese Company
- Introduction to the Anaerobic Digester Project
- Treating Digester Effluent
  - Aeration Challenges
  - New Design
  - What Makes This So Unique?
- Summary of the Results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Grande Cheese Company - Brownsville, WI

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Anaerobic Digester Project - Goals

- Eliminate hauling and land application of HSW
- Anaerobically digest HSW and produce biogas
  - Utilize biogas as a renewable fuel
- Treat digester effluent in existing aerobic treatment system
- Improve phosphorus removal
- Add post aeration of effluent
- Reduce our carbon footprint

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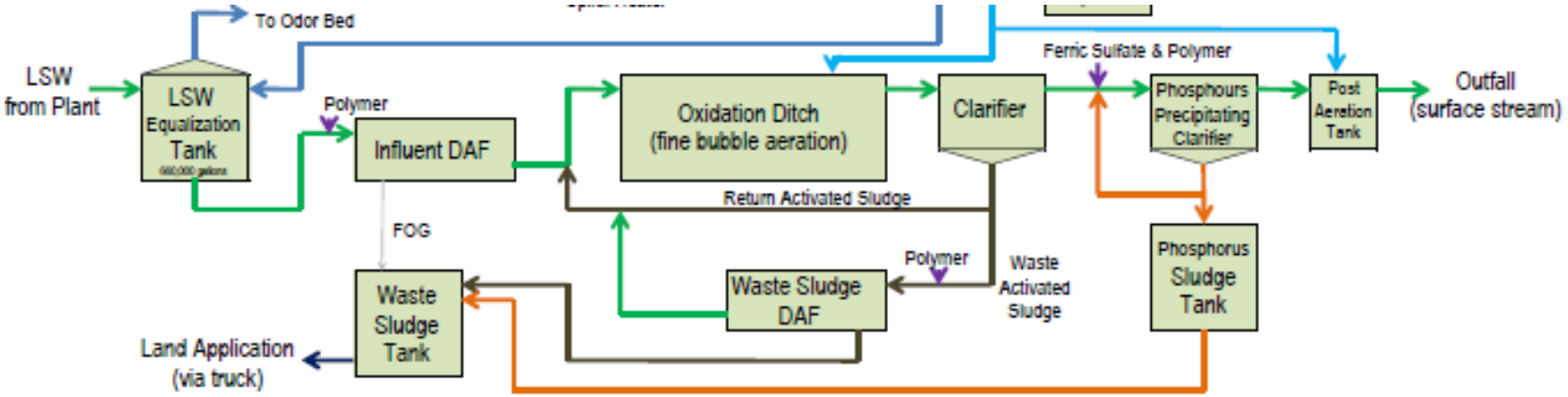
New WWT Process Flow Diagram



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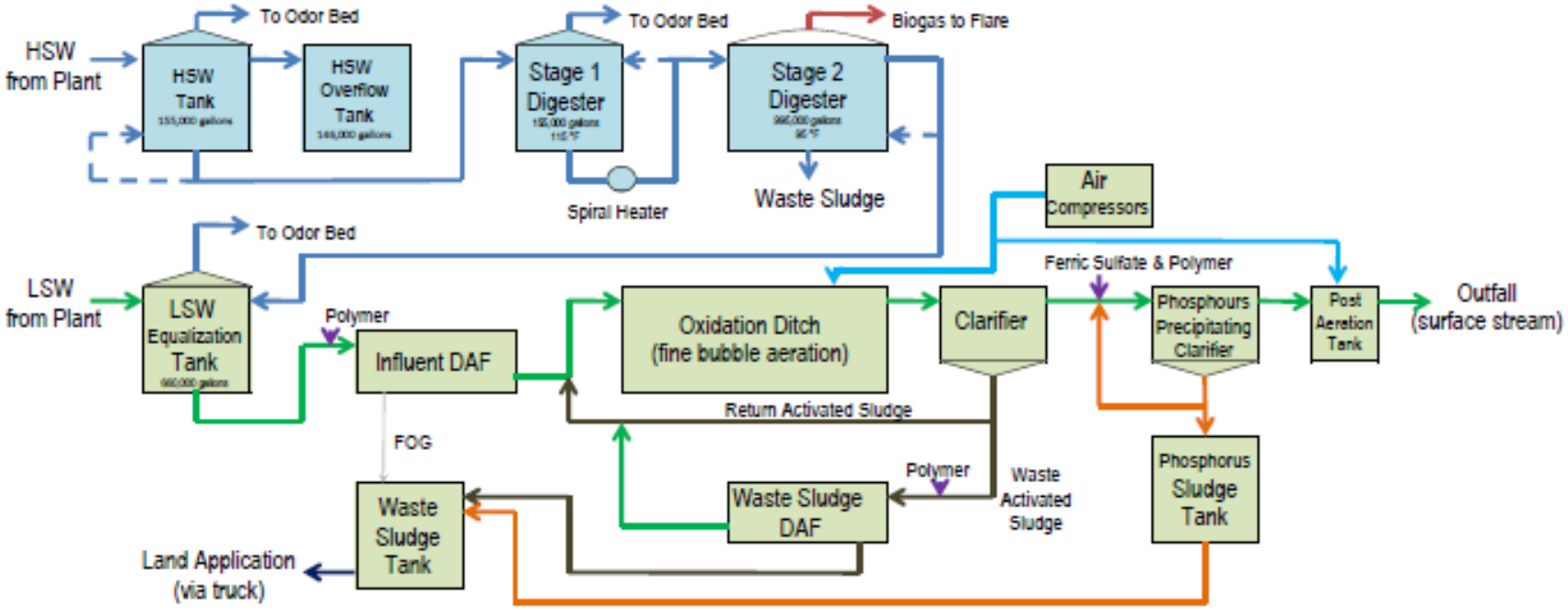
New WWT Process Flow Diagram



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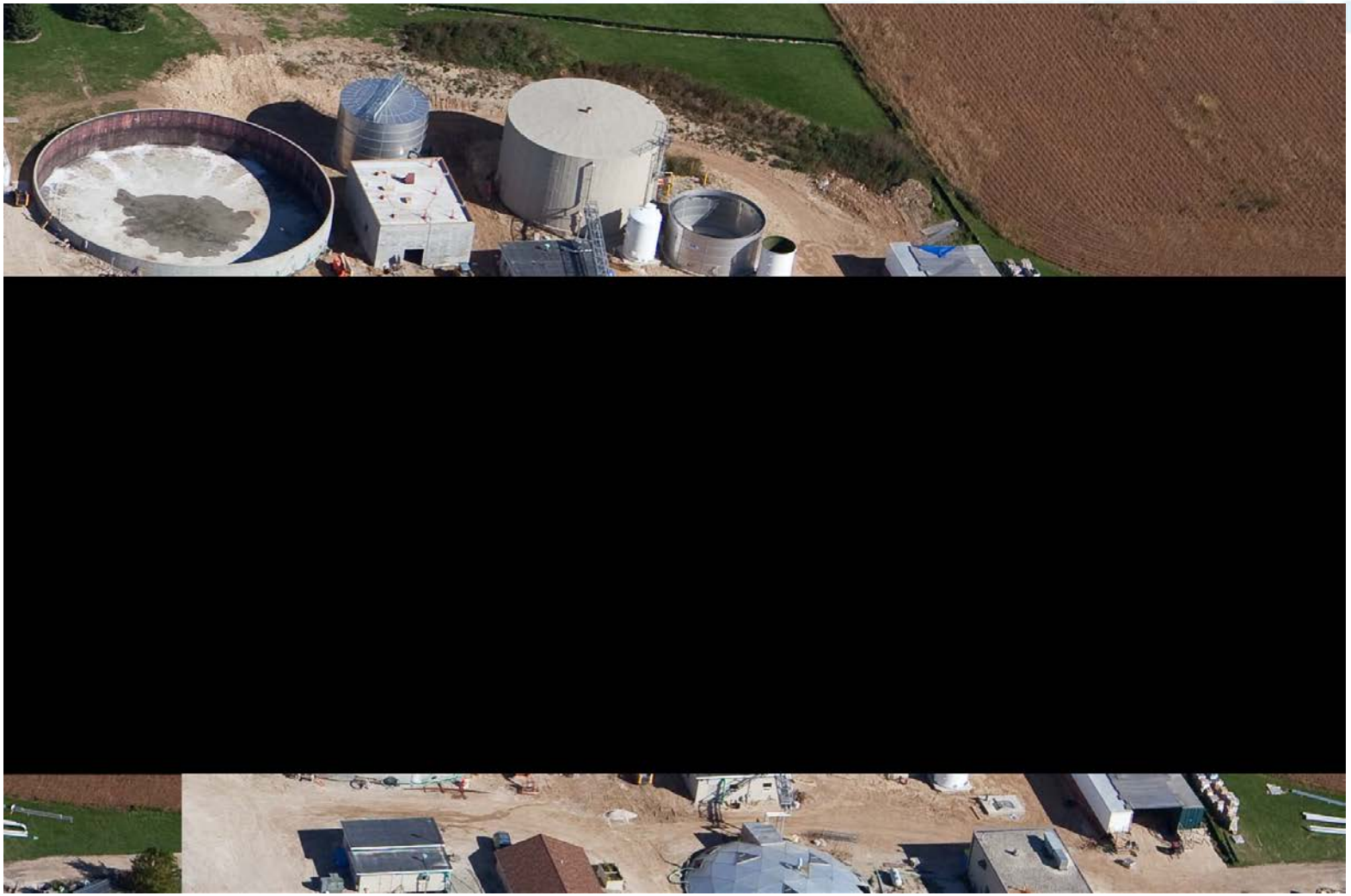
Wastewater Treatment – During Construction



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Wastewater Treatment – Post Construction

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Treating Digester Effluent in the Existing Aerobic Treatment System - Challenges

- Significant increase in influent organic loading
  - Oxygen demand increased to 98% above design
  - Supplemental aeration added in summer
- Poor dissolved oxygen control
- Cooling and drift issues with existing splash aeration
- Repairs, maintenance and energy with splash aeration
- Must keep system in service
- Site limitations

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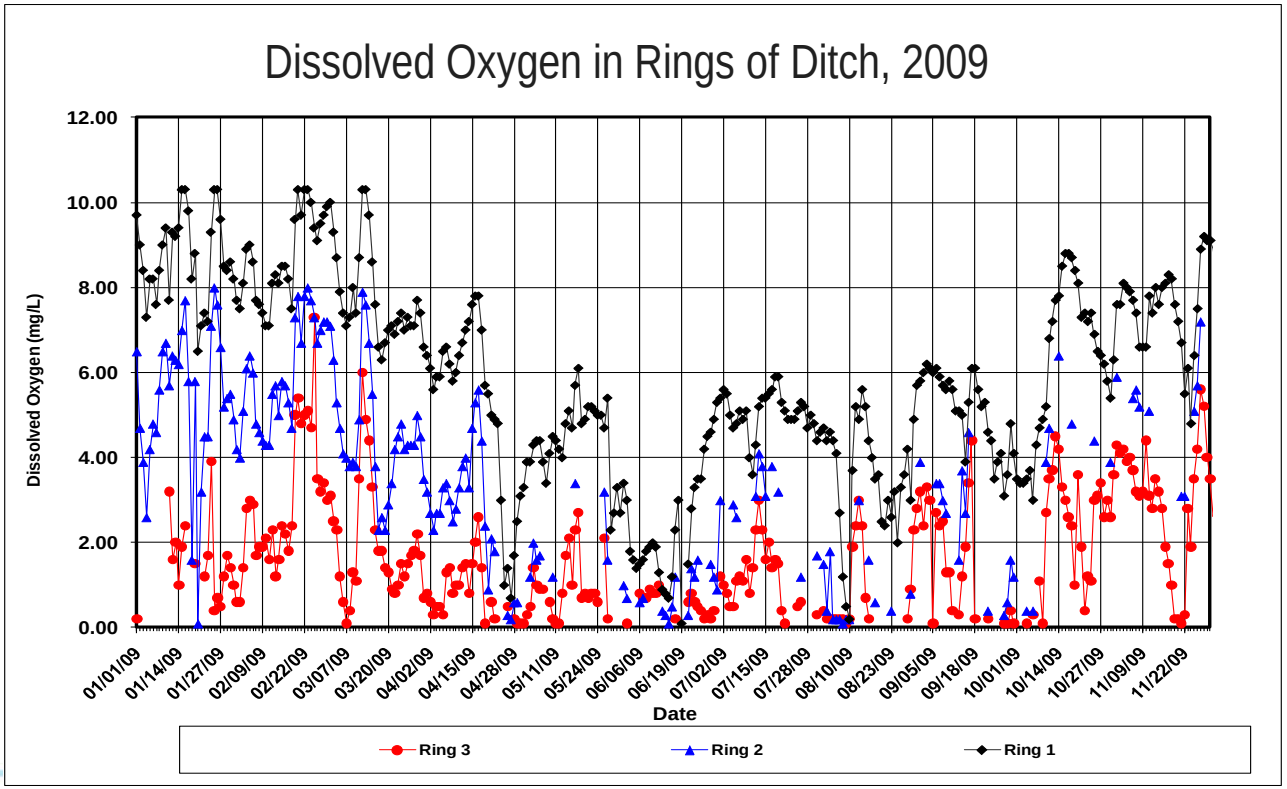
Disk Type Splash Aeration

Ring	Number of Disks
3	108
2	40
1	35
Total	183

Disk Type Aeration

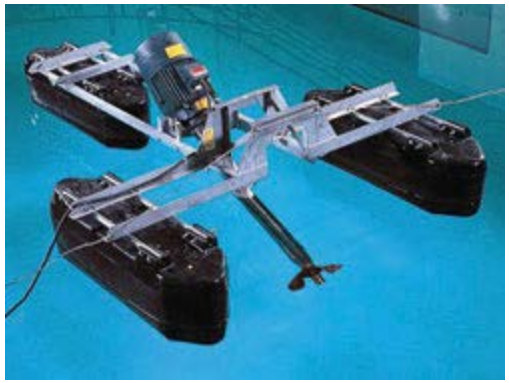
Additional aeration added in 2010 to try to help the oxygen shortage.

New loading required 904 Lbs O2/hr vs. 457 Lbs O2/hr of existing equipment (clean water).



Clearly need more Oxygen, but how?

- Add disks
  - Number of disks needed almost double current number
  - Significant increase in HP
- Alternative mechanical systems
  - Significant increase in HP
- Fine Bubble
  - Solids movement in the ditch?
  - Installation challenge?
  - Air compression?
  - Potential of little if any increase in HP



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What Made This Project Unique? - Design

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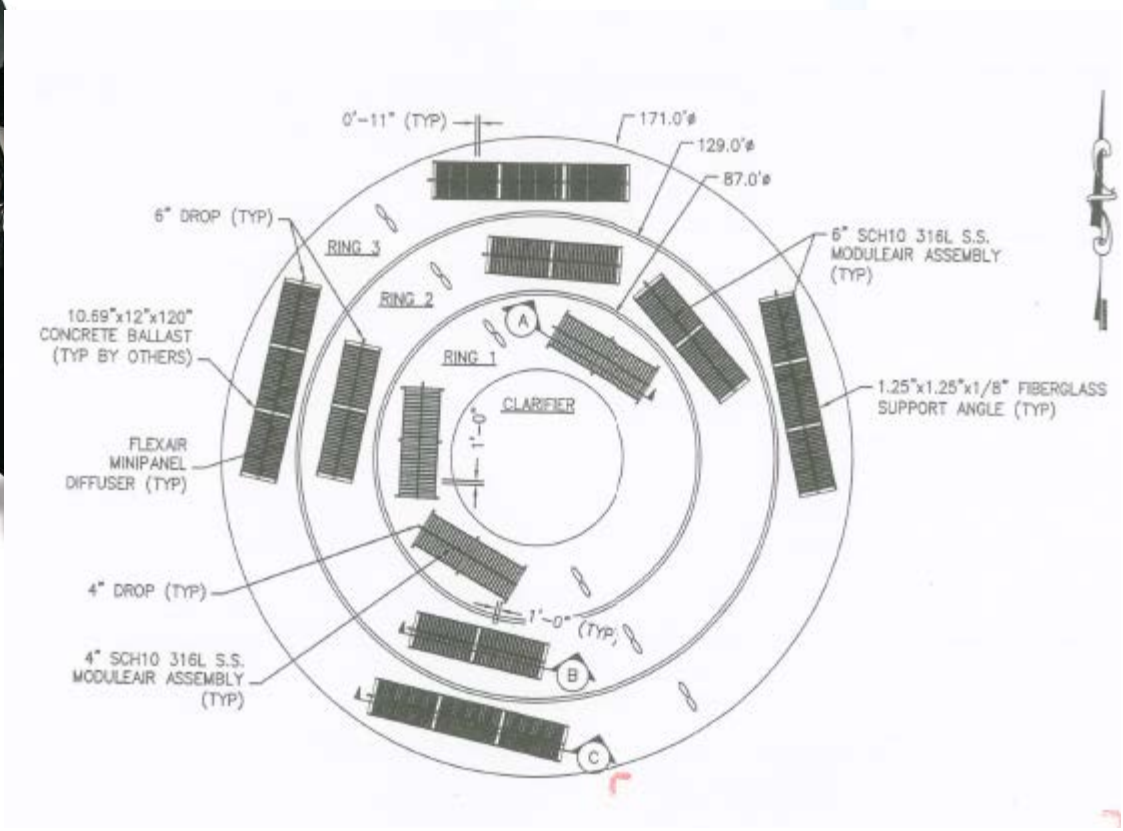

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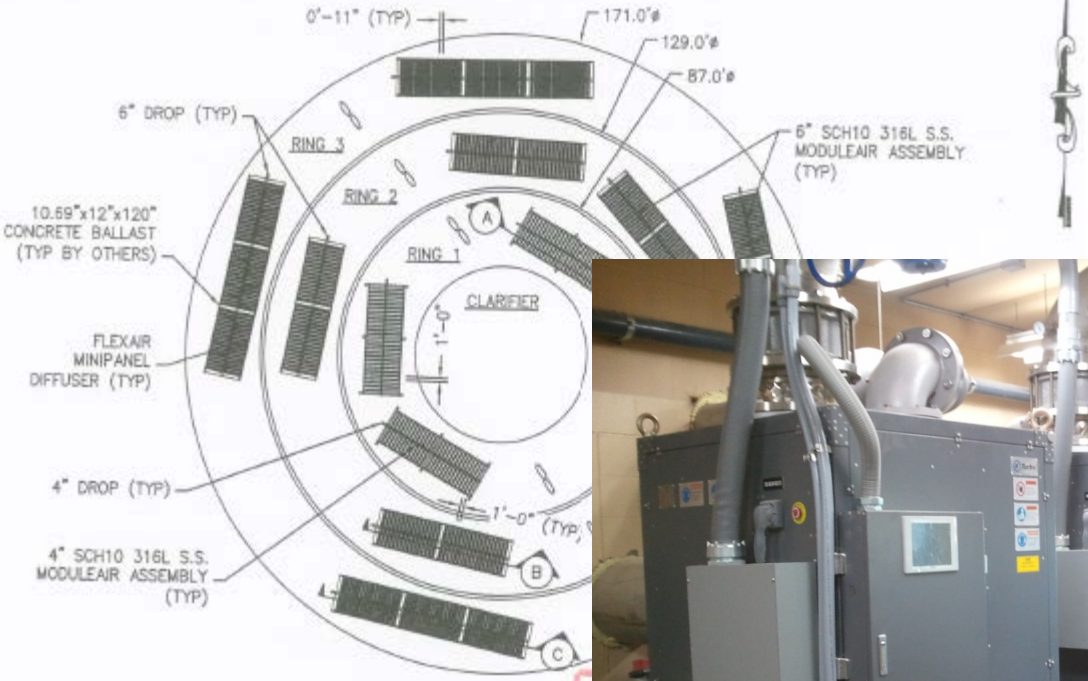
What Made This Project Unique? - Design



What Made This Project Unique? - Divers

- Removed underwater obstructions
- Installed supports for mixers

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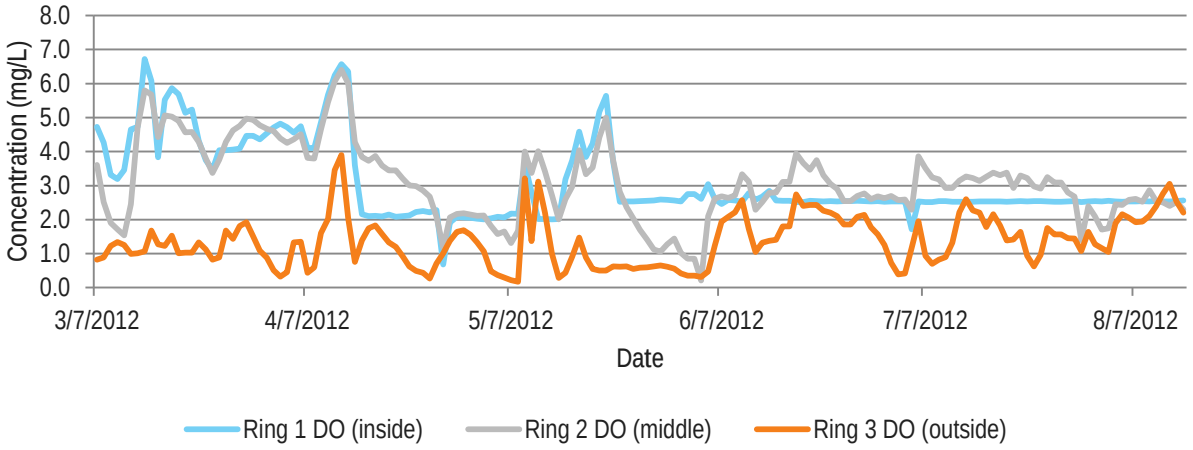
What Made This Project Unique? - Installation

Results

Aeration installation completed in 11 days once obstructions in rings were removed.

Figure 4: Grande Cheese Dissolved Oxygen Concentration



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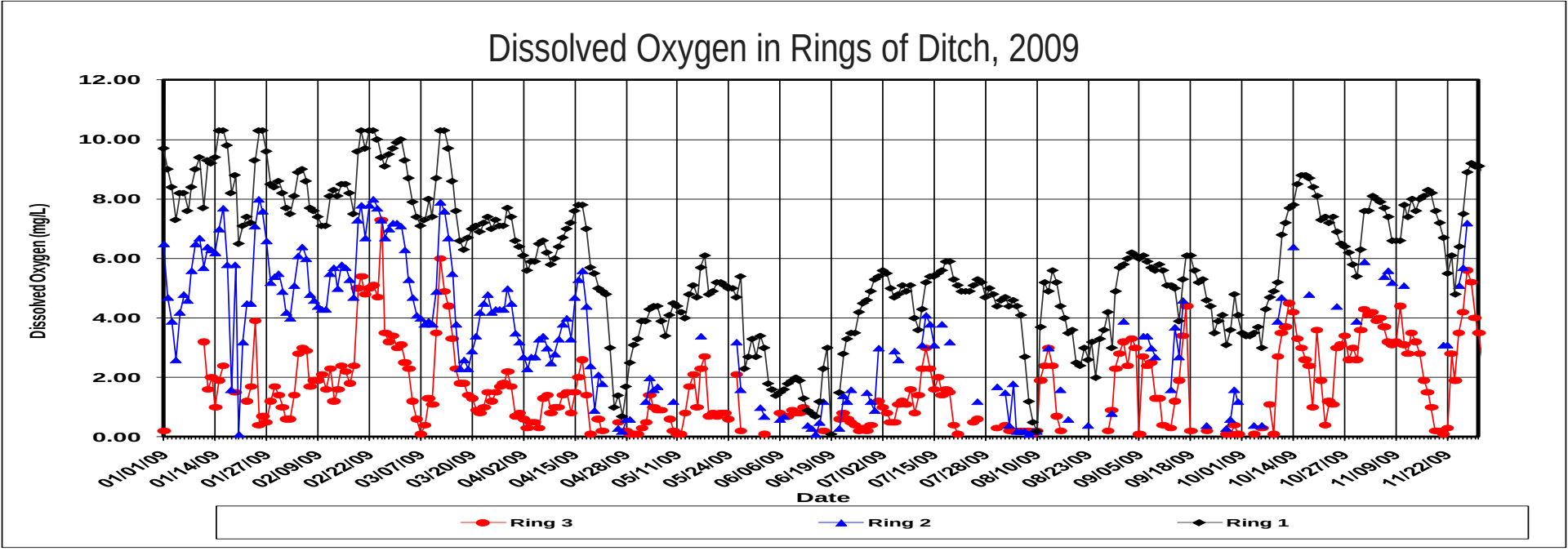
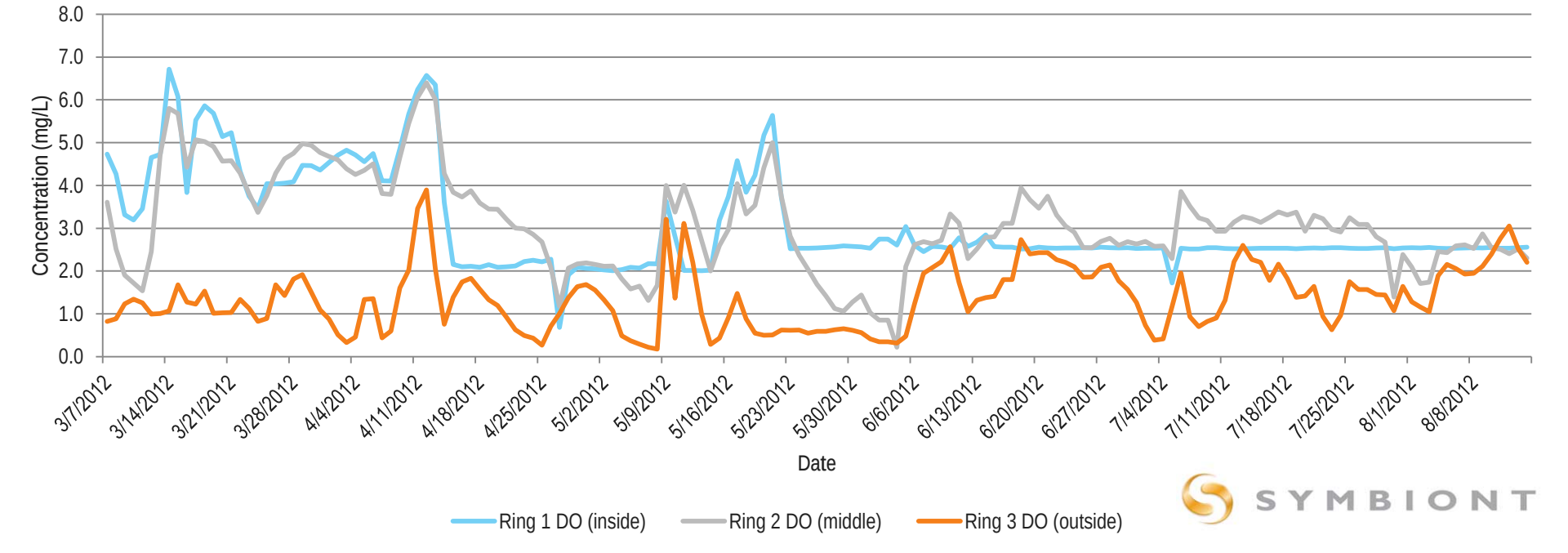


Figure 4: Grande Cheese Dissolved Oxygen Concentration



Energy Comparison: Before vs. After

Year	Organic loading to the Oxidation Ditch (#/Day BOD)	Annual Energy (kWh)	Energy Consumption (kW/BOD/day)
2009	3,339	919,800	0.031
2010	3,798	1,006,632	0.031
2011	3,653		
2012	3,877	656,124	0.019

> 15% more Organic Load

> 28% less energy

>38% less energy per BOD

Also, 10% higher oxygen demand because of ammonia

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Other Benefits?

- Mixed liquor settles better
- No filaments
- No maintenance around ditch
- Less cooling of mixed liquor during the winter
- Better DO control in all rings
- Safer work environment

Project Summary

- Converted to membrane fine bubble aeration
  - Reduced energy consumption
  - Expansion built in
  - Other process benefits
- Converted to turbo type air compressors
  - More reliable and energy efficient
  - Provides 100% backup
- Completed modifications without taking treatment system off line
  - Use of industrial divers
  - Maintain permit compliance throughout conversion

Project Benefits

- Project received Focus on Energy Efficiency incentive of $32,700.
- Oxidation ditch energy savings: $48,000/yr
- HSW trucking/disposal savings: $1,300,000/yr
  - Savings about 126,000 gallons of diesel fuel/year
  - Reduced overall carbon footprint by 1,647 metric tons CO_{2eq}[1] (352 passenger cars removed from road)

[1] Environmental Defense Fund Fleet Emission Calculator: http://business.edf.org/projects/fleet-vehicles/fleet-calculator

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Thank you!

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