34th Annual Spring Biosolids Symposium

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Fond du Lac Water/Resource Recovery Facility

- 9.84 MGD (6.89 daily ave)

- Service Area
  - 64,000 Population
  - BOD PE of 92,000

- Co-thickening Primaries
  - WAS
  - Primary

- Single-stage nitrification
  - Denitrification
  - Chem Phos Removal (Alum)

- Anaerobic Digestion
  - TPAD
Anaerobic Digestion – TPAD

• Thermophilic - 130°F
  • Feed only to Thermo’s

• Mesophilic - 95°F
  • Gas holders
  • Liquid storage before centrifuging
Thermophilic Digestion

- Thermophilic Digester #1
  - 688,500 gallons
  - 92,039 ft³
  - Pump/Nozzle Mixing

- Feed to Digester #1
  - Blended Sludge (RAS + WAS) from co-thickening primaries
  - 72,000 gal/day
  - 150 lbs VSS/day/1000 ft³
  - 250 lbs COD/day/1000 ft³
Thermophilic Digestion

• Thermophilic Digester #2
  • 688,500 gallons
  • 92,039 ft³
  • Pump/Nozzle Mixing

• Feed to Digester #2
  • High Strength Waste (Whey Permeate + Blue Cheese)
  • 30,240 gal/day
  • 120 lbs VSS/day/1000 ft³
  • 170 lbs COD/day/1000 ft³
  • 159 lbs Total Phosphorus/day
Mesophilic Digestion and Overall Results

- Mesophilic Digester #3 and #4
  - 688,500 gallons each - 92,039 ft³ each

- 2015 Fecal Coliform geometric mean 791 MPN/gram of TS

- 66% Volatile solids reduction after all digestion

- 225,000 ft³ + total biogas produced per day

95°F
High Strength Waste Receiving – Why?

• Working with local industries to help reduce their surcharge rates
• Energy savings at our facility by re-directing high BOD/COD away from the aeration basins
• Taking steps toward energy neutrality – biogas production
• Fully utilizing our anaerobic digestion capacity
Biogas Production and Utilization

• Produce greater than twice as much gas with substrate addition
  • Used to produce about 110,000 ft³ now produce 225,000 ft³ per day
• Electrical generation (CHP unit)
• Use excess heat to heat building and digesters
Biogas Utilization

• Less kWh’s purchased
  6,681,600 kWh

  3,811,200 kWh

• Lower overall energy costs
  $540,142.80

  $399,283.32
Solids Handling

- 26.5 % Cake
- Polymer usage (24 lbs/Ton)
- Have seen an increase in biosolids of about 900 Wet tons/year (15% increase)
Gas Cleaning – H2S and Siloxane

• Biological Hydrogen Sulfide removal
• Siloxane removal via media
Challenges Encountered

• Gas spikes

• Low Methane content
Challenges Encountered

• Struvite
Challenges Encountered

• Extra Nutrient loading to aeration basins

  • Phosphorus
    • Influent Phosphorus: 330 lbs/day
    • Centrate (recycle) Phos: 102 lbs/day

  • Ammonia
    • Influent Ammonia: 1,610 lbs/day
    • Centrate (recycle) NH4-N: 1,224 lbs/day
Future

• Nutrient Harvesting (phosphorus harvesting)
• Side-stream ammonia removal (Deammonification)
• Dried Biosolids with multiple uses
• Achieving self sufficiency for energy requirements
Thanks