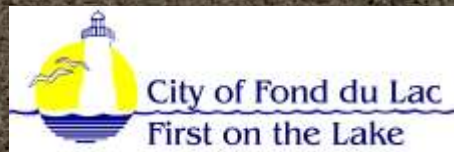


34th Annual Spring Biosolids Symposium

Jeremy Cramer
Fond du Lac WWTP



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

130°F

- 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

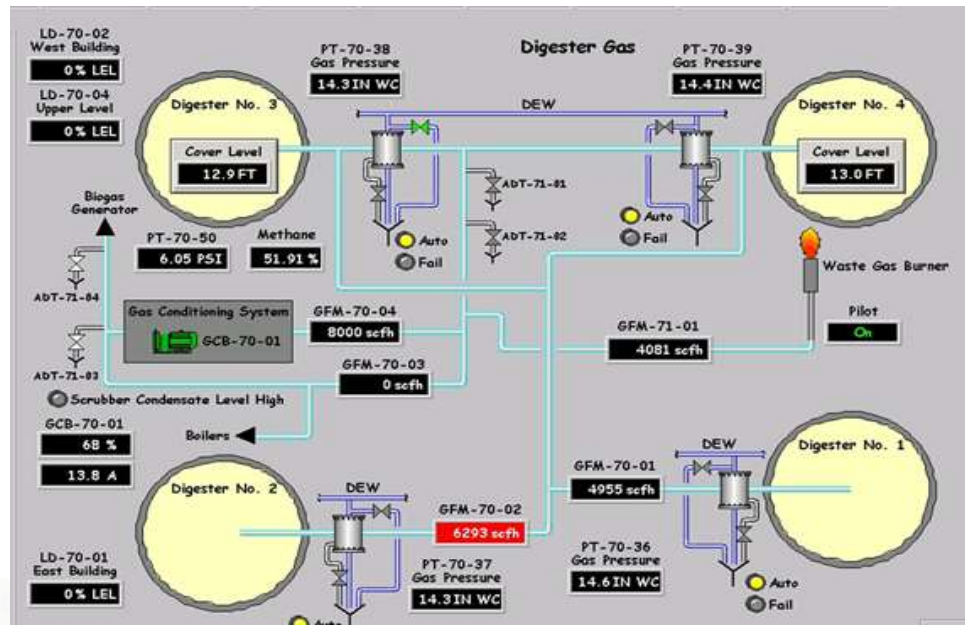
Mesophilic Digestion and Overall Results

- Mesophilic Digester #3 and #4

- 688,500 gallons each - 92,039 ft³ each

95°F

- **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**



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

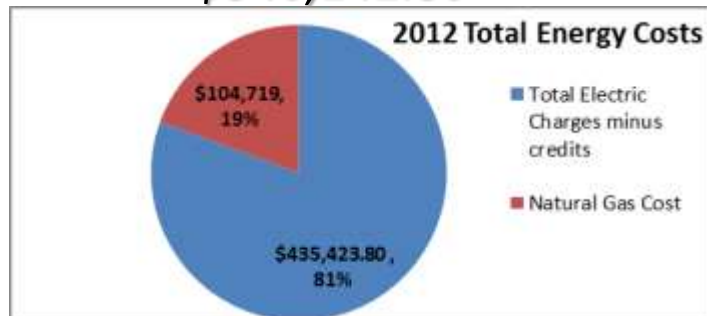


3,811,200 kWh

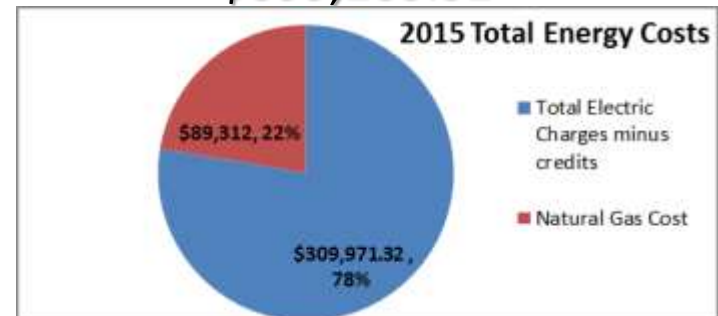


- Lower overall energy costs

\$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)



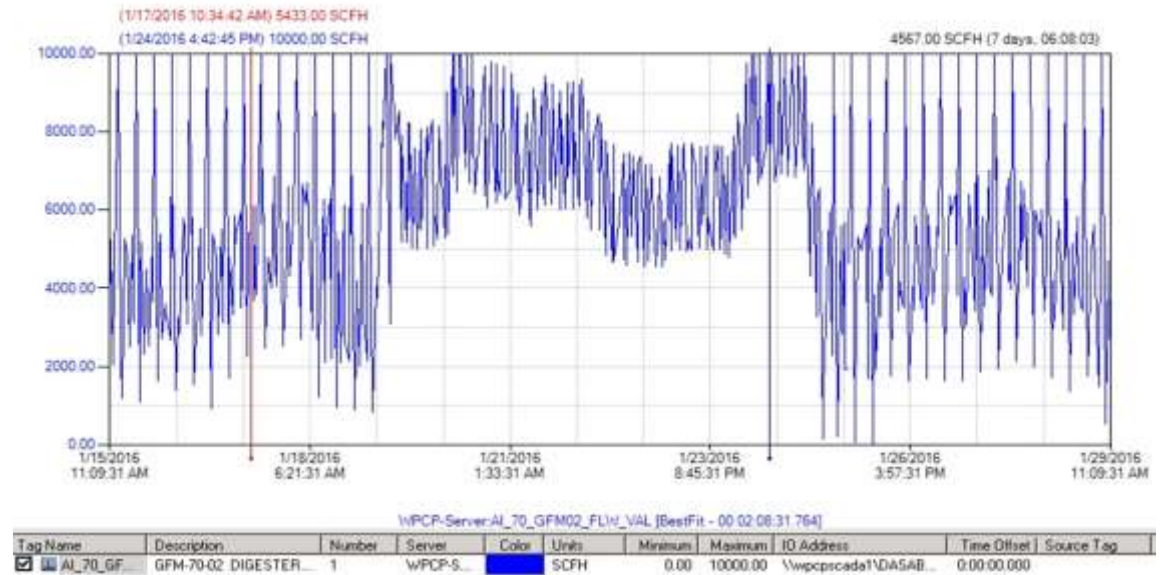
Gas Cleaning – H₂S and Siloxane

- Biological Hydrogen Sulfide removal
- Siloxane removal via media



Challenges Encountered

- Gas spikes



- Low Methane content



Challenges Encountered

- Struvite



Challenges Encountered

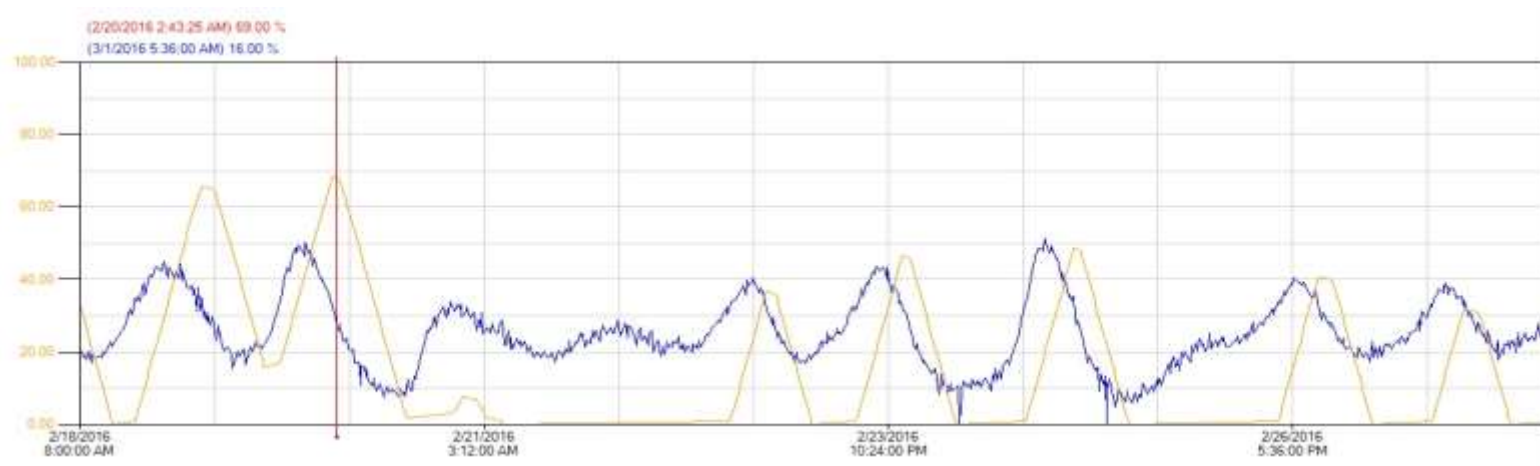
- Extra Nutrient loading to aeration basins

- 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

