Water Use, Wastewater Loading, and Energy Use Reduction Project at Sanimax

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Company Overview/Background

- Sanimax is a company that is based out of Montreal, QC, Canada
- Sanimax owns and operates many rendering plants
- There are 18 locations in the US, Canada, and Mexico
- The South St. Paul, MN facility has 5 different processes:
  - Blood
  - Feather
  - Poultry
  - Red Meat
  - Yellow Grease
Incentives to Change

• Sanimax has a goal to reduce operating expenses
• Sanimax has a commitment to the 3R’s
  • Reclaim
  • Renew
  • Return
• Sanimax has a goal to be recognized as THE VERY BEST environmental solution provider in the agri-food industry
Reasons for Seeking MnTAP Assistance

Assistance was sought to reduce operating costs

- Reduction of purchased water
- Reduction of total sewer discharge
- Reduction of sewer strength charges
- Reduction of energy bills
- Avoidance of Future SAC (Sewer Availability Charge) increases
Approach Taken to Complete Project

• Preliminary screening
  • Noncontact cooling water, process condensate, wash water, and process leaks

• Data collection
  • Quantified relevant flow rates and temperatures
  • Estimated the volume and cost of leaks

• Research
  • Identified potential changes to the process to reduce utilities
  • Gathered information about future wastewater treatment techniques

• Design & Implementation
  • Developed final recommendations for process improvements
Purchased Water Flow

Annual Purchased Water Use (gal)

- Noncontact Cooling: 12,853,000 gal
- Scrubbers (5): 16,804,000 gal
- Steam Hoses (est.): 7,563,000 gal
- Boilers: 6,098,000 gal
- Softner Regeneration: 6,098,000 gal
- Sprinkler/Mister: 16,804,000 gal
- Domestic: 3,000,000 gal
- Other Purchased Water: 1,327,000 gal

Other Purchased Water Includes:
- Evaporative losses
- Pressure washers
- Water leaks
- Water used in product
- Laundry
- Other freshwater users (PCU, piston pump, etc.)

Total Purchased Water 2014: 48,730,000 gallons
Cost: $95,716
Sewer Flow

Annual Sewer Water Flow (gal)

- PRF Condensate: 43,403,000
- Cooker #1 Condensate: 1,597,000
- Cooker #2 Condensate: 3,592,000
- Poultry Cooker Condensate: 2,566,000
- Blood Tail Water: 11,353,000
- Leaks/Other: 5,912,000
- Purchased Water: 4,554,000

Total Sewer Flow 2014: 72,977,000 gallons
Cost: $281,613

Total Strength Charge 2014: $255,790
Noncontact Cooling Water

Noncontact cooling water is used to cool process equipment:

- Ozone generators
- Centrifuge bearing oil
- Cooker bearing oil
- Pump seals and hydraulic pumps
- Air compressors

Total Purchased Water (2014): 48,738,000 gallons
Noncontact Cooling Water Use (2014): 12,853,000 gallons
Process Condensate

• There are 4 different process condensate streams
  • 2 cookers in red meat
  • Poultry cooker
  • Feather evaporator

• Tail water from blood process
• Wastewater samples collected for analysis

Estimated 2016 Strength Charge: $302,000
• Cooker #2 Condensate Portion of Strength Charge: $82,000
• Blood Tail Water Portion of Strength Charge: $72,000
Hot Wash Water

• Steam hoses
  • Hard water is mixed with steam to produce hot wash water
  • Used for higher temperature washing applications
  • Approximately 30 of these mixing valves in the plant
  • Wash water use estimated to be > 3,000,000 gallons/year

• Pressure washers
  • 3 stationary pressure washers, 2 mobile pressure washers
  • Used for higher pressure washing applications
Leaks

• Process leaks can be costly in numerous ways:
  • Decrease product revenues
  • Increase sewer volume
  • Increase wastewater strength
  • Increased need for wash water + steam

• Compressed air leaks can be costly due to high electricity use
Recommendation #1

Reduction of noncontact cooling water (soft water)

- Airfin coolers on condensate pumps
  - Cooker #1 and #2 Condensate Pumps
    - Estimated savings of 1.2 million gallons/year ($6,600)
  - PRF Boiler HP Condensate Pumps
    - Estimated savings of 1.3 million gallons/year ($7,400)
- Payback Period: 3 years
Recommendation #1 (cont.)

Reduction of noncontact cooling water (soft water)

- Fan cooled radiators for centrifuge bearings
  - Poultry centrifuge
    - Estimated savings of 1.6 million gallons/year ($8,200)
  - Red Meat centrifuge
    - Estimated savings of 1.7 million gallons/year ($8,500)
  - Payback period: 3 years

Oil Cooler
www.aihti.com
Recommendation #1 (cont.)

Reduction of noncontact cooling water (soft water)

• Optimizing other cooling water flow rates
  • Poultry cooker bearing (feed end): estimated savings of 250,000 gallons/year
• Noncontact cooling water streams not recommended for change
  • Poultry cooker bearing (discharge end)
  • Ozone generators (old ozone room)
  • Nebraska boiler pumps
  • Piston Pump
Recommendation #2

Reduction of Wash Water Usage

• Use lower flow nozzles and shutoff valves on steam hoses
  • 20% reduction of total flow with smaller nozzle
  • ≤ 20% reduction of water flow time with shutoff valve
• Estimated savings of up to 1 million gallons/year
  • $5,600
• Estimated savings of up to 1,100 dekatherms/year
  • $6,500
• Payback period: < 1 year
Recommendation #3

Identify and repair process leaks

• At least 14 significant process leaks
  • At least 10% contribution to wastewater strength charges
  • Fixing leaks can reduce:
    • Product losses
    • Sewer volume
    • Wastewater strength
    • Wash water usage
  • Longer payback period due to higher equipment replacement/servicing costs
Recommendation #3 (cont.)

Identify and repair compressed air leaks

• At least 29 compressed air leaks identified without an ultrasonic leak detector
  • Estimated 121 cfm, 213,000 kWh from these identified leaks ($17,000)
  • Many more leaks that could be identified with leak detector
  • Continued leak detection and repair required
  • Short payback period on most fittings (< 1 year)
Recommendation #4

• **Utilize dry cleaning techniques**
  • Use sweeping and shoveling prior to washing
    • Return product to process (reduce product losses)
  • Return grease/fat collection buckets directly to emulsion tank
    • Estimate of savings from frequent emptying of Cooker #2 condensate grease bucket: $2,900 / year
  • Reduce wash water and steam usage
  • Reduce sewer volume
  • Reduce wastewater strength
# Summary of Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Annual Material/Energy Savings</th>
<th>Annual Savings ($)</th>
<th>Payback Period (years)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noncontact Cooling Water Replacement</td>
<td>5,750,000 gallons of water</td>
<td>$30,700</td>
<td>3 years</td>
<td>Capital Request AFE</td>
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<tr>
<td>Optimization of Cooling Water Flow Rates</td>
<td>250,000 gallons of water</td>
<td>$1,300</td>
<td>0 years</td>
<td>Implemented</td>
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<tr>
<td>Wash Water Reduction</td>
<td>1,000,000 gallons of water, 1,100 dekatherms of energy</td>
<td>$12,000</td>
<td>&lt; 1 year</td>
<td>Recommended</td>
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<tr>
<td>Fix + Monitor Process Leaks</td>
<td>&gt; 570,000 gallons of water, &gt; 133,000 gallons of material</td>
<td>&gt; $50,000</td>
<td>Unknown</td>
<td>Ongoing</td>
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<tr>
<td>Fix + Monitor Compressed Air Leaks</td>
<td>&gt; 213,000 kWh of electricity</td>
<td>&gt; $17,000</td>
<td>&lt; 1 year</td>
<td>Some repairs completed</td>
</tr>
<tr>
<td>Utilize dry cleaning</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Somewhat in practice</td>
</tr>
</tbody>
</table>
Potential Future Projects

• Energy saving projects identified by Xcel in 2010 report
• Pretreatment of high strength effluent streams
  • Anaerobic digester
  • Ultrafiltration membrane system
  • Membrane bioreactor
  • Evaporation (blood tail water)

• Heat recovery from cooker vapor
  • Up to 107,000 dekatherms/yr of waste heat in the poultry cooker vapor
  • May be used for blood tail water evaporator
    • Potential savings of up to $110,000 annually between recovered product and WW strength reduction
Personal Experience

• **Personal Growth**
  • Process knowledge and exposure
  • Utilization of skills to make an impact
  • Tools for future career development

• **Contributions to Sanimax**
  • Ideas could reduce utilities usage significantly
  • Helped Sanimax work toward their goal of being the very best environmental solution provider in the agri-food industry
Questions?