# 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

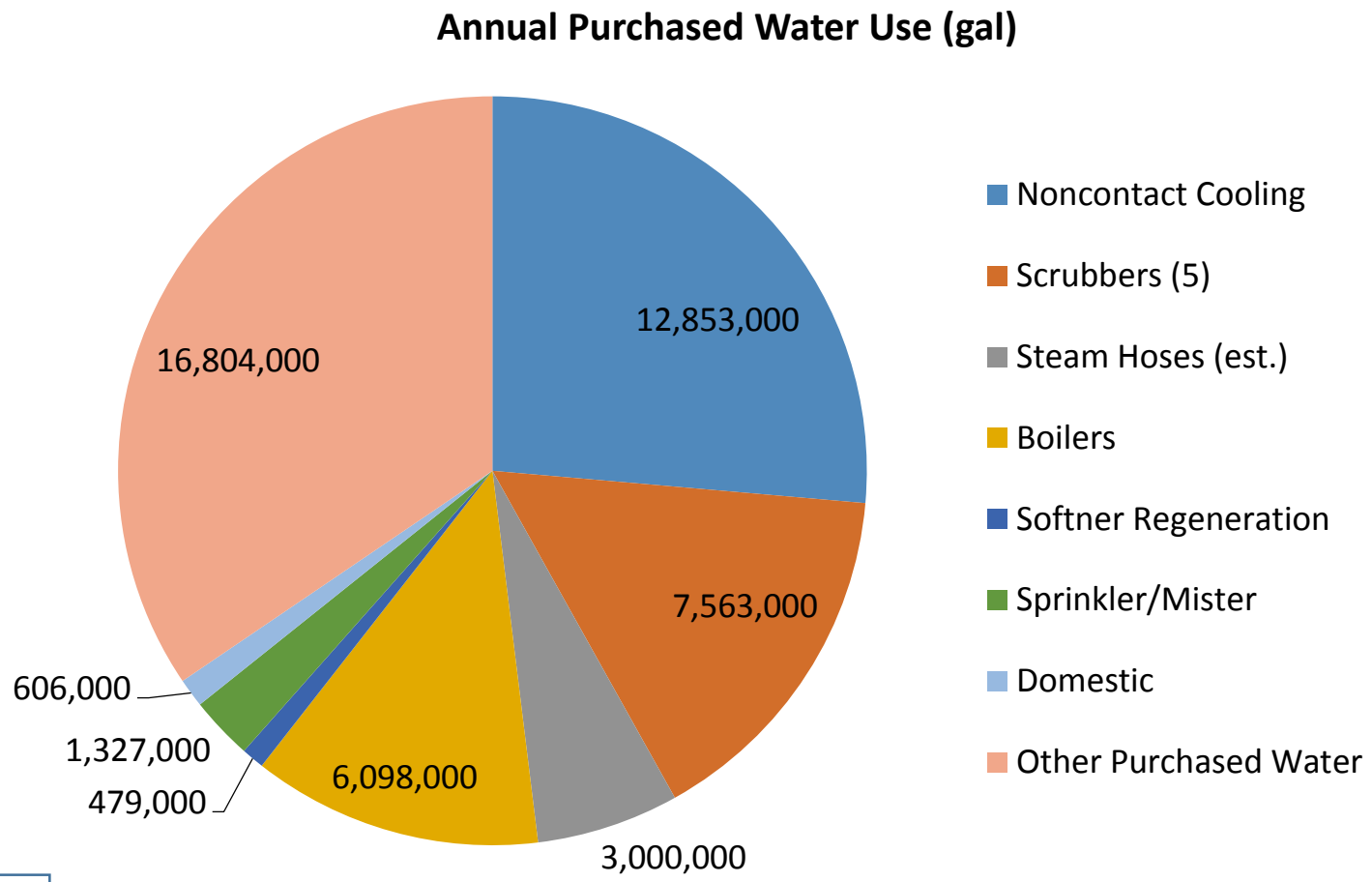
**Assistance was sought to reduce operating costs**

- 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

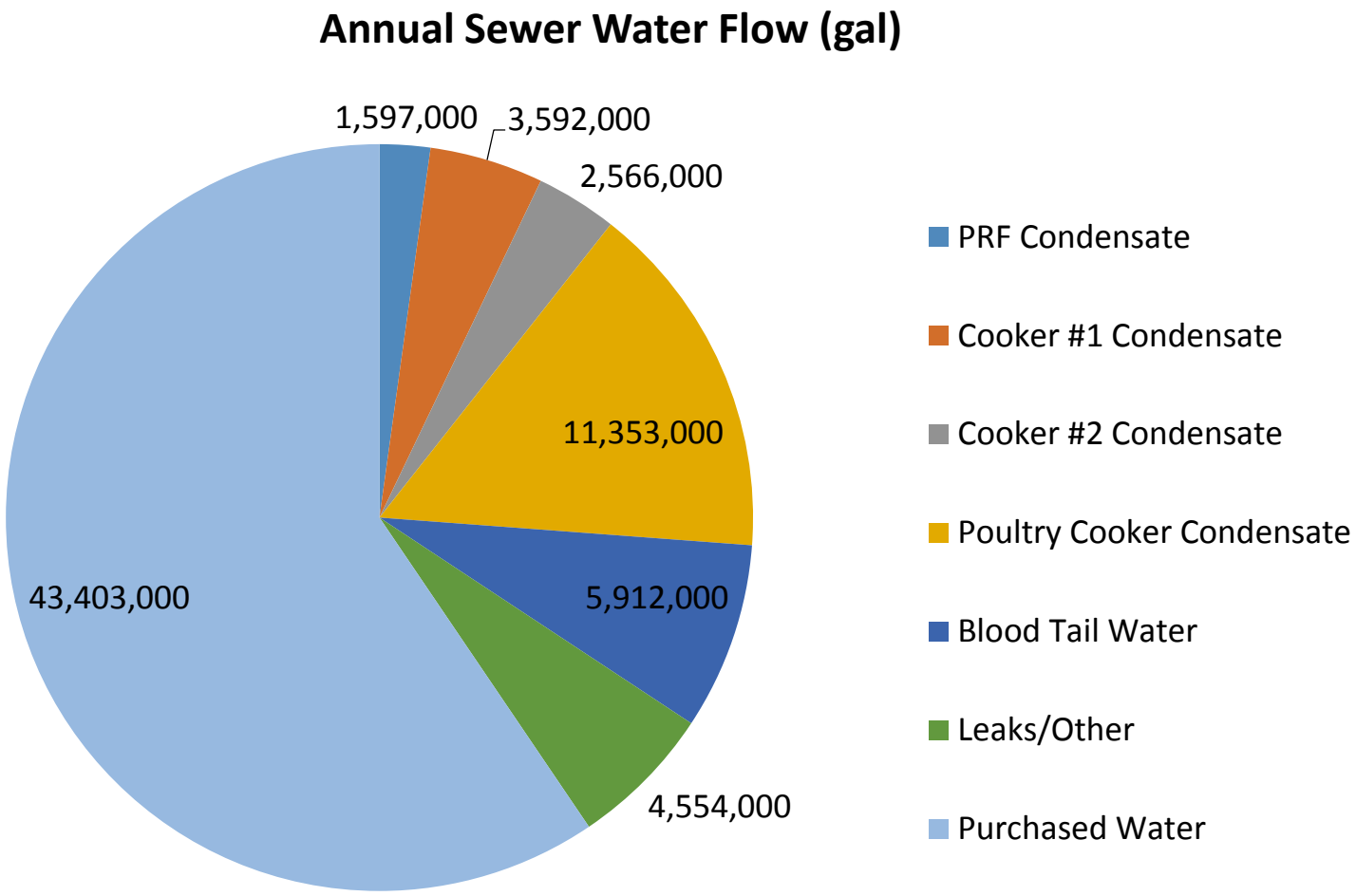



Other Purchased Water Includes:

- 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



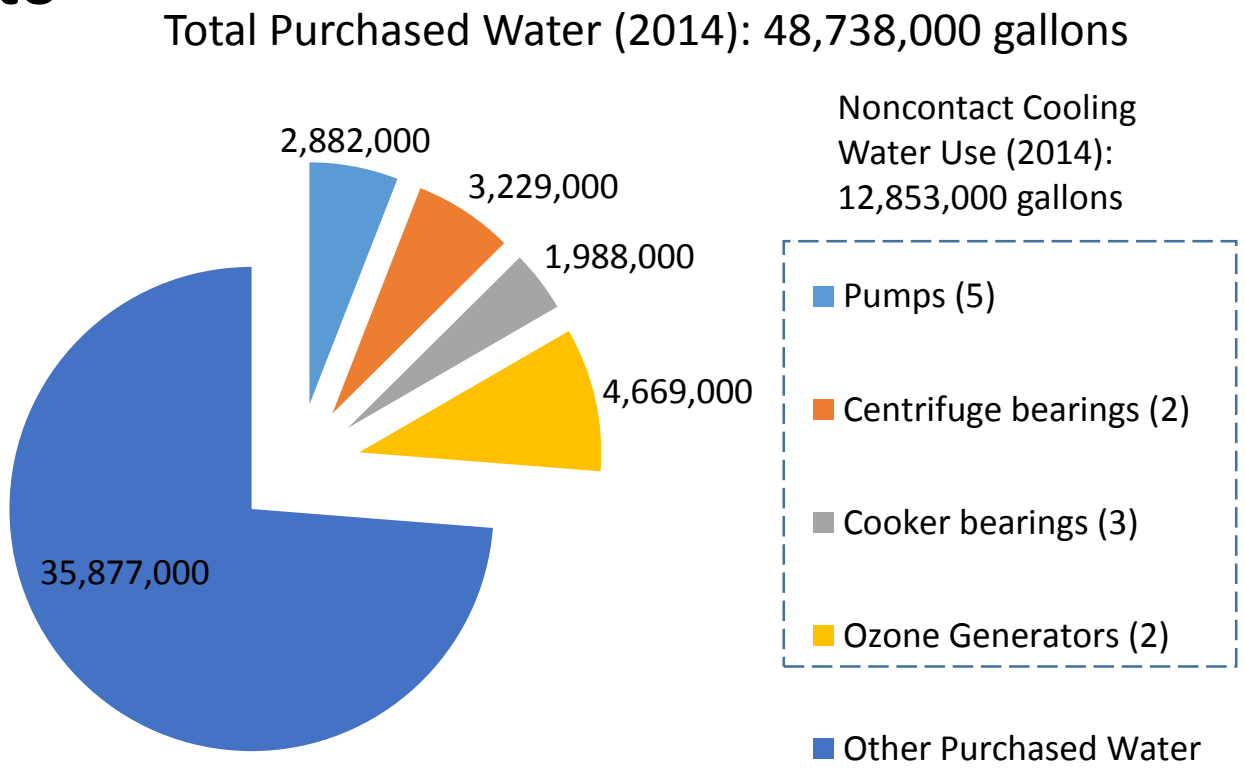

Total Sewer Flow 2014:
72,977,000 gallons
Cost: $281,613

Total Strength Charge 2014:
$255,790

# Noncontact Cooling Water

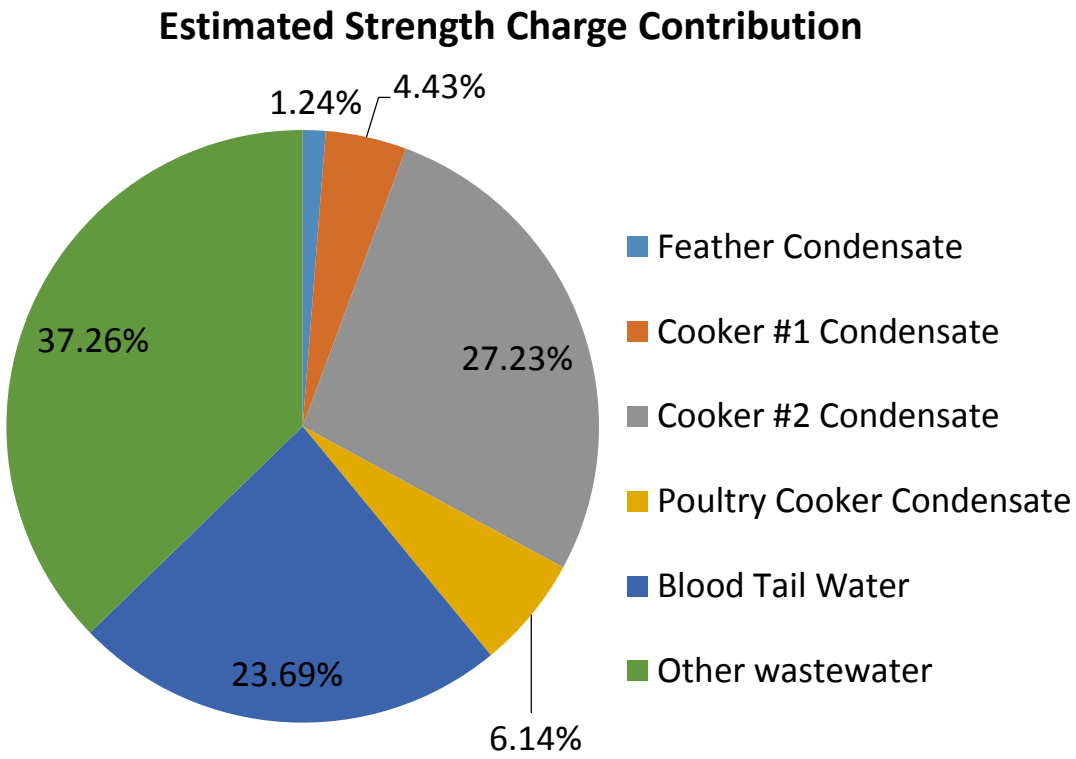
**Noncontact cooling water is used to cool process equipment**

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



# 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.)

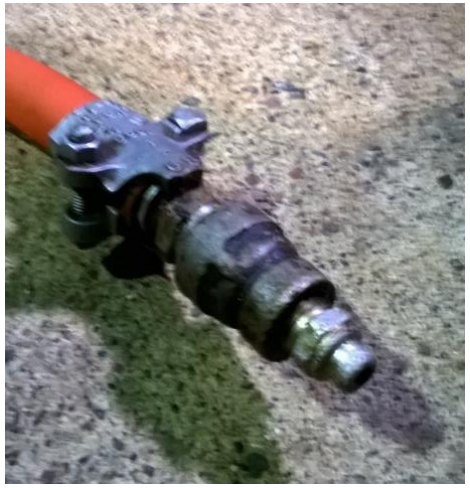
**Reduction of noncontact cooling water (soft water)**

- 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

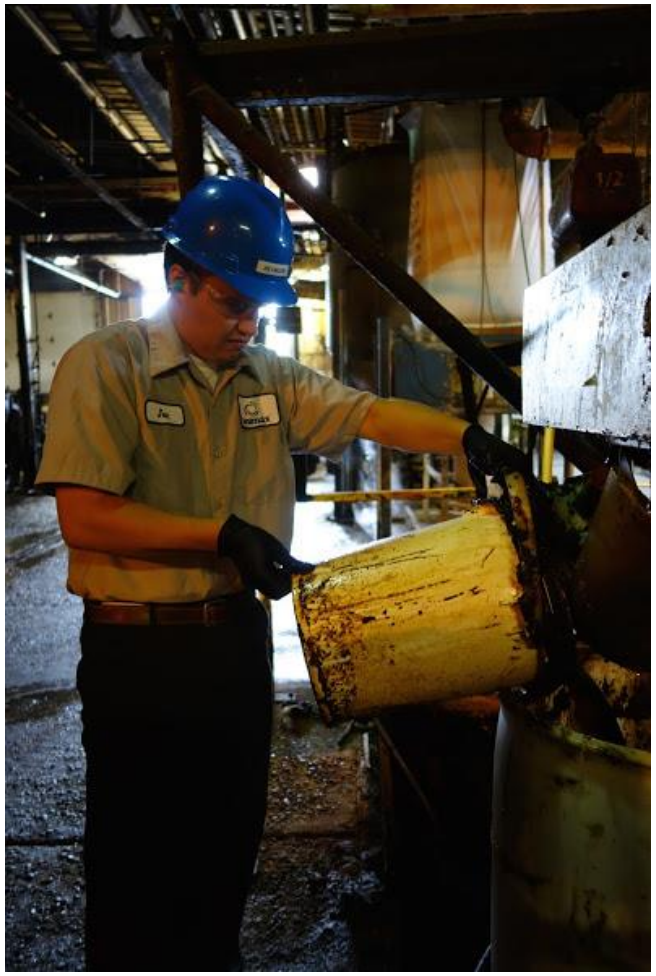
# Recommendation #3 (cont.)

## 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

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

# 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?