Energy Efficiency and Green Alternatives at IBM in Rochester

Daniel Sales
MnTAP Advisor: Jon Vanyo
On-site Supervisor: Brian Morgan

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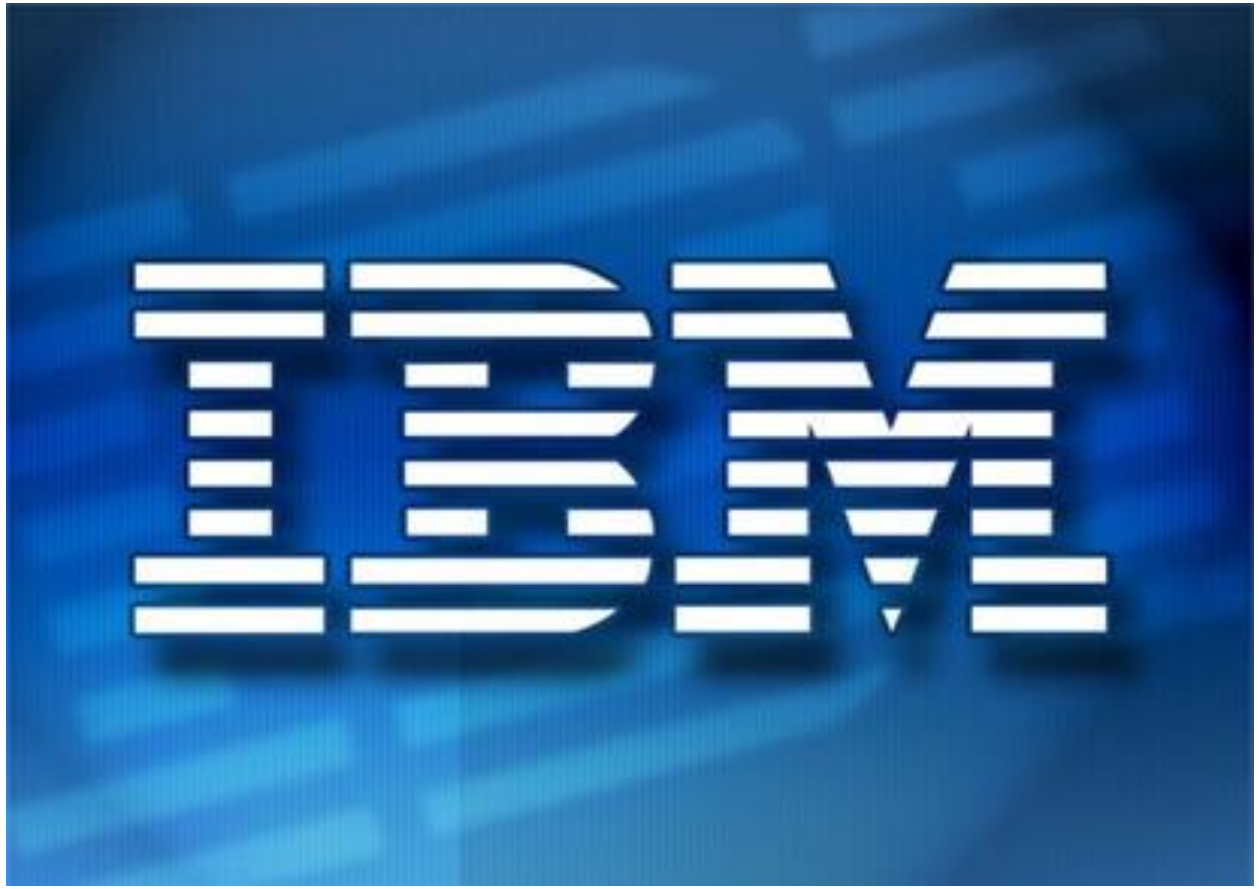
Company Overview

- Formed 19th century→ consolidation of 4 businesses
- 3.1 million square foot
- Previously manufacturing and chemical distribution
- Software and hardware, data center, business, leased space

Source: IBM Rochester Wikipedia

Motivation for Change

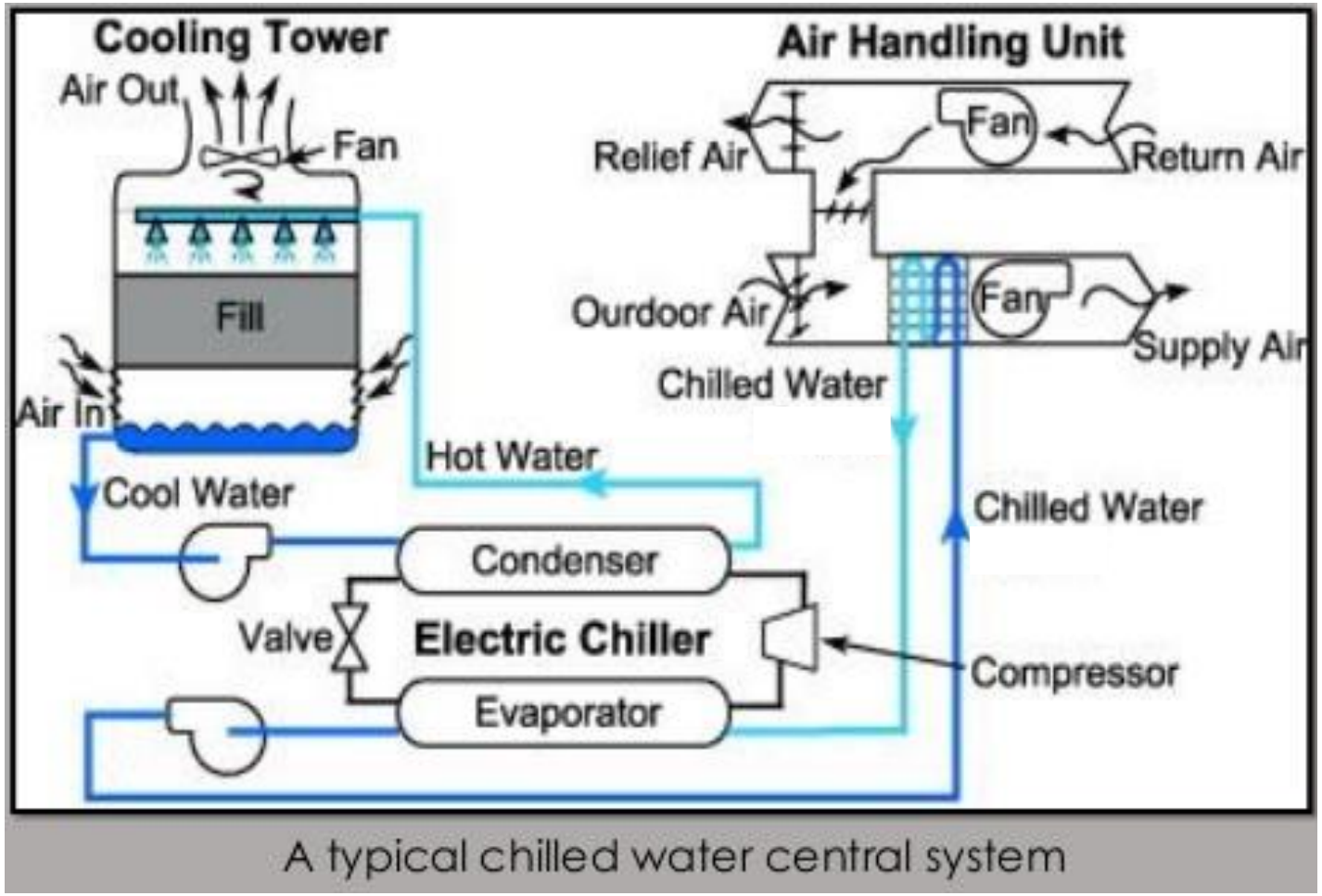
- Leader in innovation→move towards reduced energy consumption and environmental responsibility
- Renewable energy procurement and active power demand reductions
- Site-wide optimization software
- Equipment reliability and waste reduction



Reasons for MnTAP Assistance

- **Provide technical assistance on-site on projects of interest**
- **Audit HVAC and utility loop to identify opportunities for reduction**
  - Energy consumption through improved efficiency
  - Reduced peak demands
  - Green corrosion inhibitors
- **Present findings cohesively with savings and payback**

Chilled Water System

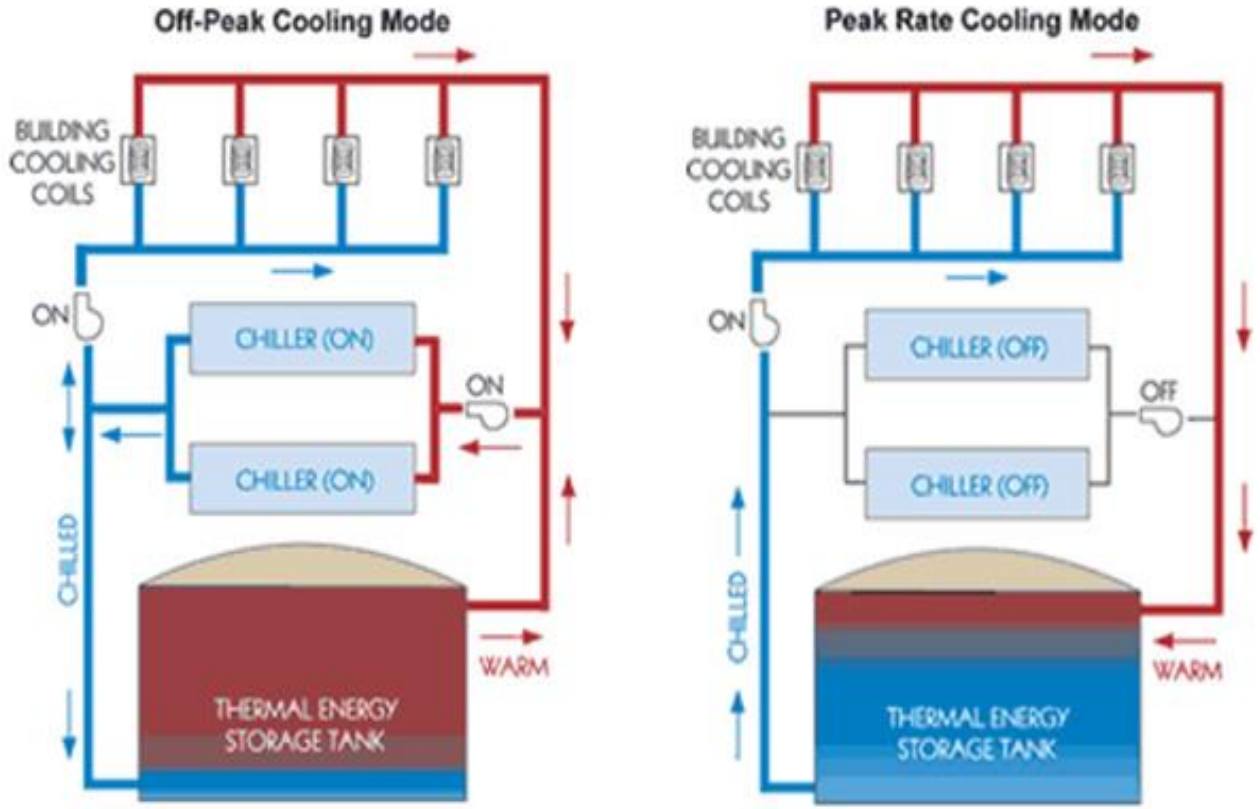


A typical chilled water central system

Source: www.slideshare.nettaratitzairconditioning-repaired

Thermal Tank System

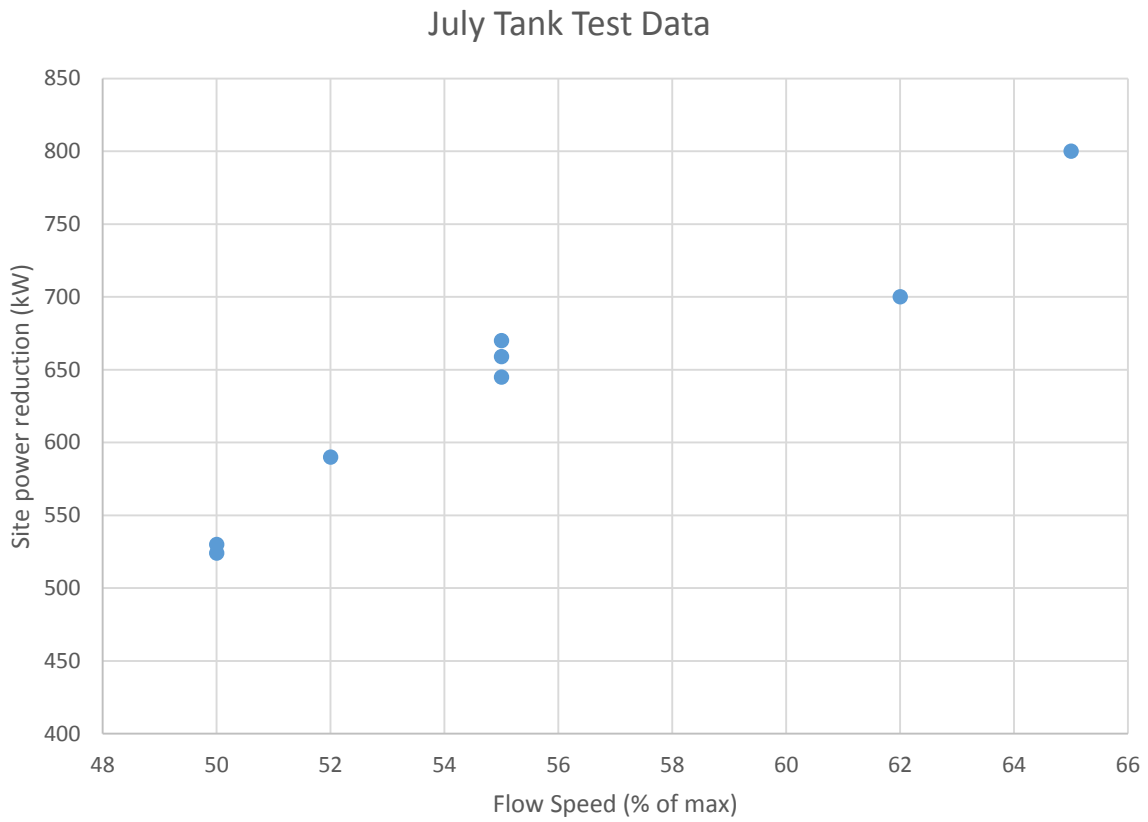
- Big battery storing thermal energy
- Discharge during the day to stop power consumption, charge at night to replenish energy
- Tempers loads improving equipment reliability



Source: http://www.cyp-res.com/stratified-chilled-water-storage-schws/

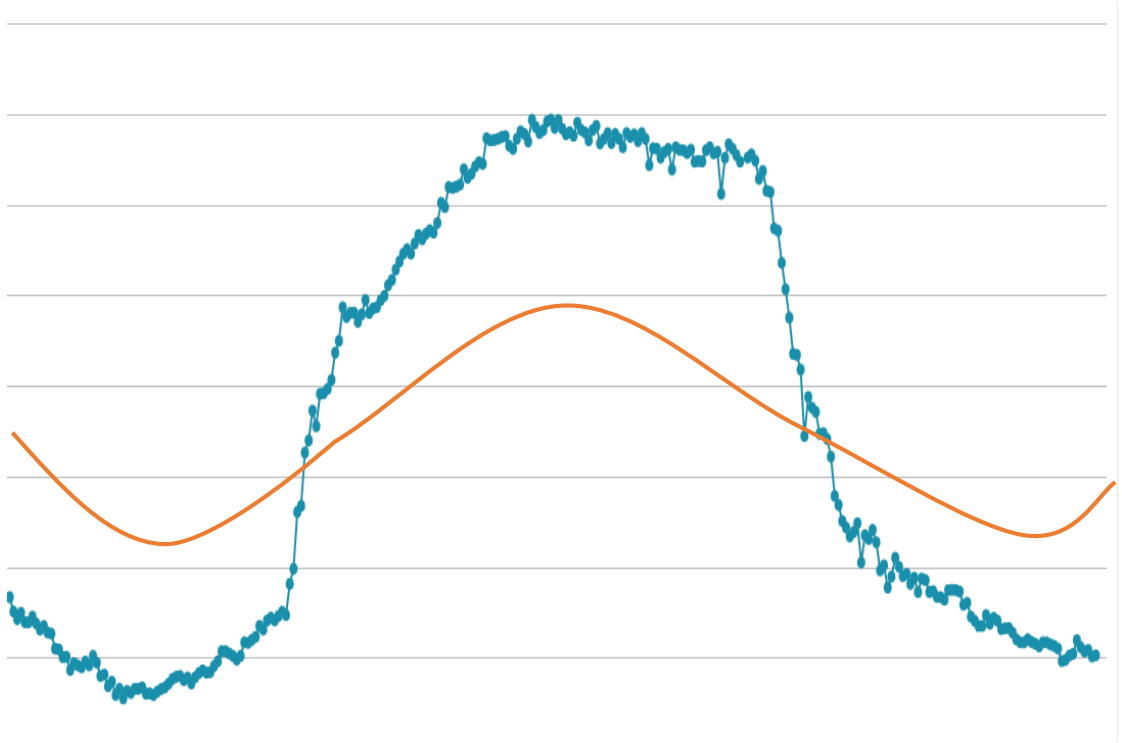
Approach 1 – Thermal Storage Tank

- **Calculate reduction potential**
- **Run experiment to verify dashboard accuracy and calculation accuracy**
  - Within 15% of kW calculations
- **Work with operators to identify concern areas**
- **Work with software contractor to automate solutions**



Recommendation 1 – Thermal Storage Tank

- Use 2015 consumption as max level
- Bring in tank incrementally (5% step levels) to achieve 700 kW power drop and run reliably
- Increase flow conditionally
- Charge evenly through the night

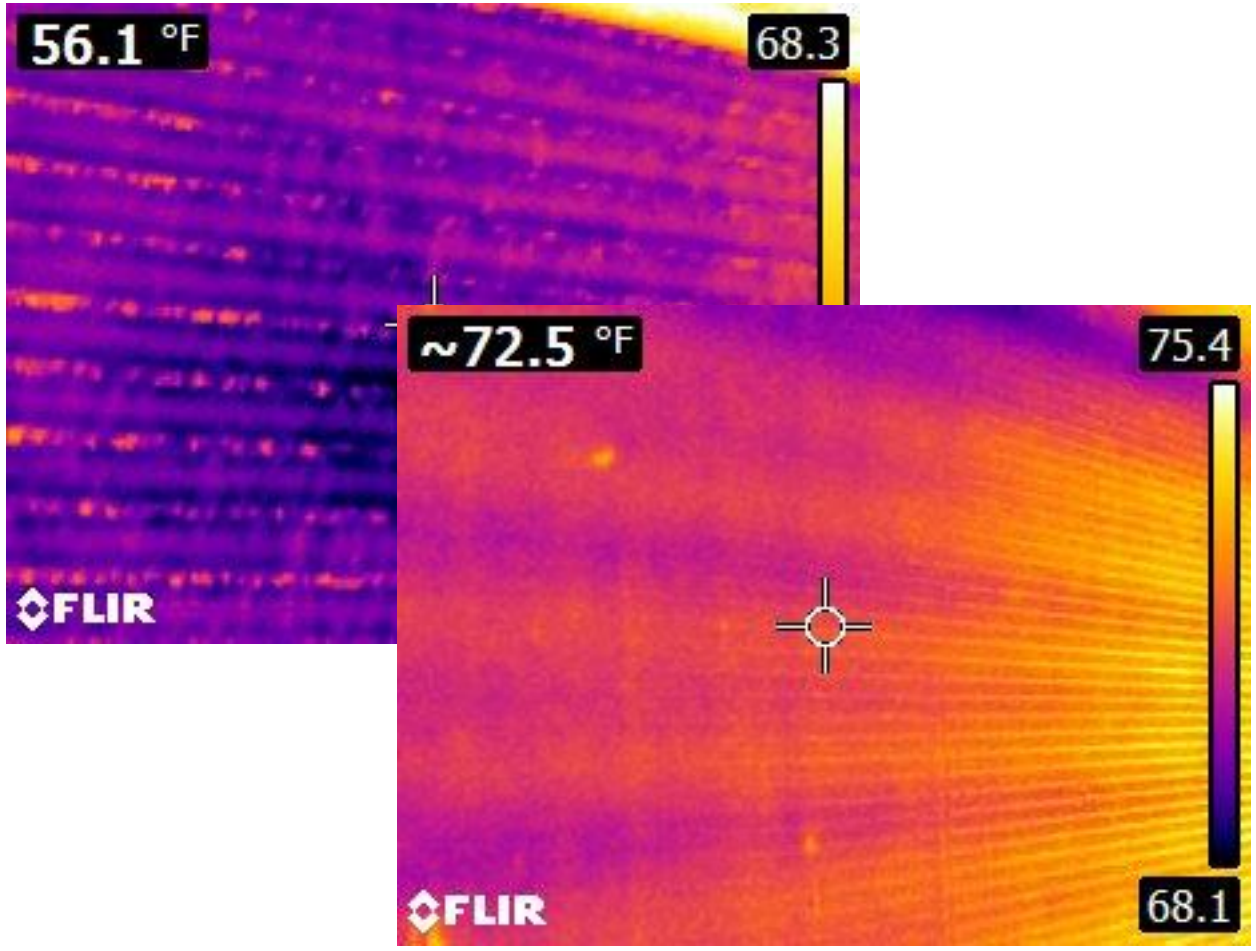


Cost Summary

Process Description	Reduction (per year)	Implementation Cost ($)	Savings ($/yr)	Payback	Status
Thermal Storage Tank	700 kW	$18,000	$103,600	2 months	Implemented

Approach 2 – Air Handling Unit Audit

- **Research components and process of an air handler**
- **Audit and catalogue opportunities for improvement**
  - Use IR camera to determine fouling and plugging
- **Run savings calculations**
  - Energy, flow, and financial



Recommendation 2 – Air Handling Unit Audit

Project Descr.	Reduction (yr)	Cost ($)	Savings ($/yr)	Payback	Status
Pressure Independent Valve	1,100,000 kWh	$170,000	$93,000	21 months	Recommended
Gauge Replacement	NA	$740	NA	NA	Implementing
Coil Cleaning	26,000 kWh	$21,000	$37,000	7 months	Implementing
Coil Maintenance	NA	$7,500	$15,000	6 months	Recommended
Coil Plugging	5,000 kWh	$6,000	$24,000	3 months	Implementing
TOTAL		**$205,240**	**$169,000**		

Approach 3 – Less Hazardous Corrosion Inhibitor

- **Water requires shipment to hazardous waste facility from molybdenum levels in corrosion inhibitor**
- **Identify areas of waste associated with corrosion inhibitor**
  - Sidestream chilled water filter
  - Perimeter heating System
- **Reach out to NC branch to analyze previous project work**
- **Identify potential alternative and clean up processes**

Recommendation 3 – Less Hazardous Corrosion Inhibitor

Benefits

- **Eliminate roughly nine 4,500 gallon tankards of waste water annually**
- **Save $41,000 in labor, equipment, and shipping costs**

Removal Procedure

- **Ion exchange resin trailers on-site 65-130 days**
- **Sidestream 35-400 gpm**
- **Get molybdenum below 3 ppm**
- **Perimeter heat – replace in shock tanks as needed**

Process Description	Reduction (per year)	Implementation Cost ($)	Savings ($/yr)	Payback	Status
Corrosion Inhibitor Replacement	40,500 gal waste water	$440,000	$41,000	11 years	Recommended

Recommendations Summary

Process Description	Reduction (per year)	Implementation Cost ($)	Savings ($/yr)	Payback	Status
Thermal Storage Tank	700 kW	$18,000	$104,000	2 months	Implemented
Pressure Independent Valve	1,100,246 kWh	$170,000	$93,000	21 months	Recommended
Coil Cleaning (exterior)	26,208 kWh	$21,000	$37,000	9 months	Implementing
Coil Maintenance	NA	$7,500	$15,000	6 months	Recommended
Coil Plugging	5,000 kWh	$6,000	$24,000	3 months	Implementing
Corrosion Inhibitor Replacement	40,500 gal waste water	$440,000	$41,000	11 years	Recommended
Total		**$663,000**	**$314,000**	**26 months**	

Personal Takeaways

- Problem solving with an open mind
- People run business, not numbers
- Somebody knows
- Confidence with results

This project was supported in part by the Minnesota Pollution Control Agency