



August Schell Brewing Co.



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Company Background

August Schell Brewing Company was established in 1860, making it one of the oldest breweries in the United States. The brewery has 70 full time employees and produces about 120,000 barrels of beer and 20,000 barrels of root beer each year. With the purchase of Grain Belt Beer in 2002, it became the largest brewery in Minnesota.



"My summer with MnTAP at August Schell Brewing Company was awesome! I learned how to design an effective approach for many different engineering problems." ~ MB

Project Background

Leading up to this project the brewery has made several attempts to improve wastewater loading and water use efficiency. A previous MnTAP project, in 2011, made recommendations primarily around water conservation and energy savings. In 2013, the brewery started separating out spent yeast from the main waste stream and selling it to be used in animal feed. This process lasted until early 2017 when changes in commodity pricing lowered the value of yeast such that the brewery now had to pay to get the yeast off site. Faced with increasing sewer surcharges, the brewery decided it was time for another MnTAP project.

Incentives To Change

Schell's is interested in reducing their carbon footprint and includes this in their core value statement: "We are rooted in tradition, cultivated in innovation." Not only are these goals in sustainability good for the environment, but they are often good for business too. By reducing key characteristics of their wastewater stream, biological oxygen demand (BOD) and total suspended Solids (TSS), the company saw great potential for savings on wastewater surcharges. In addition, brewing is a water intensive process that can range from 7 barrels of water to make 1 barrel of beer to as low as 3-4 barrels of water per barrel of beer. As the brewery continues to grow, improving process efficiency is a top priority.

SOLUTIONS

Reducing Wastewater Loading

Two approaches were explored to reduce BOD and TSS in wastewater to eliminate strength charges. By incorporating a spiral brush filter from Digested Organics, the brewery would remove solids from the waste stream and dramatically reduce organic loading. It is estimated that the filter would remove 50% of BOD and up to 50% of total suspended solids (TSS). Alternatively, an anaerobic digestion treatment system developed by Purpose Energy would utilize bacteria to break down organic waste and produce renewable energy in the form of biogas. This system would reduce organic loading by 99%, removing 430,000 lbs of BOD, 240,000 lbs of TSS, and 4,000 lbs of phosphorus. In addition the system would generate 700,000 kWh of electricity. Between the savings on electricity and sewer surcharges, the brewery would see net savings of \$190,000 annually.

Packaged Product Recycling

Currently packaged product is dumped to the drain in the event of over production or out of spec testing. The recommendation is to ship packaged products to E-Z Recycling where recyclable solids are separated from high strength liquids. Glass and aluminum are then recycled, while liquids are directed to either an ethanol plant or

Solutions

anaerobic digester for renewable energy production. This option would reduce BOD loading by 9,600 lbs per year. Between savings on labor and sewer surcharges, annual net savings would amount to \$4,200.

Reduce Sample Cooling Water

Throughout an individual brew there are 4 samples taken. These samples have to be cooled from a temperature near the boiling point. Samples are poured into a jacketed container with cold water being pumped through the outer jacket at all times. The current process uses about 274,000 gallons of water a year. By adjusting the time the water runs to 15 minutes per sample, the brewery will save 200,000 gallons of water a year and \$1,000 annually.

Greensand Filter Backwash Rate

Greensand filters are used every day on incoming city water in order to reduce iron and manganese concentration in the water, thus reducing water hardness. The greensand filters are on a schedule to recharge every night Monday through Friday. This recharge process ends up sending 1,600,000 gallons of water to the drain each year. By adjusting recharge frequency to a staggered schedule the brewery will save 550,000 gallons of water and \$2,700 annually.

Non-Phosphorus Cleaners

The brewery utilizes phosphoric acid based cleaners in their day to day operations. Between two chemicals, Dairy Acid HD and Foam Sol E, 650 lbs of phosphorus is sent down the drain each year. Two phosphorus free alternatives from the brewery's same supplier were identified and investigated. While the alternatives for both products are more expensive based on face value, when phosphorus loading costs are incorporated this is not the case. By making the switch the brewery would eliminate all 650 lbs of phosphorus going to the drain and save \$1,400 annually.

"Mason was a great addition to the Schells Brewery team. His energy and passion for continuous improvement brought new life to our sustainability efforts. We were very impressed with the improvements that Mason helped incorporate to the brewery's processes and the next steps he provided us to further our sustainability efforts. We would highly recommend other businesses invest in the MnTAP program."

~ Kyle Blair, Director of Operations

Recommendation	Annual Reduction	Annual Savings	Status
Digested organics side streaming	215,000 lb BOD and 96,000 lbs TSS	\$48,000	Investigating
Purpose energy anaerobic digester	430,000 lb BOD, 240,000 lbs TSS, 4,000 lb phosphorus	\$190,000	Recommended
Packaged waste to E-Z Recycling	9,600 lbs BOD	\$4,200	Recommended
Adjust filter backwash frequency	550,000 gallons	\$2,700	Investigating
Reduce sample cooling water	200,000 gallons	\$1,000	Implemented
Switch to phos-free alternatives	650 lbs phosphorus	\$1,400	Investigating

MnTAP Advisor: Michelle Gage, Engineer