



# WATER USE IN THE MEAT PROCESSING INDUSTRY



## Introduction

A steady and reliable supply of clean water is vital to keeping individuals healthy, businesses and farms running, and economies and communities thriving. Despite Minnesota’s nickname as the “Land of 10,000 Lakes,” the state’s aquifers do not have an unending supply of water, and many companies are interested in finding more opportunities to save water in their business operations. Water conservation assessments can provide many benefits for businesses including the following:

- Achieving cost savings on water and wastewater bills along with reducing surcharges from excess water use.
- Optimizing manufacturing processes by mapping water use and distribution, allowing for new technologies to be adopted and processes updated that could reduce energy and water costs.
- Benefiting neighbors and local communities by allowing water to be used for drinking, agriculture, and other necessary processes.

**NAICS Code:** 3116\*\*

**Industry Sector:** Animal Slaughtering and Processing  
**EPA Region 5**

### About MnTAP

The Minnesota Technical Assistance Program (MnTAP) is a confidential, no-cost, and non-regulatory program at the University of Minnesota that provides technical assistance focused on pollution prevention to organizations in Minnesota.

## Dairy Product Manufacturing Example

Water Use & Costs	Quantity
Flowrate or gallons per minute	23 gallons
Total daily water consumption of all nozzles with the same flow rate	47,000 gallons
Annual total water consumption	8,200,000 gallons
Annual total in costs	\$56,000

MnTAP was contacted by a meat processor who operated a grower-owned facility for butchering and packaging meat. The facility was interested in conserving water and minimizing high-strength waste discharges associated with regular facility processes and in preparation for an upcoming wastewater permit renewal. MnTAP staff performed a site assessment to explore new strategies for conserving water, reducing waste and chemical loading to wastewater, and conserving energy use with a focus on compressed air leaks. The table on the left covers how much water that facility was using at the time of the MnTAP site visit.

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# Opportunity: Installing Water-Saving Equipment

MnTAP staff identified sanitation hoses used for pre-sanitation, or water spraying before sanitation crews can begin, as a significant consumer of water. After observing normal operations and discussing water use with operators, MnTAP determined that the facility uses 13 hoses with similar flow rates for a total nozzle use of approximately 34 hours per day.

MnTAP staff suggested that current hoses could be replaced with two types of lower-flow nozzles. A low-flow nozzle can reduce water usage without compromising water pressure. By sending water through a fine screen, the nozzle can add air, and thus, increase the stream's force leading to less water being used to clean the same area. The table on the right illustrates how much water and money the facility could save by switching to either of the two nozzles and their respective payback periods. Payback period is how long it would take to have a financial return in terms of cost savings that could recoup the costs of purchasing the new nozzles.

Water Use & Costs	Strahman M-70	Strahman M-70LF
Flowrate or gallons per minute	9 gallons	5.1 gallons
Total daily water consumption of 13 nozzles with the same flowrate	18,000 gallons	10,400 gallons
Annual total water consumption	3,200,000 gallons	1,800,000 gallons
Annual total in costs	\$34,000	\$12,500
Unit price per nozzle	\$195	\$195
Total amount required to change 13 nozzles	\$2,700	\$2,700
Total payback	3 weeks	3 weeks
Annual costs savings	\$22,000	\$43,500

MnTAP staff can identify new technologies but cannot draw conclusions on whether these new recommendations would conform with health and safety regulations or standards. It is up to companies to determine which options would maximize water and financial savings while maintaining a sanitary facility.

## Implementing Water-Saving Practices for Employees

**Annual water savings:**  
735,000 gallons

**Cost savings:**  
\$5,000

**Status:**  
Implemented

Another area MnTAP staff identified as an opportunity for change is the constantly running streams of water on one part of the processing line. Facility employees use this water to rinse meat between steps and to wash their hands, boots, and tools. MnTAP staff determined that these valves were kept running, even when employees on the line were not working during their regular breaks.

MnTAP staff recommended operators turn off their nozzles at their workstations during each break. Turning off this water during breaks would neither hurt the production line's operation nor the cleanliness of their workstations. Implementation of this recommendation would save the facility 735,000 gallons of water and \$5,000 per year.

# Reuse and Recirculating Water: Closed-Loop Cooling Water System

Water that is used for cooling production equipment without directly cooling a product is often referred to as non-contact cooling water. In many facilities, non-contact cooling water is used for one pass before it is discharged as waste. Closed-loop water cooling systems, however, can recirculate water through a loop to continually cool products in a particular production stage for weeks or even years before the water is discharged.

The facility in question uses single pass cooling water for its hydraulic systems, and thus, faces the following two challenges to converting it to a closed-loop cooling water system:

**Water temperature.** Typically, city water is pumped into the facility at 60°F (degrees Fahrenheit) to help cool and keep hydraulic fluids at their optimum temperature. By the time the water is discharged, the water temperatures have increased to either 78°F or 88°F. For the facility to be able to recirculate this water, there would need to be ways to prevent the water from picking up too much heat.

**Large-sized contaminants.** There was a concern about how recirculating water might not be enough to prevent the system from being clogged with meat processing waste. These clogs would require manual clean outs or screens that could lead to more staff time, slowed production, and increased labor costs.

MnTAP staff recommended the following two solutions to address the above challenges:

**Install a heat exchanger.** A heat exchanger will help circulate water or antifreeze (i.e., water glycol mixture) to keep water cool or near optimum temperatures. While heat exchangers' upfront cost for installation is around \$82,000, MnTAP staff believe that this would still meet the two-year payback threshold.

**Reroute water from other production stages to maintain water levels.** MnTAP staff determined that some of the water used in one stage of the process could be rerouted into the closed loop cooling water system without compromising product quality or employee safety. This could help keep water levels high enough to prevent the system from being continually clogged by meat waste.

**Annual water savings:**  
6 million gallons

**Cost savings:**  
\$41,000

**Status:**  
Partially Implemented

## Conclusion

Water is a valuable industrial resource that can be used in a myriad ways, including washing, sanitizing, cleaning, cooling, and others. Many uses equal many opportunities for optimization and savings with some being greater than others. Achieving savings at this facility involved a combination of process changes, employee retraining, and engineering controls. Less water used at the plant means lower utility costs and less strain on public water resources, and all this equates to cost and resource savings for the facility.