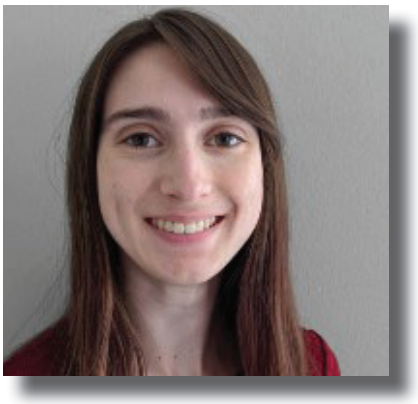
LifeCore Biomedical



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Organization Background

Lifecore Biomedical, LLC is a Minnesota based biopharmaceutical company that manufactures and supplies sodium hyaluronate in a variety of molecular weights and forms. The Chaska, MN location has two facilities, one for formulation and aseptic filling and the other for further packaging. The injectable grade sodium hyaluronate is used by multiple clients for applications in areas such as orthopedics and optometry. The company's mission is to provide high quality innovative product development and manufacturing solutions driven by their commitment to improving people's lives.

"This project was a great opportunity to practically apply my educational background in engineering and sustainability to make a positive impact at Lifecore Biomedical and on the environment. I learned so much about the biopharmaceutical industry while at Lifecore Biomedical from their remarkable employees. MnTAP provided valuable support and helped me to discover that I have what it takes to lead a project." ~ EK

Project Background

Based on recorded water data, Lifecore consumed around 46.5 million gallons of water during 2019. About half (47%) of this water is turned into Water for Injection (WFI) to be used in the production steps of the sodium hyaluronate products. The project consisted of two parts: mapping and identifying water intensive processes in the facility, and recommending and implementing water reduction strategies

Incentives To Change

Reducing water consumption can lead to financial savings related to not only incoming supply, but additional costs such as energy, sewer discharge, and permitting. Investigating water use practices and identifying opportunities for conservation could decrease demand for water and allow processes in the building to conduct work without delaying water intensive tasks. These water conservation opportunities, associated savings, and possible increase in production lead to monetary savings and increased longevity of existing equipment.

"Elisabeth investigated the solutions and proposed the equipment and processes to further investigate. The results were immediate savings of water and some potential projects for future implementation."

~ Kevin Mijal, Senior Facility Engineer

SOLUTIONS

Installing Flow Meters

An ultrasonic flow meter was used to estimate water use of four key unmetered processes. These measurements were compared to the amount of expected water consumption based on standard operating procedures (SOPs). Any water used over procedure volumes was assumed to be saved if meters where installed. Between the four tasks, it was found that approximately 1,800 gallons of water could be saved each week. It was recommended that at least 7 flow meters be installed in strategic locations

Adjustments to Standard Operating Procedures

Current water use SOPs require flow rates and times to be greater than or equal to a set quantity, but do not specify maximums. It was found that on average, an additional 30 gallons of water above the minimum is used per part rinse. A water conservation training section was created to encourage lower flow rates and times.

Another current SOP requires that sinks be left on at a constant low flow to keep the heat exchanger and pipe system sanitized with hot water. It was estimated that 7 to 9 sinks are left on at 0.04 gallons per minute, for a minimum of 4 to 6 hours every day. A sink sanitization

Solutions

study was conducted to test how long the sink ports stayed clean after sanitization. It was found that sinks stayed clean for up to 24 hours without flow. A report was created that suggests removing the documentation and practice of leaving sinks on, as well as adjusting heat exchanger sanitization to once every 24 hours.

Adjusting Condensate Coolers

Pure Steam Condensate in the facility must be cooled down to acceptable sanitary sewer discharge temperatures by condensate coolers, which is done by mixing in colder domestic water supply. It was determined that condensate coolers could be adjusted to allow a higher discharge temperature (approximately 140°F), which would use less domestic water. After adjustments, the combined initial flow rate of 12 gallons per minute (GPM) was decreased to 6.5 GPM. Half of the coolers did not respond to being adjusted and it was recommended that those be fixed to further decrease discharge.

Changing Filter Press Cloth

A filter press is used to collect the sodium hyaluronate for the majority of batches. The current filter press cloth vendor does not control for endotoxins (microbial control) in the manufacturing process. This leads to extensive cleaning of the filters and water use to dislodge potential endotoxins. If an alternative vendor was selected that did control for endotoxins in the manufacturing process, rinsing could potentially be cut in half and conserve approximately 2,300 gallons per use.

Updating/Replacing Reverse Osmosis System

The purification method used to create WFI includes a reverse osmosis system. About 32% of inlet water is rejected and discharged to surface water. The reject stream could be decreased by adding a second pass system, an electro-deionization unit, or replacing it entirely with water softeners and active carbon filters. If the discharge stream was to be eliminated, approximately 11 million gallons could be saved each year.

Recommendation	Annual Reduction	Annual Savings	Status
Install process water meters	55,000 gallons	$115,000	Recommended
Remove practice of leaving sinks on	60,000 gallons	$125,000	Implementing
Create water use training	300,000 gallons	$500,000	Implemented
Repair and adjust condensate cooler temperatures	3,000,000 gallons	$20,000	Implementing
Change filter press cloth type	70,000 gallons	$145,000	Recommended
Replace reverse osmosis system	11,000,000 gallons	$75,000	Recommended

MnTAP Advisors: Matt Domski, Waste Prevention Specialist; Taylor Borgfeldt, Pollution Prevention Specialist