



# Water Conservation at Lifecore Biomedical, LLC

**Elisabeth King**

**MnTAP Advisors: Taylor Borgfeldt and Matt Domski**

**Company Supervisor: Kevin Mijal**



UNIVERSITY OF MINNESOTA

**Driven to Discover<sup>SM</sup>**

# Company Background

## Biopharmaceutical Sector

- **Two facilities in Chaska, MN**
- **Around 350 employees**
- **Operating 24/7 based on 3 shifts**
  
- **Manufactures sodium hyaluronate**
- **Manufactures injectable drugs**
- **Clinical injectable development**



Sodium Hyaluronate Products  
(lifecore.com)

# Project Motivation



Vapor Compression Still (meco.com)

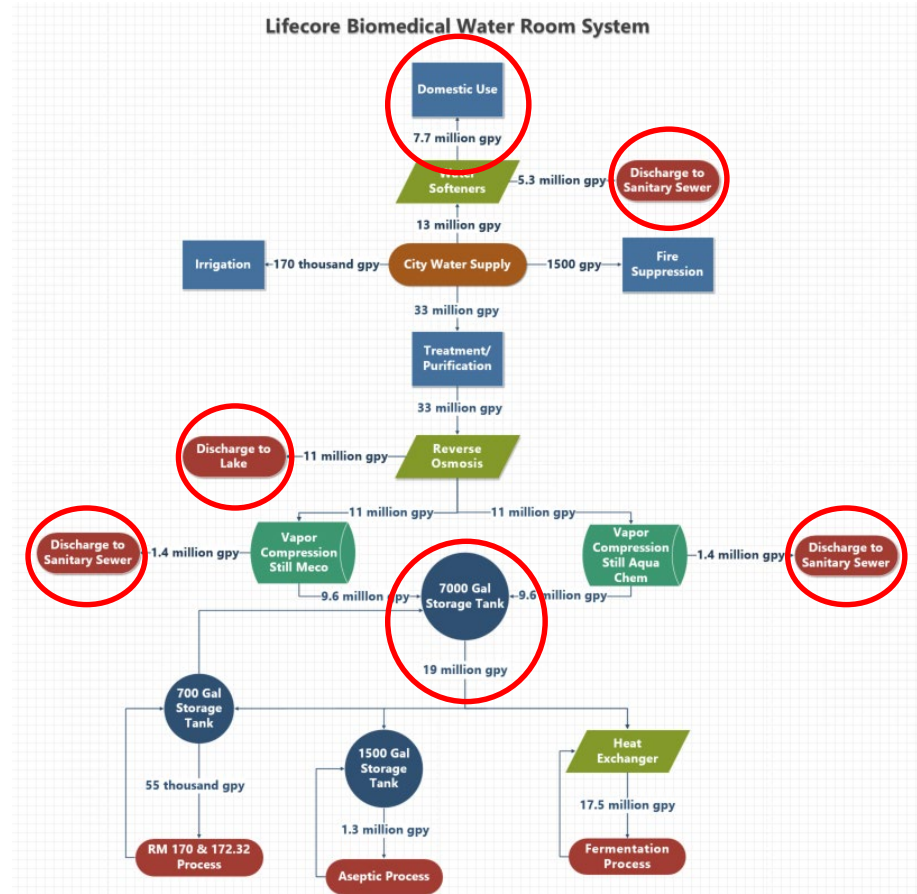
## Water is Key Component

- **Need for consistent Water for Injection (WFI)**
- **Cost and equipment of WFI**
- **Possibility of expansion**

# Project Overview

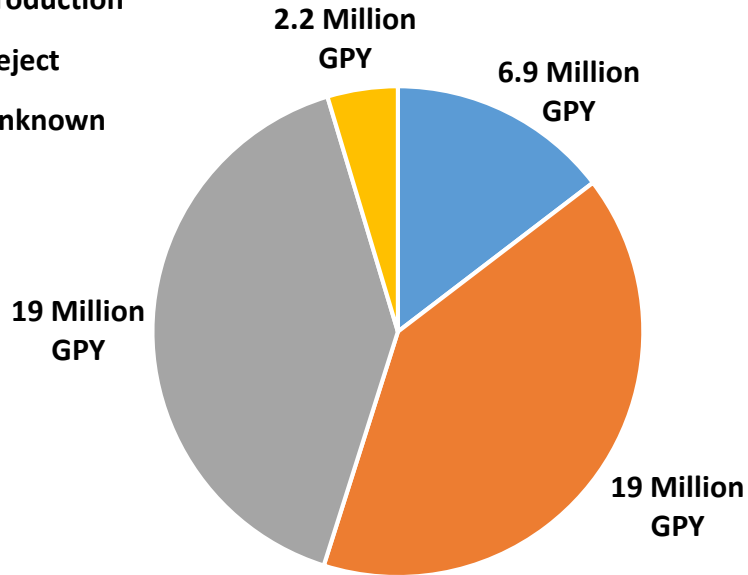
## Water Conservation

- Map water use in facility
- Quantify water intensive procedures
- Identify areas of water conservation



# Water Overview

- Domestic
- Production
- Reject
- Unknown



- |                              | Amount (MGPY) |
|------------------------------|---------------|
| • <b>Not Included:</b>       |               |
| • Irrigation                 | 0.17          |
| • Fire Suppression System    | 0.0015        |
| • <b>Domestic:</b>           |               |
| • Condensate coolers         | 5.3           |
| • Toilets and sinks          | 1.5           |
| • Boilers, chillers, cooling | 0.12          |
| • <b>Production:</b>         |               |
| • Fermentation               | 17.5          |
| • Aseptic                    | 1.5           |
| • <b>Reject:</b>             |               |
| • Reverse osmosis system     | 11.0          |
| • Water softeners            | 5.3           |
| • Vapor compression stills   | 2.8           |

# Approach

## Gather Information

- Analyze records
- Use ultrasonic flow meter
- Observe and meet with technicians

## Apply Information

- Collect more data
- Research
- Create documentation



# Primary Recommendation

Adjustment to SOP – Remove “Trickle”

Trickle (✓)
<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Yes <input type="checkbox"/> No

## Background

- Heat exchangers and pipes needs to be sanitized before use
- Constant low flow left on
- Benefits of trickle not previously tested

# Primary Recommendation

## Adjustment to SOP – Remove “Trickle”

### Methods

- Collected water samples from sink ports without trickle
- Selected sinks with shortest and longest pipe distance

### Results

- Both sinks had 0 CFU/100mL bioburden and < 0.0050 EU/mL endotoxin after 24 hours
- Change practice to leave sinks off and sanitize once every 24 hours

Recommendation	Annual reduction	Total cost	Annual savings	Payback period	Status
Remove practice of leaving sinks on	43,000 – 77,000	\$10,000 - \$20,000	\$90,000 - \$160,000	0.5 - 1 months	Implementing



# Solutions

Recommendation	Annual reduction (gallons)	Total cost	Annual savings	Payback period	Status
Create water use training	25,000 - 570,000	\$5,000 - \$10,000	\$55,000 - \$1,200,000	5 days - 2 months	Implemented
Remove practice of leaving sinks on	43,000 - 77,000	\$10,000 - \$20,000	\$90,000 - \$160,000	0.5 - 1.5 months	Implementing
Repair and adjust condensate coolers	2,500,000 - 3,000,000	\$5,000 - \$10,000	\$17,000 - \$21,000	1 - 1.5 months	Implementing
Install process water meters	42,000 - 68,000	\$12,000 - \$26,000	\$90,000 - \$140,000	1 - 3.5 months	Recommended
Change filter press cloth type	45,000 - 90,000	\$45,000 - \$70,000	\$96,000 - \$190,000	4 - 6 months	Recommended
Replace reverse osmosis system	11,000,000 - 11,500,000	\$250,000 - \$320,000	\$71,000 - \$77,000	3 - 4 years	Recommended

# Anecdote



## Cleanroom Gowning

- **Learned about cleanrooms and controlled environments**
- **Became yellow and blue gowning certified (ISO 7 & 8 cleanrooms)**
  
- **Discovered scrubs are comfy!**