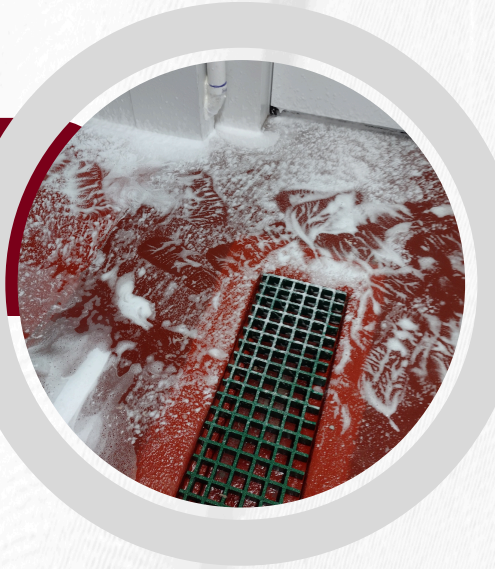
Minnesota Technical Assistance Program

POLLUTION PREVENTION IN FLOOR SANITATION



Overview

Food manufacturers are committed to maintaining consistent food safety and quality. Bacterial contamination can render products inedible or toxic, pose health risks to workers or consumers, lead to substantial financial losses and lost time associated with producing unsaleable goods, damage a company's reputation, and/or expose a company to legal liabilities.

To prevent bacterial contamination from building up on factory floors between routine cleanings, employees often sanitize their footwear with bactericidal chemicals to prevent them from inadvertently tracking bacteria across the facility floor or out of the facility. A common way to administer these chemicals is by what is popularly known as foot foamers, which apply aerated liquid bactericidal chemicals through sprayers at room entryways.

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.

Foot Foamers and Pollution Prevention

On one hand, foot foamers can reduce bacterial food contamination that can contribute to large amounts of food waste from unsaleable products. On the other hand, foot foamers often contain compounds, such as ammonium chloride and ethyl alcohol, that can be hazardous to aquatic life. To ensure safety and effectiveness, it is imperative to closely monitor the chemical concentration and volume of water used when diluting the chemical to the necessary strength. Additionally, the sprayers typically operate with a timed cycle that automatically turns the pump on and off. Setting the spray cycle correctly would help prevent unnecessary energy use in foot foamers.

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Three Best Practices for Chemical Reduction in Floor Sanitation

1. Ensure Proper Chemical Concentration - Adjust Dilution Ratio

At a meat processing facility, MnTAP staff reviewed manufacturer specifications to determine that the foot foamer used by the facility was being diluted to approximately 3,000 parts per million (ppm) above the manufacturer's recommendation of 450 ppm.

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The following calculation was used to determine the volume of foamer needed to achieve the desired diluted concentration of 450 ppm (0.045%) of active ingredients in 3 gallons of water:

$$V(Chemical) = \frac{3\,gallons * 128\frac{ounces}{gallon} * 0.00045}{(1 - 0.00045) * 0.1} = 1.75\,ounces$$

Reducing the volume of chemicals in the solution preparation to achieve the target concentration would save just over 10 ounces of chemical per 3 gallons of water. Using the facility's manufacturing schedule, MnTAP staff determined that the total annual savings associated with chemical reduction would be approximately 3,400 pounds of chemical and $3,300. If the facility wished to further minimize bacterial contamination at entryways, it could use the highest manufacturer-stated concentration of 850 ppm, which would still provide annual savings of approximately 2,800 pounds of chemical and $2,700.

Pollutant reduction:
2,800 lbs. of chemicals

Cost savings:
$2,700

Status:
Implemented

2. Ensure Proper Chemical Volume - Adjust Spray Frequency

In a processed food manufacturer, MnTAP staff observed the foot foamer discharging onto a walking area before previous discharges of foam had cleared the area. After discussing the foamer operation with facility personnel and observing the spray cycle, MnTAP determined that the distance between the foamer ejection and the sprayer could be increased by 40 seconds without impacting facility's food safety objectives. In doing so, the facility would save approximately 1 gallon of undiluted foamer and $50 per foamer per year.

Pollutant reduction:
1 gallon of chemicals per foamer

Cost savings:
$50

Status:
Pending

3. Ensure Proper Chemical Coverage Area – Adjust Spray Angle or Floor Configuration

At a meat processing facility, MnTAP staff observed foot foamers discharging to an area partially covered by a slotted grate atop a trench drain. After measuring the total area of the foamer discharge and the area of the drain covered by the foamer, MnTAP staff determined that approximately 15% of the foot foamer chemical was being discharged directly to the trench drain instead of being used for disinfection. Since the facility was still meeting its food safety objectives even with some chemicals discharging to the drain, MnTAP staff recommended replacing the slotted grate with a solid one and reducing the spray cycle by 15%. Including the cost of purchasing a new grate and reducing the foot foamer by 15% would save 580 pounds of foot foamer and $560 per year, resulting in a return on investment of just over 2 months.

Pollutant reduction:
1 gallon of chemicals per foamer

Cost savings:
$50

Status:
Pending

Conclusion

Pollution prevention does not have to come at the expense of compromising food safety. While the opportunities described above may not provide extensive financial savings, they can generally be implemented with minimal disruption to existing processes. Additionally, depending on the particular chemical makeup of the foot foamer and the facility's wastewater management practices, chemical reduction may provide savings from local pretreatment costs or municipal strength charges. Learnings from these studies have been applied to subsequent MnTAP investigations in other food and beverage manufacturers in Minnesota.