



EDIBLE OIL MANAGEMENT IN FOOD MANUFACTURERS



Overview

Edible oils are used by a variety of food manufacturers as both an ingredient and a method of cooking. Edible oils, also known as cooking oils, are lipids (fats) made from plants, animals, or synthetic compounds used when frying, baking, and preparing foods for consumption as defined by the [Michigan State University](https://www.maizeland.com/2018/01/10/edible-oils/).

Wastewater Pollution Prevention

MnTAP performed a pollution prevention study at a food manufacturer that used canola oil for frying. This oil was stored in an approximately 10,000-gallon heated tank within secondary containment. A drain in the secondary containment led to a trench drain connected to the facility's wastewater pretreatment system.

During a site visit, MnTAP staff observed a slow, constant drip from the ball valve in the secondary containment, which was measured to be approximately 2.5 milliliters per minute (mL/min). Given the density of canola oil at 9.16 gram per cubic centimeter (g/cm³), this drip equates to 1,225 pounds per year of canola oil.

Pollutant Reduction:

- Avocado
- Canola Seeds
- Corn Kernels
- Olives
- Palm Tree Kernels
- Peanuts
- Sesame Seeds
- Soybeans
- Sunflower Seeds

The most common animal-based products include:

- Butter
- Lard (e.g., pork or duck fat)
- Tallow (e.g., beef or mutton)

Using the research on the left as a guide, MnTAP estimates that the steady drip of oil from the drainpipe generates approximately 173 pounds of COD annually.

Insight from the Scientific Literature

Recent environmental literature identified a chemical oxygen demand (COD) concentration of 2,587 milligrams per liter (mg/L) in a solution of 1000 mg/L (0.1%) of vegetable oil.¹

1. Tahir, A. H. F., Kariem, N. O., & Ibrahim, S. A. (2016). COD Removal of Edible Oil Content in Wastewater by Advanced Oxidation Process. *Environment and Natural Resources Research*, 6(2), 57.

Pollutant Reduction:

1,225 lbs. of canola oil
173 lbs. of COD

Cost Savings:

\$1,080 in new oil costs
\$720 of wastewater COD strength charges

Status:

Implemented

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.

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Case Study: Edible Oils

Following MnTAP's site visit, the facility fixed the leak, saving \$1,080 in new oil costs and \$720 per year of wastewater COD strength charges. Fixing this leak also prevented the buildup fat, oil, and grease (FOG) in their wastewater system, which is believed to cause over 50% of blockages worldwide.²

Oil Tank Insulation

In industrial settings, edible oils are kept at higher temperatures for processing and cooking. In 2023, Ventura Foods of Albert Lea, Minnesota hosted a MnTAP intern, and a written summary of her work can be found on the [MnTAP website](#). She identified 38 uninsulated tanks at the plant with an average surface temperature of 120 °F. Over 10% of the plant's natural gas usage is being discharged as heat due to lack of insulation on these tanks.

With the support of facility personnel and MnTAP staff, she reviewed the oil use and insulation options. The insulation selected for this project ended up being closed cell spray foam insulation with DC315 fireproof paint. Installing this insulation will reduce natural gas by 74,000 therms and result in annual savings of \$52,200 annually. Additionally, the insulation will lower the temperature in the oil storage room, thereby improving the facility's industrial hygiene while decreasing the risk of heat-related injuries.

Pollutant Reduction:

74,000 therms

Cost Savings:

\$52,200

Status:

Implemented



Conclusion

Following MnTAP's investigation and reporting, both facilities gained a clearer picture of the opportunities for wastewater load reduction and energy conservation. Oil loss reduction and regular inspections will ensure that COD loads in wastewater are reduced, and proper insulation will improve a facility's energy efficiency and reduce costs. MnTAP has used the learnings from these studies in subsequent investigations in other food manufacturers in Minnesota.

2. Sultana, N., Roddick, F. A., & Pramanik, B. K. (2024). Fat, oil and grease wastewater and dishwashers: Uncovering the link to FOG deposition. *Science of The Total Environment*, 907, 168032.