CUSTOMER’S CHALLENGE

Due to changes in local stream water quality standards for Total Maximum Daily Load (TMDL), the paperboard recycling mill was facing a significant reduction in the regulatory limit on the amount of fecal coliform bacteria which could be discharged into the receiving water following full activated wastewater treatment at the facility. Even though the fecal coliform consisted primarily of non-enteric bacteria, the local state regulatory body required the mill to achieve an overall reduction in the site discharge.

The mill evaluated a number of treatment options based on treatment efficacy, disinfection byproduct formation, operations and maintenance, safety, corrosiveness, and cost.

STUDY DESIGN

The paperboard mill installed a MIOX RIO Zuni 2 on-site generator which uses only salt, water and electricity to produce Mixed Oxidant Solution (MOS) at the facility. Pilot testing to evaluate MOS was conducted using a side stream wastewater flow into a contact chamber. Batch testing was carried out by first introducing 250 gallons of water into the contact chamber and withdrawing control samples establishing initial fecal coliform populations in the untreated water. Using an overhead stirring mechanism, MOS was then added to the desired dose of 5 – 30 mg/L, and additional samples withdrawn after 5, 10, or 20 minutes of contact time and were analyzed for post-disinfection fecal coliform populations.

CONCLUSION

MIOX’s MOS was able to meet the regulatory target for fecal coliform under nearly every condition tested in the pilot study. Bacteria control in these waters can be achieved through ensuring either the amount of MOS added to the water or the contact time of the MOS was long enough to achieve the desired bacteria inactivation outcomes.

Results from these and other pilot tests were used in the design of a full scale disinfection treatment program at the mill using a MIOX VAULT M60 on-site generation system.

MIOX’s Mixed Oxidant Solution disinfects recycled paperboard mill wastewater to prevent introduction of fecal coliform bacteria and allows mill to meet TMDL water quality standards, stay ahead of future regulatory compliance and contribute toward Corporate Sustainability initiatives.
**COLIFORM BACTERIA CONTROL**

This graph shows the results of the batch scale pilot tests with different applied MOS doses and contact times. The native fecal *coli*form population in the water being tested was an average of 1,600 MPN/100 mL (0 mg/L data points). In most conditions tested, no fecal *coli*form bacteria were detected in the treated water, and this result was more likely to be accomplished with either increased dose or increased contact times.

![Graph showing the results of the batch scale pilot tests with different applied MOS doses and contact times. The native fecal *coli*form population in the water being tested was an average of 1,600 MPN/100 mL (0 mg/L data points).](image)

**RESULTS**

**REGULATORY COMPLIANCE**

Using MIOX’s MOS as a disinfectant for mill wastewater, the facility will be able to meet future TMDL regulatory requirements ahead of schedule for fecal *coli*form populations of less than 100 MPN/100 mL in the discharged wastewater.

**ENVIRONMENTAL STEWARDSHIP**

On-site generation of disinfection reduced carbon footprint by 80% by replacing five truck deliveries of liquid bulk sodium hypochlorite with just one delivery of table salt. The use of MOS will improve overall water quality discharged from the site into the local stream.

**PLANT SAFETY IMPROVEMENT**

The mill demonstrates improvements in employee safety by choosing a disinfectant whose only precursor (table salt) is inherently safe. The MOS solution is non-hazardous and generated at a <1% concentration with zero PPE requirements in case of a spill or personnel contact.

The facility will also be able to use the oxidant generated on site for filamentous control in the activated sludge process, further reducing storage of delivered 12.5% sodium hypochlorite.

**ECONOMIC ANALYSIS**

This graph compares 10 years of operational cost for treatment of the mill wastewater stream using MOS vs. 12.5% sodium hypochlorite and chlorine dioxide.

Along with enhanced biological control and improved safety, MOS provides a significant cost advantage over the common disinfectants historically used for industrial wastewater treatment.