

F:M Stabilization at a Mechanical Wastewater Treatment Plant

Wastewater treatment plants receiving inconsistent influent loads often face challenges maintaining effective biological treatment. Many key microorganisms in wastewater processes depend on organic substrate to grow and divide. When influent flows are limited, the biodegradable carbon source available to the treatment system may be too low to sustain biomass. Insufficient organic substrate in the plant can reduce biological treatment efficiency. Calculating the food-to-microorganism ratio (F:M) is one way to monitor changes in organic carbon quantity and biomass in a system. Although optimal F:M ratios vary among treatment plants, they can fall below stable values when the carbonaceous food supply is limited.¹ Augmenting a wastewater process with an external carbon source can help balance the F:M ratio. BioLynceus® Candy Carbon® is a high-strength organic carbon product. The following paragraphs detail the use of CC at a mechanical wastewater treatment plant (MWTP) struggling to maintain year-round biomass stability.

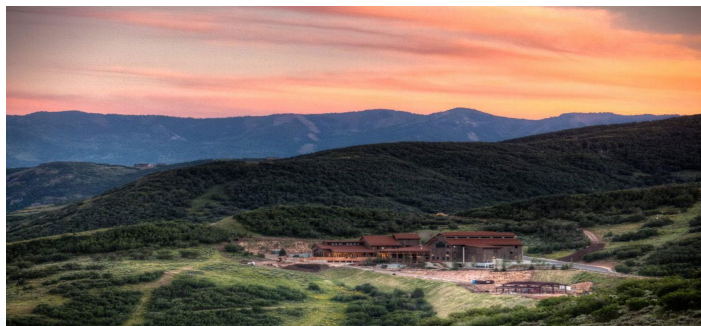


Figure 1. Resort location where the study MWTP received toxic waste from tourist and distilling activities.

A 0.06 MGD MWTP at a resort in Utah was having difficulty maintaining a consistent F:M ratio. During weekends and peak recreation seasons in winter and summer, the resort hosted thousands of visitors. The resort had consistently high flows during these periods.

Consequently, the biomass in the system was not supplied with a consistent food source to facilitate growth and metabolism. Conversely, during weekdays and off-seasons in fall and spring, the biology in the plant suffered. Organic carbon inputs were too low to sustain the organisms that multiplied when visitors were present. Issues arose during rapid transitions between low and high flows throughout the year. When high flows returned, the plant biomass was dispersed and unable to utilize the increased organic substrate in the influent. This resulted in high biological oxygen demand and nutrient concentrations in the effluent wastewater. Plant operators struggled with this for years and needed to secure a viable food supply for the biology when flows decreased.

The plant was using Old Roy dog food as a daily organic carbon supplement, but it did not effectively support the biology at the facility. Plant management contacted BioLynceus®. A company representative suggested replacing the dog food with CC. The CC treatment would provide a concentrated organic carbon source to sustain the wastewater microbiology when tourists were absent.

Over 120 days, CC was applied to the aeration basin. The treatment kept the biomass active despite variable influent loading and also improved long-term denitrification. After the plant's biology had been sustained year-round, the facility manager reported, "I am extremely pleased with the BioLynceus® product."

The treatment balanced the system's F:M ratio and improved denitrification.

¹ Mishoe, G.H. (1999). F/M ratio and the operation of an activated sludge process. Florida Water Resources Journal 3, 20–21.