

F:M Stability in a Sequencing Batch Reactor

In many resort towns, influent loads to wastewater treatment systems are highly variable throughout the year. During tourist seasons, there is an abundance of wastewater to sustain the biomass at treatment facilities. However, when the transient population leaves, there is a drastic reduction in organic substrate. The organic carbon supplied to the system, the carbonaceous biological oxygen demand (CBOD), serves as a food source for organotrophic organisms in activated sludge systems. The ratio of food to microorganisms (F:M) in wastewater declines correspondingly with CBOD. Low levels of organic substrate slow cellular growth, indicating that the biomass is using emergency carbon stores to fuel cellular function.¹

Eventually, the biology in the system becomes dispersed and unable to efficiently process influent wastewater. Augmenting a treatment process with an external carbon source helps balance the F:M ratio. As a healthy F:M ratio is achieved, the biological treatment process is supported, providing a higher-quality effluent. The remainder of this document discusses a successful application of Candy Carbon® (CC) to improve organic substrate availability and biomass stability.

A small town on the eastern slope of the Sangre de Cristo Mountains in Colorado was dealing with inconsistent flows at its wastewater treatment plant. The town's SBR received average flows of 0.003 MGD when seasonal residents and visitors were present from May through December. However, influent flow dramatically decreased when visitors left each year between January and April. From September to December, there were also short periods of vacancy in the town that impacted the volume of organic inputs to the treatment plant.

During these periods of low flow, the biology in the SBR was not receiving an adequate supply of organic carbon. This caused biomass mortality, which produced a rancid odor at the plant during the late winter months. The facility needed to find a reliable organic carbon source to keep the plant's biology alive when influent substrate loads were limited. The SBR operations supervisor contacted BioLynceus® to inquire about its non-methanol carbon supplement.



Figure 1. A sequencing batch reactor similar to the one located at the plant. A strong-smelling odor was emitted from the plant during periods of low flow in the late winter months.

BioLynceus® Candy Carbon® (CC) was implemented at the system headworks to supply the plant with high-quality organic carbon. The CC treatment kept the biology in the reactor alive until the transient population returned in the spring. Additionally, effluent quality at the SBR improved after CC applications. The facility remained fully functional year-round without producing bothersome odors. Even with variable influent loads, CC helped the SBR maintain biomass that efficiently processed wastewater.

¹ Gerardi, M. (2006). Wastewater Bacteria. Hoboken, New Jersey: John Wiley & Sons, Inc. p. 73.