

Candy Carbon® Denitrification in an Activated Sludge System

For many municipal wastewater treatment facilities, reducing inorganic nitrogen to permitted discharge levels is a challenging requirement. Without the role of biological nutrient removal (BNR) in treatment systems, effluent wastewater can contain high concentrations of nitrogenous species. Specifically, discharging nitrate loads into surface waters can have adverse impacts on aquatic environments, including eutrophication and toxic algal growth. Because of this, wastewater facilities are obligated to keep their biological treatment functioning properly.

For denitrification to proceed efficiently, wastewater treatment facilities must maintain several environmental conditions. These include sustaining an adequate abundance of denitrifying bacteria (DB) in the biomass, forming an anoxic zone, and maintaining consistent organic carbon inputs to the anaerobic process. DB must be present in the anoxic zone for nitrate removal to occur. These organisms require a stable, low-dissolved-oxygen environment to reduce nitrate to nitrogen gas. Organic carbon availability in the anaerobic process is a limiting factor for denitrification.¹

Internal carbon substrate is often exhausted during aeration in activated sludge systems, leaving very little to support denitrification. Previous studies have found that adding external organic carbon is necessary to achieve optimal nitrate removal.²

1 Gerardi, M. (2006). Wastewater Bacteria. Hoboken, New Jersey: John Wiley & Sons, Inc., p. 86.

2 United States Environmental Protection Agency (EPA). (2013). Wastewater Treatment Fact Sheet: External Carbon Sources for Nitrogen Removal (EPA 832-F-13-016). Washington, DC: EPA Office of Wastewater Management.

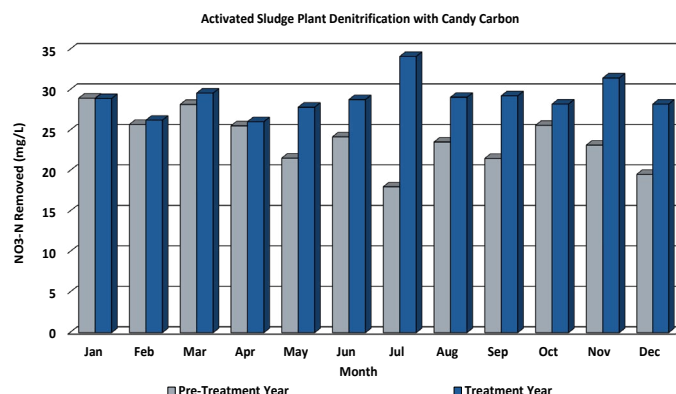


Figure 1. Monthly nitrate as N (NO₃-N) removed from the ASP anoxic basin was measured over two years, with CC treatment (blue) and without CC treatment (gray).

BioLynceus® provides an alternative organic carbon source, Candy Carbon® (CC), to fuel BNR. The following case study summarizes the use of CC at a 0.2 MGD activated sludge plant (ASP).

The ASP was not achieving denitrification in the secondary treatment basin. To avoid permit violations for nitrate, the plant operators began supplying the system with daily doses of CC. The product was applied to the anoxic zone, where DB were reducing nitrate in the wastewater.

Within days, nitrate concentrations in the facility's effluent decreased significantly. Monthly nitrate removal increased during CC treatment (Figure 1). The greatest monthly increase in removal between the pre-treatment and treatment years occurred in July at 16 mg/L, while the smallest occurred in January at 0 mg/L. Candy Carbon® helped improve denitrification at the ASP.

BioLynceus® Candy Carbon® provides a quality organic carbon source for denitrification.

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