



SUFFIELD WATER POLLUTION CONTROL AUTHORITY

SUFFIELD, CONNECTICUT

CASE STUDY

A \$5.3 million upgrade of Suffield's wastewater treatment facility failed to improve nitrogen removal. For 2½ years the facility – operated in accordance with the design engineer's recommendations – discharged total-nitrogen averaging 6.8 mg/L. Relatively minor operational changes now produce an effluent total-nitrogen of 1.2 mg/L.

Suffield is not only complying with its 4 mg/L total-nitrogen limit, because less electricity is consumed, Suffield is operating a more sustainable wastewater system. The plant's carbon footprint been reduced, and Suffield is now spending \$30,000 less annually on electricity.

Effluent phosphorus now averages less than 0.5 mg/L; without any chemical addition. Prior to the process changes, total-P averaged 1.7 mg/L.

Background. In 2006, the Suffield municipal wastewater treatment plant was upgraded in order to: (i) bring Suffield's 3.02 MGD dual train, two-step oxidation ditch facility into compliance with new Long Island Sound nitrogen limits, (ii) accommodate a high industrial organic loading, and (iii) replace chlorination with UV disinfection.

For nitrogen removal, a pre-anoxic tank and two internal recycle pumps were installed. A new final clarifier was installed and UV disinfection replaced the gas chlorine system. Effluent BOD and TSS improved to 5 mg/L, but the new equipment did not improve nitrogen removal. Effluent nitrogen averaged 79 lbs/day (6.8 mg/L), nearly double Suffield's 2014 nitrogen discharge limit of 45 pounds per day. The t-N discharge now averages 14 lbs/day (1.2 mg/L).

Process Changes. One of the two fixed-speed internal recycling pumps (2,400 GPM) has been turned off and the second pump is operated only 18 hours per day. The reduced internal recycle rate doubled the hydraulic retention time in the pre-anoxic zone, beneficially causing the tank to become anaerobic. Now, the tank converts 0.8 mg/L of the influent organic-nitrogen to ammonia.

Mechanical aeration mixer settings were changed to provide less aeration in the first pass and more in the second, the opposite of the engineer's settings. The short, initial aeration zone solubilizes the high particulate BOD waste from an ice cream manufacturer. This provides a ready supply of BOD to promote nitrate removal in the subsequent anoxic zone (a 4.7 mg/L improvement). The longer retention time in the second aeration zone that results from the reduced internal recycle rate provides for more consistent, complete ammonia removal.

Better treatment, with a smaller carbon footprint, and at lower cost. The Water Planet solution!

