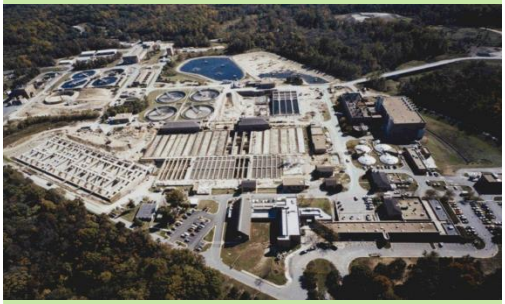
Virginia's Largest MBBR Protects the Chesapeake

Biological Treatment | Case Study

Fairfax County, Virginia

The Client

The Noman M. Cole Jr. Pollution Control Plant (NCPCP) is an award-winning municipal wastewater treatment plant owned and operated by the Fairfax County Government and is located in Lorton, VA. The NCPCP is currently permitted to treat up to 67 million gallons per day (MGD).



The Benefit

MBBR effluent achieves NO_X-N ≤ 2.0 mg/L while also limiting the soluble $CBOD_5$ increase to ≤ 1.0 mg/L across the process to meet strict limits.

The Client's Needs

As part of a long-term strategy to protect and restore the Chesapeake Bay, Fairfax County developed a Nutrient Reduction Program (NRP) for the NCPCP to significantly reduce nitrogen and phosphorus in the plant's effluent. To meet Virginia's Enhanced Nutrient Removal (ENR) regulations, the NCPCP needed to meet a total nitrogen (TN) effluent limit of 3.0 mg/L, which required effluent NO_X-N (Nitrate-N+Nitrite-N) from the MBBR to be less than 2.0 mg/L. At the same time, to meet BOD limits, the increase in $sCBOD_5$ across the MBBR was required to be less than 1.0 mg/L.

The Solution

AnoxKaldnes™ moving bed biofilm reactor (MBBR) technology utilizes engineered biofilm carriers to provide compact and efficient wastewater treatment. In municipal wastewater, MBBR is used for BOD removal, nitrification, deammonification, and – in the case of the NCPCP – for denitrification. The MBBR carriers support a robust population of biofilm to provide treatment. They are retained in the reactor with the use of stainless steel media retention screens. Mixing of anoxic reactors is done by top-entry or submersible mixers, depending on the application. Aeration of oxic zones is accomplished using stainless steel air grids.

Virginia's Largest MBBR Protects the Chesapeake: MBBR

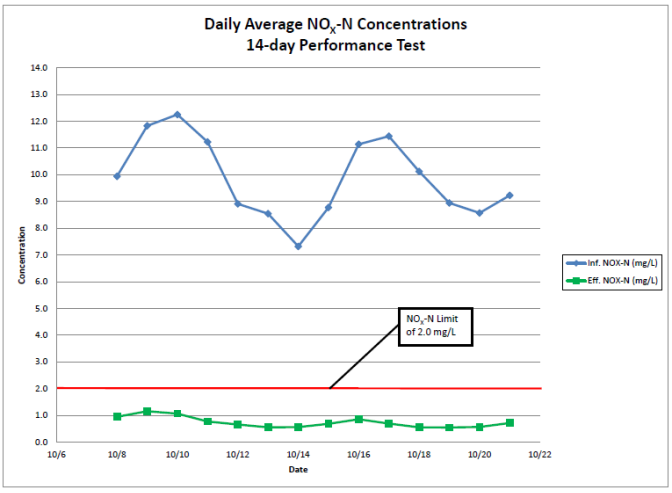
Process Description

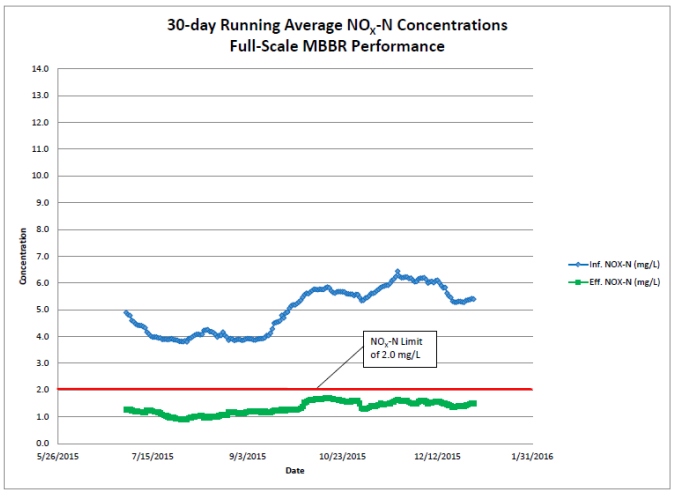
Kruger, the Veolia US Municipal Solutions business unit, designed a six (6) train AnoxKaldnes MBBR system to treat a future design flow of 78.4 MGD. There are five (5) trains currently in operation with the ability to add one (1) additional train into service in the future. Each train consists of two (2) anoxic MBBR reactors for denitrification. The anoxic reactors utilize AnoxKaldnes K1 media. Flat stainless steel screens retain the K1 carriers in the MBBR reactors. Submersible mixers provide mixing in the anoxic reactors. A methanol dosing system provides the carbon necessary for denitrification.

Following the anoxic MBBR reactors, each train is equipped with a re-aeration reactor to oxidize any excess methanol. The entire system is thus a precisely engineered balance to remove nitrogen to very low concentrations, while at the same time ensuring that excess carbon does not bleed through to the MBBR effluent. K1 media is used in the re-aeration reactors and retained with cylindrical stainless steel screens. Aeration is provided by AnoxKaldnes stainless steel medium bubble air grids. These provide a robust, proven and maintenance-free mechanism for aerating MBBR reactors.

Results

At the NCPCP, the AnoxKaldnes MBBR system proved itself during the 14-day performance test, when effluent NO_x-N concentrations were maintained below the required 2.0 mg/L (see graph below left). The system has continued to provide consistent treatment, as shown by the six months of data covering the last half of 2015 (see graph below right). The AnoxKaldnes MBBR system is thus performing well to allow the NCPCP to meet Virginia's strict ENR regulations to protect the region's vital Chesapeake Bay resource.





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