

CASE HISTORY:

MUNICIPAL WWTP - INSTALL OF BIOS AND PAL CONTROL SOLUTION

CITY OF LEBANON, PA

INSTALL DATE JUNE, 2012

SYNOPSIS

Advanced treatment including BNR (Biological Nutrient Removal) facilities requires precise operational control to produce the desired result. Next-generation, intelligent control solutions provide the know-how and precision automation necessary to operate these facilities. With almost 30 online instruments, intuitive user interfaces, predictive and adaptive logic, and multiple fail-safes and overrides “*very few changes are required by the system when in auto and we are exceeding our original goals [...] in large part to the robust system designed by BioChem.*” – Frank DiScullio Jr., Wastewater Systems Director

BACKGROUND

In June of 2012, the City of Lebanon Authority began a BNR upgrade project to reduce their region’s environmental impact on the Chesapeake Bay. The plant’s goals were to reduce Total Phosphorous to 0.8mg/L and Total Nitrogen to 6mg/L. Total Nitrogen objectives are required to support a TMDL (total maximum daily load) of 146,000 pounds per annum or approximately 8mg/L at the plant design flow.

To satisfy these increasingly stringent effluent requirements, an Integrated Fixed Film Activated Sludge (IFAS) process with anoxic/aerobic swing zones and polishing denitrification filters was constructed to provide the necessary BNR treatment in the small plant footprint available. Coarse bubble diffusers are used in the IFAS zones for air scouring and increased mixing whereas fine bubble diffusers are provided in the swings zones for energy efficient supplemental aeration.

CHALLENGE

Complex, advanced treatment facilities including BNR plants frequently require a level of operational precision that is beyond the capabilities of traditional plant staffing. Simple feedback control systems traditionally employed to automate processes like this frequently sacrifice precision and accuracy for reliability and cannot typically be depended on to facilitate the achievement of plant effluent goals. The Lebanon facility is particularly challenging in this respect as it consists of multiple different biological treatment processes and utilizes both fine pore and course bubble aeration hardware.

EXECUTION

BioChem’s BIOS (Bioprocess Intelligent Optimization System) and PAL (Predictive Aeration Logic) provide integrated process and operational control of the entire biological process. Control of key high frequency operating functions includes:



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EXECUTION CONTD.

- Determination of optimal DO setpoints for all biological treatment zones including the operating function of swing zones
- Control of both coarse and fine bubble systems
- Reprogramming single-stage blower MCP for flow based operation
- Control of internal mixed liquor recycle flows
- Control of trickling filter bypass for denitrification carbon balance
- Control of supplemental chemical feeds

RESULTS

The PAL and BIOS control systems together conduct the secondary treatment process to exceed the plant's daily TN and P effluent goals. In 2015, the plant discharged a total of 65,471 pounds of nitrogen compared to its permitted limit of 146,000 pounds, and did so while reducing aeration and energy requirements between 40%-47% vs. manual control.

TESTIMONIAL

Biochem has given the City of Lebanon Authority the ability to look at historical trends by providing an additional computer and monitor inside the control panel. This has been very beneficial in troubleshooting. Recently, we had an air valve that was torque tripping every couple of hours and with Biochem's backup control, the valve would go to 50% to provide sufficient air to that zone even though the valve had malfunctioned. We were able to use the historical trends to see what was happening and fix the problem.

Biochem was very easy to work with from the beginning. I recall changes that were made during our first trip to their facility for Factory Testing. During startup, they would work to make sure we understood how to operate the system and make changes to suit our needs. When they weren't at our facility, they were quick to respond to phone calls, emails and text messages.

Our Operators find the Bioreactor Process Control System very easy to navigate and make changes. However, very few changes need to be made when everything is in Auto. Today, we are exceeding our original goals and can reduce Total Phosphorous to as low as .4 mg/L and Total Nitrogen to 3 mg/L in large part to the robust system that was designed by Biochem.

Satisfied Customer,

Frank DiScuillo Jr., Wastewater Systems Director
City of Lebanon Authority, Lebanon, Pennsylvania