

bottling company uses Sievers* InnovOx On-Line TOC Analyzer to optimize membrane bioreactor wastewater system

challenge

The wastewater treatment system at a major bottling company struggled with high organic strength and solids content due to increased production. Consistent operation was complicated by highly variable influent, including major fluctuations in sugar loading, plant flow, and high solids.

These challenges often resulted in discharges to the local Publicly Owned Treatment Works (POTW) that exceeded permit limits. Consistent chemical oxygen demand (COD) removal, as required to meet local regulations, was also hindered. The manual COD testing required more than three hours to generate results and the values were insufficient to allow for process adjustments.

Plant expansion efforts were discussed, but stalled due to lack of space and the severity of fluctuation from the production facility.

solution

Plant modifications were made to allow for the diversion and storage of concentrated organic and high COD waste. After capture, the concentrated waste is slowly metered back into the process during periods of low concentration flow. With priorities being “clean” effluent and the system’s small footprint, the decision was made to add a membrane bioreactor (MBR) system.

The membrane system utilized an on-line carbon load analysis to help maintain healthy biomass to consume “sugar” by optimizing the nutrient ratio. The facility installed a Sievers InnovOx On-Line TOC Analyzer. The Sievers InnovOx On-Line technology offered the most extensive organics monitoring system for the bottler’s situation, including unparalleled oxidation robustness, a dynamic linear working range of 0.05 to 50,000 ppm, and six-month calibration curve stability. It also offers user-configurable alarms and outputs and an intuitive touch-screen display. Sievers InnovOx On-Line is extremely versatile and its multi-stream capability allows users to run up to five sample streams with just one instrument.

To provide healthy biomass, a 100:5:1 ratio (carbon/nitrogen/phosphorus) is required for the bottler’s application. As the component with the highest variability and by far the largest concentrations, the bottler decided to continuously monitor the organic carbon load and add an ammonia product to the equalization basin to maintain the carbon/nitrogen ratio.



The TOC Analyzer, programmed to output load data as a correlated COD value, was used for the process control input to dose ammonia as COD varied. Phosphorus needs were met with the basic flow characteristics. **Figure 1** shows a schematic of the bottler's new wastewater treatment system.

results

Upon system stabilization, various benefits of the MBR were realized including:

1. Total suspended solids (TSS) in the effluent was drastically reduced.
2. COD removal was greatly improved.

Implementing an on-line TOC Analyzer and correlating the values to the COD test allowed the operator to adjust the carbon/nitrogen/phosphorus ratios.

Including the Sievers InnovOx On-line with SUEZ MBR system solved many of the water quality issues that the bottler's wastewater treatment plant was experiencing.

The combined solution saved the bottler hundreds of thousands of dollars per year on costly chemicals, waste hauling fees, and fines. The system was also much easier to operate mechanically and upsets no longer caused violations in permit requirements.

An MBR system with reliable on-line analytics can provide results well beyond a conventional system. It is one of the reasons why MBR popularity increased in recent years, causing industrial MBRs to comprise approximately 27 percent of all commercial MBR installations as of 2000¹. The Sievers InnovOx On-Line enables process optimization by measuring organics thus nutrient load can be adjusted as needed.

References

¹ Brindle, K., Jefferson, B., Judd, S., and Stephenson, T., *Membrane Bioreactors for Wastewater*.

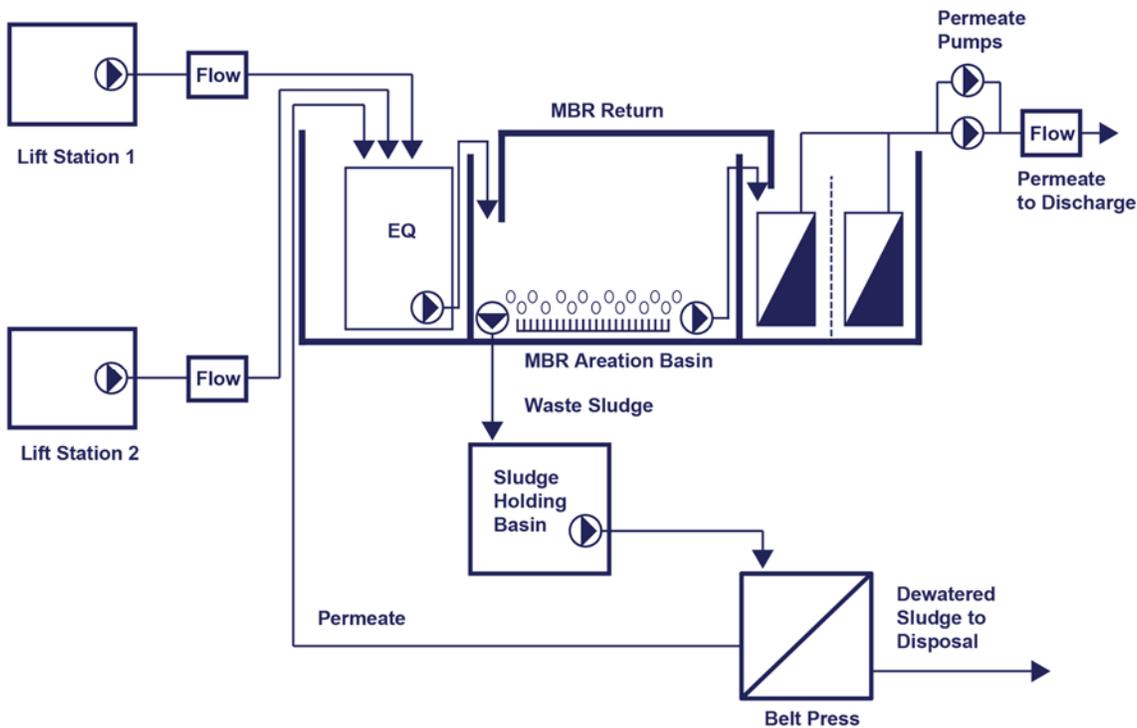


Figure 1. A schematic of the bottler's new wastewater treatment system