Improving to Adhere

By Elizabeth Pyles
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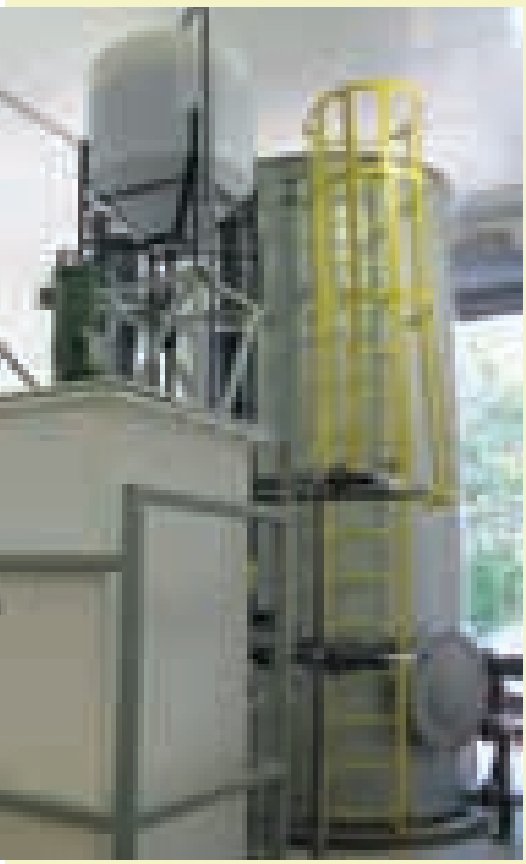
A New England water district adopts new technology to achieve DBP compliance



The first MIEX system in the New England region commenced operation in Newport, Maine, in late June 2009. This is the first such system in the U.S. to continuously operate with sodium bicarbonate regeneration.

The Newport Water Plant (NWP) is a traditional slow sand filtration plant that pulls from a low-turbidity and low-alkalinity pond. Chemical additives used at the water plant included caustic soda, hydrofluosilicic acid and sodium hypochlorite solutions.

Being a small system, the district was required to comply with the U.S. Environmental Protection Agency Stage 1 Disinfectants and Disinfection Byproducts (D/DBP) Rule in January 2004. The first quarter of 2004 did not bring acceptable DBP levels; it resulted in haloacetic acid (HAA5) in excess of 80 µg/L. Operations staff attempted to optimize finished water chemistry, but both trihalomethane and HAA5 averages continued to trend above their respective maximum contaminant levels.

By the end of 2004, it was apparent that a significant capital improvement project would be necessary to successfully comply with the Safe Drinking Water Act.

Taking Action

MIEX technology was first considered in 2005 when Thomas Todd, Newport Water District (NWD) general manager, visited a MIEX pilot test being operated in Massachusetts. At the time, Todd had thoughts of installing membrane filtration with a small amount of coagulant for removing total organic carbon (TOC). Pilot testing indicated that enhanced coagulation would not decrease TOC sufficiently to maintain long-term compliance with the Stage 1 D/DBP Rule.

In 2007, the district, in consultation with its engineer Wright-Pierce, decided to evaluate biologically active granular activated carbon (BAC) head to head with the MIEX process. The pilot was conducted in late September 2007. At the time, raw water and finished water TOC levels averaged about 5 mg/L and 3.5 mg/L, respectively.

With the MIEX process, average TOC levels were reduced to less than 1.5 mg/L—a 73% reduction, on average—while BAC reduced the TOC levels by 53%. As a result, it was determined that the MIEX system would enable NWD to comply with the Stage 1 and 2 D/DBP Rule at lower capital and operating costs.

Customization

Sodium chloride is typically used to regenerate the MIEX resin. The resulting brine waste can then be discharged to the local sewer. This disposal option, however, was not available to the NWP, and the cost to haul the brine waste for offsite disposal was prohibitive.

As a solution to this issue, Orica Watercare, along with Wright-Pierce, determined that sodium bicarbonate could be used as an alternative regenerant solution to regenerate the resin.

WATERTREATMENT

The cost of handling and disposing a sodium bicarbonate solution with natural dissolved organic matter on site was determined to be far lower than the cost of hauling brine waste off site for disposal.

"Creativity is required to help smaller communities design water treatment systems that work for their facilities—systems that provide the best method to achieve the highest water quality and meet new regulations," said Jeff Musich, P.E., vice president of Wright-Pierce. "The district's water quality will meet stringent federal and state requirements, and consumers should notice improved taste and reduced color."

The 420-gal-per-minute MIEX system was commissioned in June 2009. Water quality data measured shortly after startup showed dissolved organic carbon and true color average reductions at 76% and 86%, respectively, which is in line with expectations and pilot results. WWD

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