Flow Pacing
for optimum results

Controlling flow during a WRF filter basin expansion

By Jim Poff & Bruce Wilson

When the Clayton County, Ga., Water Reclamation Facility (WRF) expanded its capacity from 6 million gal per day (mgd) to 10 mgd, an expansion of the filter basin was a major part of the project. This filter basin performs the plant's tertiary filter treatment, just ahead of the ultraviolet treatment, and is made up of Schreiber's Fuzzy Filters, which were selected in 2000 to replace the sand filters previously in place.

A view of the complete filter basin.

Other plant equipment forms a backdrop for one part of the filter lineup.

One of nine control panels; there is one for each filter position.

The selection was based on the performance of a pilot unit. The Fuzzy Filter has a high flow rate with a small footprint. It also uniquely uses the influent feedwater for washing rather than having to store and reuse final effluent to wash.

The expansion was called for based on the area's population growth projections and because some of the plant's equipment was nearing the end of its expected life cycle. The Clayton County WRF also was facing a lower allowed concentration of phosphorous in the effluent, down from a level of 0.30 ppm to a new limit of 0.18 ppm.

The filters are critical to meeting the lower effluent phosphorous limit. To the original contingent of five filters, the expansion project added another four. Based on the county's good experience with the initial complement of Fuzzy Filters, they were used in the expansion. The WRF has space for an additional three filters.

Flow Pacing

During the expansion, plant influent flow dropped significantly. With more filters and less flow, the WRF staff found that flow volume through the plant sometimes fell below 10 gal per minute (gpm)/sq ft—the level needed for the filters to wash effectively. This caused inconsistent quality in the plant's effluent and was deemed an undesirable, unacceptable situation.

After discussing the situation with Schreiber and control system integrator Revere Control Systems, it was determined that the solution was a flow pacing program in the filter controls. The essence of this program involves using the flow measurement signal from the filters and taking a filter offline whenever the flow drops below 14 gpm/sq ft. This configuration remains in place until the flow rises to greater than 30 gpm/sq ft. At that point, a filter is brought back online. The process can continue to add filters, up to the maximum of nine, in order to keep the flow level at less than 30. This way, the flow always stays within the optimum hydraulic loading and adequate wash water is available.

The automatic nature of the flow pacing is very important. Without it, the county would have had to make these adjustments manually, and it is not staffed to handle such manual operations. In addition to the flow pacing, the controls also assure that each filter automatically goes through its wash cycle once every 24 hours.

Project Outcome

The project to add the flow pacing logic, led by a team of Schreiber and Revere Control Systems associates, was well executed.

According to Revere Project Engineer Ben Lamar: "We met with the customer to find out exactly what they wanted and developed a scope of work. After performing the programming, we had the customer come to our facility to demonstrate the program on a working demo unit. The test verified the logic was implemented per the scope of work. We also tested it against the test procedure agreed upon. The new logic was installed without ever having to take the filter system offline. The install took place on a Monday and Tuesday [March of 2009] and was observed overnight into Wednesday. On Thursday, when a couple of minor bugs surfaced, we logged into the system remotely and took care of them."

The pacing program has been working fine ever since. The benefits of this flow pacing program stem from continuous operation of the filters in their performance "sweet spot." This yields a consistent quality of the effluent and energy savings.

These benefits were achieved through a collaborative effort that fully identified the problem, achieved consensus on a solution, developed an implementation plan and successfully carried through on the plan. WWD

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