Filter force

An Arizona treatment plant discovers water and cost savings in a water reuse initiative

By Shannon P. Murphy

The Northwest Valley Regional Water Reclamation Facility (NVRWRF), owned and operated by Arizona American Water, is nestled in the North Phoenix, Sun City, Peoria area of central Arizona and is responsible for treating 2.5 to 3.5 million gal of wastewater per day.

Having both wet and dry odor scrubbers on site, NVRWRF utilizes mainly the wet scrubbers; however, due to space availability and cost the facility needed to convert the existing wet scrubbers over to dry. Additionally, the plant was put to task to save money. In the process, the group found a simple project that has saved more than just money.

Initiative to Save

In June 2008, as part of its overall cost reduction initiative, the NVRWRF was challenged by Operations Manager Doug Griffith to come up with new and innovative ways to reduce water consumption in regard to odor scrubber operations. Maintaining odor control is of critical importance because of a residential neighborhood located less than 300 yd east of the facility.

NVRWRF has a unique open-communication relationship with the neighboring community that ensures continued proper operation of the odor scrubbers at all times. At the time, facility odor scrubbers were using between 36,000 and 43,000 gal per day of potable water at a cost of about $5,000 to $7,000 per month. After reviewing the plant's total water consumption, it was determined that these odor scrubbers were using approximately 75% of the entire potable water consumption.

Following a review of the engineering drawings of the facility, Senior Plant Operator John Lulewicz devised a plan to reuse water from the facility's 1.2-million-gal equalization basin. This basin is an uncovered holding reservoir immediately prior to tertiary filter treatment. The facility's in-plant water pumps (nonpotable) pull water from this basin.

Arizona American Water located one of these nonpotable water lines within 50 ft of where new Watts Big Bubba filters were to be installed. Being that the basin is open air controlling algae growth, the situation was challenging. Because the water is treated before it enters the basin, the main issue was how to further filter the water to remove any remaining solids and ensure algae control.

Additional Filtration & Lessons Learned

Upon further review, the facility decided to add another layer of sediment filtration and chlorine addition. Initial plans for the system were leaning toward the use of a chlorine injection system, but NVRWRF wanted the entire system to be as nonmechanical as possible. Based on that and a review of available technologies, it was decided to utilize CL_2 tablets instead.

A concrete pad was poured outside the chemical building, and a line was trenched to tap into the closest nonpotable water line. Upon review of products available in the field, Arizona American Water decided to utilize two Watts Big Bubba filter housings with sediment cartridges, which were installed in sequence. Within a few days the filter cartridges were plugging up due to algae buildup. The filtration system went online in August 2008, in the peak heat of summer out in the Arizona desert, where algae control is at its most difficult.

Based on the flow reduction and the pressure buildup on the filter elements, Arizona American Water began experimenting with a number of different micron rating filters, as well as adding a second bank of two Watts Big Bubba filter housings in series. After a series of experiments with different filter micron ratings, it was decided that the 150-micron pleated sediment filter was the best way to go. Additionally, two Y-Strainers were added prior to the filter housings.

The entire filtration system was installed with extra valving in order to ensure the system could be shut down for routine maintenance without interrupting the water flow. Also installed was a pressure reducing valve, a cement pad with curbed containment area surrounding the entire project and a drain line that was trenched to the nearest manhole. Finally, it was determined that two 3-in. CL_2 tablets per day provided the necessary available chlorine to oxidize any algae in the system.

Added Benefits Discovered

Initially it was thought that there would be a slight increase of onsite chemicals used in order to further treat the nonpotable water. After some casual discussions with multiple engineers at a trade association conference, Arizona America Water was anticipating, minimally, an increase in bleach usage in order to control algae and other disinfection needs of the treated nonpotable water. When the filter system went online, the operators did not increase the bleach usage, wanting to see what the impact would be.

What was discovered was that there was no need to increase the bleach settings, as there was no increase in chlorine demand on the treated nonpotable water. Additionally, there was no increase in sodium hydroxide (caustic) usage, as was predicted earlier on in the development and planning phase of the project.

Drinking water in Arizona has some unique secondary water quality issues. Standard drinking water in the valley is in the range of 15 to 18 grains of hardness, with TDS levels in the 600 to 800 range. The first things one sees when walking into the chemical room are four large, commercial water softeners and a wall of salt bags. In order to prevent scaling and fouling of the scrubbers, the facility had to install this

ARTICLE SUMMARY

Challenge: An Arizona WRF needed to reduce excessive odor scrubber-related water consumption as part of an overall cost reduction plan.

Solution: Plant staff devised a plan to conduct Watts filter-enhanced water reuse using the WRF's 1.2-million-gal equalization basin.

Conclusion: The plant now saves about 900,000 gal of water each month, and thus up to $7,000 in monthly expenses. Plans for future reuse expansion are in place.

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equipment when potable water was being used.

One of the unanticipated savings of the project was to eliminate the need to soften the nonpotable water that was now feeding the odor scrubbers. Upon analysis of the treated nonpotable water, the hardness was dialed into the range of around 4 grains hardness. As a result, the facility has taken the bank of softeners offline and is saving on maintenance of these systems as well as the hard cost savings of $750 per month on the salt needed to regenerate the units.

Costs & Savings

In order to control costs and meet time frame needs, all of the work was completed by in-house staff. Material costs for the project were less than $6,000. It has been estimated that during the summer months the costs to operate the filter system will be approximately $8 per day, and during the winter months it is about $4 per day. This is due to the higher temperatures and need for greater replacement frequency of the filters during the summer months.

Nearly 50% of the cost of the project was recognized, in savings, within the first month of operation. Expenses for water have dropped from the $5,000 to $7,000 per month range to around $1,500 during the summer and $800 in the winter. This one treatment plant is now saving conservatively 900,000 gal per month (10 million gal per year).

In Arizona, where water is quickly becoming one of the most prized and sought after resources, this is an enormous savings for not only Arizona American Water, but the entire valley. Upon further review of the water usage at the facility, the NVRWRF has been looking at other areas in which it can use this reclaimed water.

Starting in early 2009, the group will be adding a third bank of Watts Big Bubba filters to the process, which will increase production and the ability to reuse the water in other areas at the plant. Once these areas are put into service, their water usage savings will be conservatively estimated at 12 to 15 million gal of potable water per year. WWD

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