NAME:

Scottsdale CAP Plant

LOCATION:

Scottsdale, Ariz.

PLANT SIZE:

150-acre site; 70-mgd total capacity; 20-mgd new expansion capacity

INFRASTRUCTURE:

DAF pretreatment, MF membranes, GAC facility

Significant population growth combined with a limited water supply signaled to Scottsdale plant managers that an upgrade was needed.

Designers and contractors had to choose the appropriate technology that could fit into a tight spot and still provide additional future capacity.

The Siemens CP MF membrane system installed at the CAP plant is the first and largest in the U.S.

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By Clare Pierson

From Concept to Reality

Expansion eases pressure on water supply

The Scottsdale CAP plant receives its feedwater from Central Arizona Project (CAP), a 336-mile-long diversion canal, the largest and most expensive aqueduct system in the U.S. The aqueduct diverts water from the Colorado River from Lake Havasu City near Parker, Ariz., into central and southern Arizona. Designed to bring about 1.5 million acre-ft of river water per year to Pima, Pinal and Maricopa counties, this system of aqueducts, tunnels, pumping plants and pipelines is the largest single resource of renewable water supplies in the state of Arizona.

The plant began operating in 1987 and went through a major upgrade in 1999.

Taking Action

Sunny Scottsdale, Ariz., has seen 35% population growth in the past 10 years; coupled with the fact that its sources of drinking water have been notoriously stressed, plant officials at the Scottsdale CAP plant decided to act quickly to ensure water availability for the area for years to come.

In order to meet expected demand in the near future and increase reliance on the use of surface water rather than groundwater, plant officials at the Scottsdale CAP plant—the largest single source of drinking water for the city of Scottsdale—authorized construction to begin in January 2007 on a $78-million, 20-million-gal-per-day (mgd) capacity expansion for surface water treatment.

According to Brad Reisinger, P.E., of engineering consulting firm Separation Processes, Inc. (SPI), 13 different processes were evaluated by Scottsdale plant officials and SPI, including plate tube settlers, solids-contact clarifiers and disc filters for pretreatment, and submerged membranes and granular media for filtration. They settled on dissolved-air flotation (DAF) for pretreatment and microfiltration (MF) membranes for filtration based on the relatively good quality of the feedwater, life-cycle costs, expandability and operational flexibility.

Another big factor in choosing the appropriate technology was the fact that designers and contractors Archer Western did not have much room to work with, and had to expand while keeping systems operating, Reisinger said.

Membrane Auditions

Pilot testing with three membrane systems began in December 2005. Each system was tested for two 40-day periods. In January 2007, Siemens came to Scottsdale plant officials with its new CP system and offered the city a competitive price point that plant officials could not resist. After a 100-day pilot test with that system, it was chosen.

Reisinger said key decision-makers were impressed with the Siemens membranes because they sustained an instantaneous flux rate of 51 gal per sq ft per day and maintained a cleaning interval greater than 41 days. The MEMCOR pressurized, pre-engineered CP system is the first and largest CP system in the U.S. Infilco Degremont, Inc. was chosen as the supplier of the DAF treatment. The combination of the chosen DAF pretreatment technology and MF system is also a relatively new and unique combination and design in the U.S., according to Reisinger.

"A lot of the applications we've installed are brand new and do not have a whole lot of history," said Art Nunez, water/wastewater director of the Scottsdale CAP plant. "This is sometimes frustrating when something happens that nobody warned you about. But we're learning a lot."

Currently the CAP water coming into the plant is high-quality feedwater—to the extent that Nunez said there is an eventual capability to bypass the DAF system and have the membranes do all the work.

Yet, the pretreatment mechanism "is still nice to have in place during high-turbidity events," Reisinger said.

Hurdles

Design hurdles that the engineers and contractors faced and had to overcome were piping modifications to accommodate the new technology and site constraints. Adding capacity to an existing, already-complex facility is always a challenge. It was like "getting everything into a shoebox," Reisinger said.

On top of selecting a new treatment method, other required upgrades included new raw water conveyance methods, an additional pretreatment contact basin, modifications to split the flow between all three plants at the site and increased chemical and finished water storage.

The plant initially was conceived to be 50 to 80 mgd; however, the declining economy and a recent slowing growth rate in the area were contributing factors to the scaled-down 20-mgd final capacity. It does, however, have ultimate build-out capacity to 50 mgd if needed in the future.

Plant officials also are strongly considering building an onsite carbon regeneration facility. Nunez said this would offset the costs of having 4 million lb of carbon—which treats the entire plant's effluent—changed out each year.

The plant is still in its early stages of testing, having recently started up in early 2010. Officials have ordered further membrane cleaning and testing, but so far the process is "running smooth and stable," Reisinger said. WWD

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