

EXPANSION OF SCOTTSDALE WATER CAMPUS ADVANCED WATER TREATMENT (AWT) FACILITY

Project Description

The City of Scottsdale (City) is currently conducting conceptual design efforts for the expansion of the Water Campus Advanced Water Treatment (AWT) Facility to be followed by full design and construction of the expanded facility. The expansion will increase reliable capacity of the AWT from approximately 8 mgd to 27 mgd. The expansion will also include additional vadose zone recharge wells and an *advanced oxidation process* to address compounds of potential concern.

This project is split into three phases. The first phase consists of the conceptual efforts to determine the most cost effective means to approach the AWT expansion, with the final product being a Conceptual Design Report expected to be completed in the summer of 2009. The second phase of the project will encompass full design of the expanded facility expected to be completed late in 2009. The third phase of the project is the construction of the expanded facility which is anticipated to reach substantial completion in the 2011 / 2012 time frame.

Background

The City's primary Water Reclamation Plant (WRP) located at the Water Campus provides state-of-the-art technology to treat wastewater generated in North and Central Scottsdale for irrigation of turf, primarily golf courses associated with the City's Reclaimed Water Distribution System (RWDS). The WRP process includes Nitrification – DeNitrification followed by tertiary treatment and disinfection which provides Class A+ reclaimed water, as defined by the Arizona Department of Environmental Quality (ADEQ). The City also conducts groundwater recharge at the Water Campus as part of our assured water supply program. The primary source water for this effort is Class A+ reclaimed water from the WRP further treated through the Advanced Water Treatment (AWT) Plant which is also located at the Water Campus. The AWT consist of microfiltration, reverse osmosis, post treatment stabilization and vadose zone recharge wells.

The 2008 Wastewater Master Plan for the City of Scottsdale recommended increasing the capacity of the AWT to meet increased flow demands generated by growth and inflow and infiltration related to storm events. The City is also considering treatment technology beyond what is currently implemented at the Water Campus to address recently identified compounds of potential concern (CPC) that can impact the quality of groundwater due to recharge. In addition, the RWDS golf course users have approached the City expressing a desire to change the water quality characteristics of the reclaimed water they receive. The primary characteristic change involves a reduced sodium level of less than 125 mg/l. This reduction can be achieved through the AWT process.

The Current AWT Facility is comprised of the following components:

- Flow Equalization

A seven million gallon reservoir (Reservoir B) provides reclaimed water storage volume for diurnal flow equalization prior to the AWT Facility.

- Microfiltration

Seven vertical turbine pumps piped in parallel with automatic backwash strainers provide feed pressure to 24 - 90M10C Memcor continuous microfiltration (CMF) units. There is space for an additional 3 pumps. Installed pumping capacity is 40 mgd with a firm capacity at 33 mgd. The current CMF units implement hollow fiber polypropylene modules with a pore size of approximately 0.2 microns.

Maintaining the original CMF design capacity of 16MGD has not been possible due to redundancy issues, ancillary equipment limitations, and the membranes approaching the end of their useful life. The original membranes have been in service for approximately nine years and the maximum operating flux has declined. The current reliable capacity has been identified at approximately 8 mgd.

Five vertical turbine pumps transfer microfiltration filtrate to the high-pressure RO pumps. Installed pumping capacity is 27 mgd with a firm capacity of 18 mgd.

- Reverse Osmosis (RO)

The RO system consists of chemical addition, cartridge filters, 14 high pressure feed pumps, a clean-in-place system and 14 separate skids. The RO skids consist of 8-inch thin film composite membranes with 10 configured in a 24 x 10 x 5 array and 4 configured in a 20 x 10 x 5 array. At the design flux of 10.6 gfd, the installed feed capacity is 14 mgd at 85% recovery to produce approximately 12 mgd of permeate. The existing 14 racks occupy all available space within the RO building. Concentrate flow from the RO system is conveyed from the facility in a dedicated line and ultimately disposed of in the sanitary sewer.

Advances in membrane technologies along with pilot studies and research suggest current expansion needs for the CMF and RO systems can be achieved within their current foot print.

- Post Treatment

Post treatment of RO product water includes decarbonation followed by lime addition for product water stabilization.

- Product Water Pump Station

Four vertical turbine pumps deliver stabilized product water to the vadose zone recharge well system. Installed pumping capacity is 27 mgd with a firm capacity of 17 mgd.

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