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First in Nation Technology Taps Renewable Water Supply In Parker

By Alan Pratt and Mike Lutz

The Rueter-Hess Water Purification Facility (RHWPF), located southeast of Denver in Parker, Colorado, opened in October 2015, representing the culmination of 30 years of planning by the Parker Water and Sanitation District (PWSD). The water treatment plant, which serves a community of approximately 50,000 residents, uses new technologies that have enabled PWSD to convert from rapidly declining groundwater sources to a renewable water supply, including surface water, groundwater, alluvial well water, and reclaimed wastewater.

“Historically, we’ve had access to really clean, fairly cheap ground water and we have a great well system to take advantage of the aquifers. But because it’s nonrenewable, it’s essentially mining that out,” said PWSD District Manager Ron Redd.

PWSD has more than 40 wells drilled into the various aquifers. The groundwater comes from up to 2,000 feet below the surface.

“We’re extracting water at a much higher rate than it can replenish itself. By doing that, what’s happening is the water levels of the ground water table are actually dropping. The result for us is that our well production declines at about 4% per year,” said Pieter Van Ry, PWSD Director of Engineering.

Although the water purification facility does not entirely eliminate the use of groundwater, it will enable PWSD to extend the life of the groundwater.

“We’ve got decades before we have serious issues but what we can do at this facility is reuse our return flows, our water. It opens up the water resources available to us to treat for our communities,” Redd said.

Designed by Dewberry, the RHWPF is the first plant in the world to incorporate a trio of cutting-edge technologies to meet US Environmental Protection Agency drinking water standards. The process includes three key stages.

- A coagulation, flocculation, and sedimentation chamber uses mic-
rosand to enhance particle sedimentation while reducing the chamber’s surface area requirements.

- A recirculating powdered activated carbon (PAC) chamber cuts costs by sending used PAC back through the system, increasing the amount of contact time between PAC particles and dissolved organic compounds for a more aggressive and efficient treatment.

- The treated water is then pumped through ceramic membrane filters to remove remaining particles larger than 0.1 microns in size and any remaining microsand or PAC.

In the first such application in a drinking water system in the United States, the 600 ceramic membrane modules were specifically chosen for their ability to withstand impacts from the abrasive sand and PAC particles used in upstream processes and then be cleaned back to like-new condition, in contrast to polymeric membranes, which typically deteriorate over a life of six to ten years and then need to be replaced. The ceramic membrane filtration system is anticipated to last much longer than conventional polymeric membranes.

The completion of the 10-mgd RHWPF (expandable to 40 mgd) is part of a visionary, multi-phase plan for PWSD, where district leaders had long recognized groundwater as a diminishing resource within the rapidly developing area, which grew from a population of 300 to 50,000 in just 34 years. The new network features a 50-cfs pump station that brings surface water from nearby Cherry Creek and Cherry Creek alluvial wells into the 75,000-acre-foot Rueter-Hess Reservoir, completed in 2012. Water stored in the reservoir flows by gravity into the RHWPF. After moving through the two ballasted sedimentation chambers and the ceramic membrane filters, the disinfected water is pumped into the PWSD’s distribution piping network for use by customers. Wastewater is returned to nearby reclamation facilities and then to Cherry Creek for reuse.

In addition to Dewberry, the project team included Western Summit Constructors, Inc. as the primary contractor, Garney-Weaver for construction management, and Kruger Inc. for the ballasted sedimentation and ceramic membrane filter technologies.
“The ability for us to turn many different water qualities into a high-quality potable water supply has been made possible only with the combined effort of many different companies coming together,” Redd said. “Dewberry, Western Summit, and Kruger have all worked very hard to make this plant a reality.”

Alan Pratt is a Senior Engineer with Dewberry in Denver. He has successfully managed projects with construction costs up to $50 million, and two of his design projects received Engineering Excellence Awards from the American Consulting Engineers Council of Colorado. Pratt has an extensive background in municipal water systems, with experience in facility planning, design, and construction phase engineering services.

Mike Lutz is a Principal Engineer with Dewberry whose career has focused on municipal water and wastewater facilities and includes planning studies, design, and construction management. He has developed innovative treatment process designs for both water and wastewater facilities, and his designs have been awarded two Engineering Excellence Awards and a Grand Conceptor Award from the American Council of Engineering Companies. Lutz conducted pilot tests and developed the process design for RHWPF, which incorporates one of the first Actiflo-Carb (PAC contactor) and first ceramic membrane filters in the United States. For more information visit www.dewberry.com.