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

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

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The two treatment processes, necessary to remove the organic compounds inherent to raw surface water sources, incorporate microsand and recirculated powdered activated carbon to increase efficiency and reduce space requirements. Photo: courtesy of Dewberry

The Colorado Department of Public Health and Environment provided regulatory approval for the first-time use of ceramic membrane filters for a drinking water system in the U.S. Photo: courtesy of Dewberry
• A coagulation, flocculation, and sedimentation chamber uses microsand 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 micron 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. The ceramic membrane filtration system is anticipated to last much longer than conventional polymeric membranes.

“The ceramic membranes are very durable and can withstand impacts from sand and powdered activated carbon, which is very abrasive,” said Alan Pratt, P.E., Dewberry project manager for the design of the RHWPF. “The ceramic membranes can be cleaned back to a new condition, whereas polymeric membranes typically deteriorate over a life of six to 10 years and need to be replaced.”
Completion of the 10 million-gallon-per-day (mgd) RHWPF (expandable to 40 mgd) is part of a visionary, multi-phase plan for the water district, where district leaders had long recognized groundwater as a diminishing resource within the rapidly developing area. The new network features a 50-cubic-foot-per-second 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,” said PWSD District Manager Ron Redd. “Dewberry, Western Summit, and Kruger have all worked very hard to make this plant a reality.”

Information provided by Dewberry (www.dewberry.com).