

ON THE GROUND

Deep Brackish Water Considered for New Mexico Development

Robert M. Sengebusch – INTERA Inc.

New Mexico is experiencing rapid growth, but new development is limited by water availability. In Sandoval County north of Albuquerque, developers currently must demonstrate at least a 100-year water supply before construction can begin. This requirement presented a challenge to Aperion Inc., a residential and commercial developer with plans to construct Rio West, a development for 70,000 new residents, to be located west of the city of Rio Rancho. Surface water in New Mexico is already overallocated, and groundwater rights in the county are expensive—on the order of \$20,000 to \$35,000 per acre-foot (Brown, 2007). Rio West is expected to require around 10,000 acre-feet per year for domestic, commercial, and industrial uses. For comparison, Rio Rancho currently pumps about 12,000 acre-feet per year.

A New Source of Water

Rather than pursue purchase of new groundwater rights, Aperion and Sandoval County considered another source of water: deep, brackish groundwater. According to current New Mexico law, water produced from depths greater than 2,500 feet and with total dissolved solids (TDS) greater than 1,000 milligrams per liter (mg/l) is not regulated by the New Mexico Office of the State Engineer (OSE), therefore appropriating this deep, brackish groundwater would not require OSE approval. Sandoval County is also interested in the feasibility of using this water to support additional growth in the county beyond Rio West.

During the summer of 2007, Sandoval County and Aperion formed a partnership to drill and complete two deep wells in an untested aquifer within the Rio Puerco Basin of Sandoval County. The first well (Exp-6) begins in upper Cretaceous rocks and crosses the Moquino fault, a major down-to-the-east normal fault. Exp-6 was drilled to 3,850 feet below ground surface (bgs). The 5.5-inch diameter well is

screened between 3,598 and 3,809 feet bgs in sandstones and limestones. The second well (Exp-5, 7 inches in diameter) was screened in multiple zones between 3,360 and 4,820 feet bgs, also in sandstones and limestones. The wells were drilled using a mud-rotary drill rig typically used to install oil and gas wells. A full suite of geophysical logs was run in both holes to assist with the selection of potentially productive zones.

Artesian Flow

Exp-6 produced artesian flow of approximately 600 gallons per minute (gpm). Exp-5 initially produced approximately 20 gpm of artesian flow, although after a commercial fracturing procedure, it flowed at a sustained rate of approximately 150 gpm.

A 13-hour, constant-flow-rate aquifer test (drawdown and recovery) was conducted in Exp-6. The water temperature at the surface during the later portions of the test was approximately 151°F. During the test, the well was allowed to flow at over 400 gpm, which resulted in 83 feet of water-level decline (measured as change in pressure) in Exp-6 and 1.5 feet of water-level decline in Exp-5, 3,450 feet west of Exp-6. This suggests the wells are hydraulically connected. A change in slope in the drawdown curve suggests a barrier boundary condition, presumed to be the Moquino fault, within several hundred feet of the well. A 30-day production test is planned to further evaluate the aquifer.

Treatment Costs Likely Less Than Rights

Groundwater from the wells was found to contain approximately 12,000 mg/l TDS, 3,100 mg/l chloride, and 4,400 mg/l sulfate. In comparison, brackish groundwater that is being developed by the City of Alamogordo, New Mexico, has a TDS range of 1,000 to 4,000 mg/l.

While water from the two new wells will require treatment to bring it to potable standards, the cost to treat it is expected to be less than the cost of obtaining existing water rights in the area. Estimates by the U.S. Bureau of Reclamation (2003) indicate

the cost of treating brackish water is on the order of \$1 to \$3 per 1,000 gallons. For the Sandoval County wells, the treatment cost is expected to be reduced through utilization of renewable energy, including wind and solar. A conceptual engineering study is underway to estimate production, desalination, and infrastructure costs. Additional well locations are under investigation with the objective of developing a water supply that will serve not only Rio West but other current and future neighboring communities.

INTERA Inc. was retained by Sandoval County to provide independent review of the project and acknowledges contributions from Guy Bralley, Balleau Groundwater Inc., Dirk Van Hart, and John Hawley. Contact Rob Sengebusch at rsengebusch@intera.com.

References.....

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Kathy Freas, Albuquerque
Tel: 505.884.1682 x205
kathy.freas@ch2m.com

Tom McLean, Phoenix
Tel: 480.966.8577 x6239
tom.mclean@ch2m.com

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