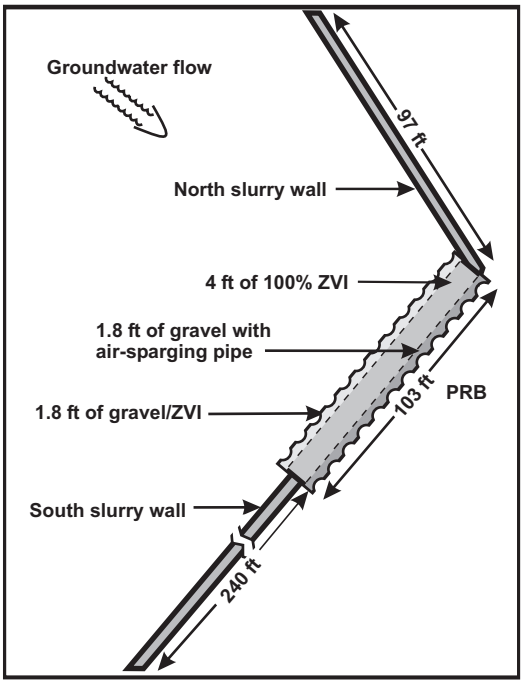
Monticello Projects Update

Long-Awaited Land Transfer Finalized

On June 28, 2000, the City of Monticello, Utah, signed a quitclaim deed from the National Park Service that completed the transfer of 383 acres of government-owned land, including the former Monticello millsite, from the U.S. Department of Energy (DOE) to the city.

The city will perform restoration work on the millsite as payment in lieu of construction under a DOE–City of Monticello Cooperative Agreement. The city received $6.8 million for the restoration project, including funds for design, construction management, and subcontract costs. As part of the Cooperative Agreement, the city must restore the millsite in accordance with a design approved by DOE, the U.S. Environmental Protection Agency, and the Utah Department of Environmental Quality. The city must also complete the restoration work by July 2001. The city awarded the restoration contract in August 2000 and is receiving construction management services from MACTEC Environmental Restoration Services, a DOE Grand Junction Office contractor.

Starting in 1995 with the Monticello Site Specific Advisory Board, some residents of Monticello lobbied for the millsite land to be used for an expansion of the Monticello golf course. However, after consulting a golf course architect who recommended that the existing golf course be expanded at an alternate location, the city decided to use the millsite area for open recreational space to provide the public with picnic areas and a hiking trail along Montezuma Creek.



This schematic shows the permeable reactive barrier installation at Monticello, Utah.

Monticello Permeable Reactive Barrier Performing as Anticipated

In June 1999, a permeable reactive barrier (PRB) was emplaced at the Monticello Mill Tailings Site to treat contaminated groundwater (see the winter 2000 *Grand Junction Office Perspective*). The Monticello PRB project is funded by the DOE Office of Science and Technology (EM–50).

A PRB, in essence, is a subsurface zone of reactive material through which groundwater flows. Contaminants in the groundwater are either contained or degraded as a result of passing through the PRB. The Monticello PRB is a funnel-and-gate system containing zero-valent iron (ZVI) that immobilizes many contaminants. Slurry walls are used as the funnel to ensure that the contaminated plume moves through the gate containing the reactive material. An extensive monitoring network was installed to evaluate the performance of the PRB. To establish that water is in fact passing though the PRB gate, more than 50 sampling ports are being used. To date, seven rounds of monitoring have been completed. Monitoring results are available on the DOE Grand Junction Office website at **www.doegjpo.com/perm-barr/projects/monticello/perform1.htm**.

Monitoring Results

Overall, the PRB has effectively removed the major contaminants of concern from the groundwater. The major contaminants of concern include arsenic, selenium, vanadium, and uranium, which are present in groundwater at concentrations of 10 micrograms per liter (µg/L), 40 µg/L, 400 µg/L, and 700 µg/L, respectively. Analytical results of samples of groundwater exiting the gate show these contaminants have been reduced to nondetectable levels.

As expected, concentrations of dissolved iron increase as groundwater passes through the gate. However, levels of dissolved iron exiting the gate were lower than predicted by treatability studies and are within acceptable risk ranges. Although they are not contaminants of concern, concentrations of nitrate and molybdenum were reduced to near nondetectable levels. Geochemistry data also indicate that a strong chemically reducing environment was established in the gate. Monitoring will continue four times per year for the foreseeable future.

Tracer Study

An extensive tracer study was completed in July 2000 to better evaluate the hydraulic performance of the PRB and to help determine how long the system will remain effective. The tracer study was funded in part through a separate EM–50 project managed by Oak Ridge National Laboratory.

The comprehensive continuous-injection tracer study supplements the information obtained from performance monitoring. The tracer study involved injecting a nonhazardous, unreactive compound (the tracer) into upgradient wells and monitoring downgradient concentrations over time as it moves with the groundwater. The Monticello Mill Tailings Site tracer study used both anions (bromide and iodide) and noble gases (helium, neon, and argon).

Oak Ridge National Laboratory and MACTEC Environmental Restoration Services personnel conducted the tracer study of the Monticello, Utah, permeable reactive barrier.

Study results show that groundwater moved through the reactive gate faster than anticipated, at a rate of 24 to 26 feet per day. Groundwater generally moved in a straight path as it entered, moved through the ZVI, and exited the reactive gate. However, some preferred pathways were observed with groundwater flowing laterally through the ZVI before it moved downgradient. The anions were useful in tracking groundwater flow; however, the gas tracers were not detected downgradient. Additional data evaluation is ongoing to estimate more accurately the groundwater velocities and residence times in the gate.

"At some point," says Donald Metzler, DOE Grand Junction Office Project Manager, "The ZVI medium will be 'used up,' or incapable of further reactions, but how long until that happens is not yet known." Regardless of how long the system functions before new media is required, the contaminants are locked within the gate. As for economics, Metzler says PRBs can account for a tenfold reduction in cost because of their passive operation.

For more information about the Monticello Projects or the Monticello PRB, contact Joel Berwick or Donald Metzler, DOE Grand Junction Office Project Managers, at (970) 248–6020 and (970) 248–7612, respectively.❖