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## Reservoir Rehabilitation

The Jackson Gulch Reservoir, an imperative resource to the mountainous regions of southwestern Colorado, supplies water to more than 13,000 acres of agriculture lands as well as domestic water to Mesa Verde National Park. So when the concrete structure began to weaken, the Mancos Water Conservatory District hired Buckhorn Geotech Inc., Montrose, Colo., to evaluate the damage.

The assessment of the 60-year-old concrete structure showed the inlet canal, which feeds the reservoir, had signs of deterioration in its concrete flume including surface spalling, joint deterioration, blowouts, and vertical wall cracks.

Rehabilitation is challenging because of the environment, according to Norm Aufderheide, an engineer for Buckhorn Geotech. “At 7000 feet, weather conditions are harsh with an average winter temperature well below freezing. Added to this, access to the flume is limited to a few weeks in

August and September when the canal is not operational and ahead of the winter temperatures and snow.”

After rehabilitation began in 2003, a three-year program began to test membrane liners. Tests showed conventional liners aren’t ideal for such a complex environment, so Buckhorn chose a spray-on crystalline waterproofing system manufactured by Xypex, Richmond, British Columbia, Canada, due to its ability to seal paths where water and chemicals penetrate.

“We selected the crystalline waterproofing system for the concrete repair and protection of the concrete flume because it could be installed in confined spaces and because of the system’s ability to seal or heal itself should damage occur to the concrete surface from falling rock or routine maintenance in the coming years,” says Aufderheide.

After the system was chosen, Sika Corp. Materials, Lyndhurst, N.J., was selected for the expansion joint treatment and Mays Construction

Specialties, Grand Junction, Colo., was made the contractor.

The first step was removal of test liners, residue, and glue from the three-year testing program—most of this was done by handgrinding or sandblasting. Then the entire flume was power washed with 3000-psi pressure washers to prepare a bonding surface for the coating.

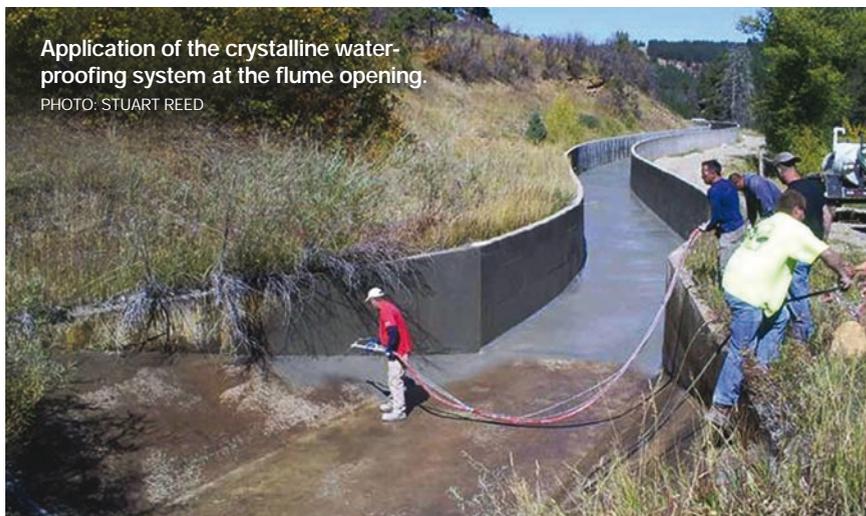
Keeping the flume dry was the next challenge. Every time it rained, the crews had to remove the water before they could continue the repair and coating process.

To meet the deadline, the crews became innovative. One crew dewatered the flume with squeegees, brooms, and pumps, while another crew pushed water and debris out by attaching a squeegee blade to the front of an ATV.

Then the flume was coated with Xypex Concentrate and modified using an Essex spray machine. The mixed material was pumped through 200-foot-long hoses to a nozzle that sprayed the flume’s concrete surfaces.

About 10,000 square feet of the waterproofing and protection was sprayed daily. “Our quality assurance team checked bag counts every day to make sure we were achieving proper coverage throughout the flume,” says Stuart Reed, estimator/project manager for Mays Construction.

The inlet flume finished on time in late September 2009. The district also requested repair on the outlet flume because the weather was still nice. Although the project is complete, Aufderheide says the crews will be back to evaluate samples from the flume to ensure the crystalline waterproof penetration is deep enough. **CC**



Application of the crystalline waterproofing system at the flume opening.  
PHOTO: STUART REED