

Research Update

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Bottom Line

This research project examined Aqualastic® spray-applied polyurea to repair degraded roller compacted concrete (RCC) canal lining.

Better, Faster, Cheaper

Finding a thin, strong, easy-to-apply coating to stop deterioration will reduce ongoing maintenance costs. Moreover, patching concrete-lined canals with more concrete reduces the canal's capacity over time. Polyurea can seal canals without losing that capacity.

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Polyurea Holds a Canal Together

Is polyurea a cost-effective way to seal and maintain concrete-lined canals?

Problem

Reclamation has many concrete- and shotcrete-lined canals in various stages of repair. Finding a material that is economical, results in a smooth surface, is relatively easy to apply, does not reduce channel capacity, and that will last for many irrigation seasons is critical for repairing Reclamation's and irrigation district partners' infrastructure.

The standard way to repair concrete-lined canals is to patch with more concrete. This process is labor intensive and costly. Shotcrete repairs vary between 2 to 4 inches of material over the existing shotcrete. This fills the channel with concrete rather than with water, reducing the channel capacity. It can also make the channel rougher, further reducing flows and channel capacity. To avoid this, the old shotcrete and/or concrete would need to be removed, but this increases the cost of repairs substantially. Reclamation needs to find cost-effective ways to repair and maintain these canals.

Solution and Results

Aqualastic® is a polyurea elastomeric coating that is sprayed onto a prepared surface. This product is similar to spray on bedliners commonly used in pickup trucks. Aqualastic® is currently applied to concrete canal linings as a crack sealer.

This Reclamation Science and Technology Program research project applied Aqualastic® over a section of canal about 75 feet long by 36 feet wide to measure its ability to reduce seepage and protect degraded or eroded sections of the lining. The tests are also determining how well the product adheres to roller-compacted concrete (RCC) and shotcrete substrate over time, over a large area. The product could also increase transmission efficiency by reducing the channel roughness as it provides a smoother surface.



Before: Deteriorating lining from dozer tracks and previous patchwork at the toe of the slopes is typical in this area of the North Unit Main Canal, Oregon.



After: The test section after one irrigation season and one winter season. Adhesion to the concrete substrate is excellent and there is no cavitation damage on the coated section.

Application and Results

The North Unit Irrigation District in Madras, Oregon, partnered to provide a test bed in the North Unit Main Canal. The canal is dewatered every winter and is subject to freeze-thaw damage. The RCC lining also had dozer trackmarks left in the concrete from construction, which are prone to cavitation damage during the irrigation season.

Different preparation methods were used on the RCC, including sandblasting to white and brushed. The two-part polyurea was applied to the test sections. The test sections were then inspected after the irrigation season and after a winter's non-irrigation season to check for freeze-thaw damage.

The test sections have had two irrigation seasons and one winter season to date. The test sections are doing well—no new cavitation damage, freeze-thaw damage, or direct sun exposure damage. Basic adhesion tests showed that the method of surface preparation did not show appreciable difference in the adhesion of the polyurea to concrete, based on attempts to pry the material's leading edge.

Future Plans

This project and future projects will check the test sections on a yearly basis to see how well the polyurea holds up over time. Followup reports in 1, 3, 7, and 10 years will document durability and ongoing maintenance costs (the 7- and 10-year reports will be completed under new Science and Technology Program research projects).

Aqualastic® can be a cost-effective repair method that does not reduce channel capacity and can also reduce seepage.

Many miles of concrete- and shotcrete-lined canals serve the American West. This technology should be easily transferrable to other irrigation districts and Reclamation offices with these types of canals.



Typical equipment used to apply Aqualastic® in cracks at Roza Canal, Washington, during annual maintenance. (Note that this was not part of the test research project.)

“Wish we had enough money to coat all 12 miles of the RCC lining tomorrow! That Aqualastic® really works to seal the canal without reducing flows.”

**Mike Britton
General Manager,
North Unit Irrigation District,
Madras, Oregon**

Collaborators

- Reclamation
 - ◇ Technical Service Center
 - ◇ Yakima Field Office, Pacific Northwest Region
- North Unit Irrigation District, Madras, Oregon

More information

www.usbr.gov/research/projects/detail.cfm?id=786