

Glen Elder Dam

Glen Elder, Kansas



Project Profile (2010)



Project Summary

The US Bureau of Reclamation completed original construction of the Glen Elder Dam and Spillway in 1968. This dam serves multiple purposes in controlling flooding as well as creating Waconda Lake which is used for municipal and irrigation water. The 664 ft wide spillway underwent significant renovation of the inlet slabs in early 2010.

The existing concrete in both the inlet apron and the pier noses/gate structure had extensive deterioration due to freeze-thaw damage which promoted alkali-silica reaction. The repair procedure consisted of removing deteriorated concrete using hydro-demolition and replacing new concrete back to the existing lines and grades. Due to uneven deterioration, the removed concrete varied from full-depth removal (18") to intermediate removals ranging to the areas of sound concrete. The islands of good concrete were saw-cut at sharp angles (image 1). Further, the replacement concrete coarse aggregate was only locally available in 1/2" nominal, which further increased concerns regarding shrinkage cracking.



Islands of sound concrete remain after removing uneven depths of deteriorated concrete.



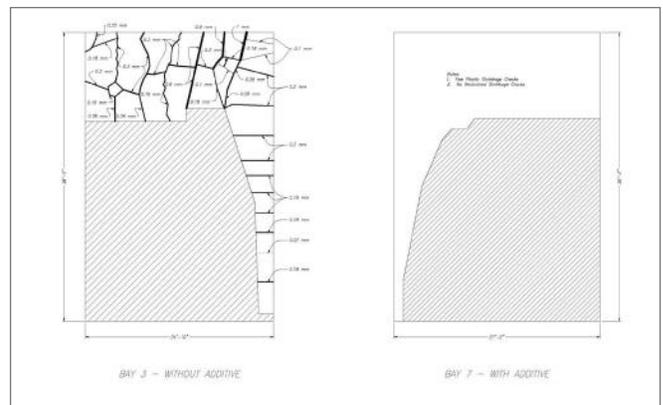
Extensive shrinkage cracking appears 1-2 weeks after pouring concrete mix **without** PREVent-C.

When the new concrete was placed, extensive shrinkage cracking occurred within the first seven days. The concrete mix was re-evaluated for improvements before proceeding further. Convention SRAs based on glycol ether were considered and may have improved the shrinkage cracking moderately, but were not chosen based on their potential effects on compressive strength gain as well as freeze-thaw durability concerns.

PREvent-C was chosen as a trial admixture to evaluate its effectiveness on shrinkage cracking, as well as its effects on other fresh and hardened concrete properties. After approval by the US Bureau of Reclamation, Materials Engineering and Research Lab, PREvent-C was placed in three trial slabs. Crack-mapping was completed for two of the trial slabs and compared to the control slabs that had no PREvent-C. The results were impressive - **cracks were completely prevented in two of the test slabs, and about 90% reduced in the third slab.**



Test slab with PREvent-C (right) showed a 90% reduction in shrinkage cracking when compared to control slab (left).



Test slab with PREvent-C (right) showed a 100% reduction in shrinkage cracking when compared to control slab (left).

The complete report on the Glen Elder field trial is documented in the USBR MERL Report #2011-34 titled *Evaluation of New Concrete Shrinkage Reducing Additive for Glen Elder Dam Spillway Inlet Slab Repair* and can be found by visiting www.usbr.gov.

Owner: United States Bureau of Reclamation
Engineer: United States Bureau of Reclamation
General Contractor: Norcon Corporation
Ready-Mix Producer: Beloit Ready-Mix
Products: PREvent-C®500 Shrinkage-Compensating/Reducing Admixture



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