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## **EMERGENCY REPAIR OF A SMALL WATERSHED DAM DUE TO ABRUPT EROSION OF DISPERSIVE EARTHFILL MATERIAL**

Built in 1956, the Six Mile Creek Site 26 flood control structure near Ozark, Arkansas functioned flawlessly for 50 years. This earth fill embankment dam is 27 feet high, has a drainage area of 1,702 acres, and a sediment pool area of 17 acres.

A 2006 inspection of Six Mile Creek Site 26 revealed a small opening resembling a crayfish hole on top of the central part of the embankment. No other abnormalities were observed. A 2007 inspection noted that the hole had increased in size, but again no other unusual features were visible. In March 2008 the NRCS inspector received a call from an adjacent landowner concerning a hole in the dam. A follow-up visit found numerous holes ranging in size from 6 inches to 2.5 feet in diameter on both the downstream and upstream slopes. These holes were limited to a section of the dam that was excavated in the mid 1980s during installation of a second principal spillway conduit.

Material collected from around the holes was subjected to field crumb tests for dispersion. These tests resulted in moderate to severe reaction ratings of 3s and 4s. Samples sent for double hydrometer testing produced percent of dispersion readings of up to 75%.

It is believed that soil in the reconstructed section may have been backfilled with insufficient moisture content following installation of the second principal spillway pipe in 1985. Other possible causes for formation of the holes include inadequate compaction, insufficient interface between existing fill and backfill, and exposure of dispersive soils during installation of the additional conduit. The recent widespread appearance of holes on the embankment followed approximately 10 years of very dry conditions, likely forming cracks on the surface of the dam. Periods of above average rainfall in early 2008 probably accelerated the erosion process.

Four remedies were considered: 1 - install a chimney filter; 2 - excavate the reconstructed section and mix soil with a chemical amendment prior to replacement; 3 - decommission the dam; and 4 - excavate and lime treat 2 feet of material from the reconstructed area. Option 2 allowed for a thorough examination of damage, and was the preferred remedy based on practicality and cost considerations. The portion of the embankment above the principal spillway conduit was removed, processed and treated with quicklime equivalent to 2% by weight hydrated lime, then replaced and compacted according to NRCS standards.