SEISMIC ANALYSES AND POTENTIAL FAILURE MODES OF THE INTAKE TOWER AND BOREL CONDUIT AT LAKE ISABELLA AUXILIARY DAM

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ABSTRACT

Lake Isabella is a 568,000 AF reservoir in Kern County, California impounded by two earth-fill embankment dams: a 185-foot high main dam and a 100-foot high auxiliary dam. Each dam includes an embedded intake tower to control flow releases. Recent investigations of the Kern Canyon fault, which traverses beneath the auxiliary dam at its right abutment, indicate that the fault is active and has ruptured at least once within the last 3500 years.

The Lake Isabella reservoir is classified as one of the highest risk projects in the Corps' inventory under the Dam Safety Action Classification (DSAC) system outlined in Draft ER1110-2-1156. The seismic analyses of the auxiliary dam modeled the foundation, embankments, and tower and conduit to properly represent the soil-structure-interaction effects. The results of the analyses show that under moderate to high levels of shaking, the towers' moment and shear demands would substantially exceed their capacity, resulting in a high potential for development of gross failures of these structures. Further, the excessive embankment deformation of the auxiliary dam adjacent to the tower and conduit would result in shear and tensile failures of the conduit joints. These types of failures could result in the development of piping failure modes leading to an uncontrolled release of the reservoir threatening the downstream population including the Lake Isabella and Bakersfield, CA.

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