

## **SAVING LIVES WITH 2-D INUNDATION FLOOD MODELING AS A DAM DESIGN TOOL**

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### **ABSTRACT**

Today, when designing dams, great attention is paid to the downstream consequences that might be caused by dam failures. Using 2-D inundation flood modeling as a dam design tool can help to get approval to build a dam, as well as, prevent potential loss-of-life downstream of the dam in any flooding scenario.

Tohajiilee Dam, also known as Canoncito Dam, is located in the Canoncito Navajo Indian Reservation in central New Mexico, about 35 miles west of Albuquerque. The dam was built in 1971 for irrigation purposes, for watering livestock, as well as a flood control structure. Approximately 18 miles downstream from the dam is a school for 400 students, together with surrounding recreation facilities. After an incident in April 2004, when one of the upstream dams failed during the flood event, the dam was breached with an open-cut trapezoidal section to pass the 100-year flood. After many discussions, in 2011, BIA made a decision to rebuild the dam.

In the dam redesign process, the flood wave from the Inflow Design Flood (IDF) and corresponding dam breach, was simulated using a two dimensional modeling software, after which, the recordings from the animation of this event were analyzed. This simulation resulted in a portion of the school grounds being inundated by as much as 5 ft.

With the help of 2-D flood inundation software, the possibility of diverting the water flow from Tohajiilee Dam to the nearby Canada de los Apaches River was tested, with the focus being to divert flood waves from the school grounds. During this modeling scenario, the use of an iterative procedure has provided the minimum dimensions of the channels and the berms. The results of the modeling shows a successful deterrence of these facilities by flood flow from the school area, which can best be seen in the corresponding animation.

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