

GEOPHYSICAL METHODS USED TO SUPPORT TVA'S DAM SAFETY ASSURANCE PROGRAM

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The Tennessee Valley Authority (TVA) was created by an Act of Congress on May 18, 1933. One of the agency's primary mandates was to create and implement a program for the unified development and management of the Tennessee River system. Today, TVA maintains a series of dams on the Tennessee River from Knoxville, TN to the Ohio River, and on the major tributaries of the Tennessee River. These dams provide a variety of benefits including flood control, power generation, and navigation. Since 2012, TVA has undertaken an ambitious program of stability analyses and internal erosion studies for its dams through the Dam Safety Assurance Program. Geophysical programs play an important role in these studies through the characterization of embankment dams and their foundations, and other features of the dam project. We present case studies where geophysical methods such as seismic refraction, multichannel analysis of surface waves (MASW), electrical resistivity (ERI), self-potential (SP), microgravity and electromagnetic (EM) have been used to identify geologic structures, karst zones, weathering profiles and seepage pathways via land and marine surveys. We examine how TVA's historical geologic investigations and construction records, augmented by more recent geotechnical data, are used in conjunction with the geophysical results to produce comprehensive hydro-geologic models of the dams and their immediate environment.