

## **GUNTERSVILLE DAM SOUTH EMBANKMENT 3-D GIS MODEL**

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The Tennessee Valley Authority (TVA) was created by an Act of Congress on May 18, 1933. Guntersville Dam, the third main river dam project completed, was authorized on November 27, 1935 and the gates were closed and the reservoir began filling on January 16, 1939. Soon after the reservoir began filling, high groundwater levels were noted downstream of the left (south) embankment. These high groundwater levels have been the subject of several rounds of investigation at Guntersville Dam. Most recently, TVA commissioned development of a comprehensive three-dimensional (3-D) geographic information system (GIS) model of the site which is being used in risk assessments for Guntersville Dam as part of TVA's Dam Safety Assurance Program. The first version of this 3-D GIS model concentrated on the dam's south embankment and is the subject of this presentation. The model incorporates pre-dam site topography and top of rock surface, the major dam construction components of the south embankment (trenches, concrete cut-off wall, steel sheet piles, grout holes, grout takes, calyx holes, and caves), the post dam topography and top of rock surface, all borings from 1935 to present, all geophysical data, and input from the site hydrogeological investigations. The 3-D GIS model is a valuable tool for TVA engineers to visualize the interaction of the dam's engineered structures with site geology and groundwater hydrology as conditions have changed since dam construction began. Viewing the various geophysical datasets, such as microgravity surfaces, SP surfaces, seismic refraction velocity profiles, and ERI resistivity profiles georeferenced into the model gives the geophysicist and the engineer a powerful collaborative tool for understanding complex site conditions.