

Tennessee Valley Authority Power Plants Seismic Assessments

Client:

Tennessee Valley Authority

Location:

Chattanooga, TN

Services or Products Provided:

- Advanced engineering assessments to evaluate seismic stability of CCR impoundments across 7 power generation facilities.

Value Provided:

- Developed and implemented a "Best Practices" approach to obtain predictions of the most likely performance rather than conservative estimates of performance.
- Full seismic assessments have been completed for Shawnee and Allen Fossil Plants, major facilities annually generating 8 and 5 billion kilowatt hours of electricity, respectively.
- Geocomp's "Best Practices" approach has saved TVA **\$100 million** in potential remediation and closure costs to date.

Background & Project Challenges

The Tennessee Valley Authority (TVA) is the largest public power utility in the United States, operating 10 coal-fired power plants. In 2015, the United States Environmental Protection Agency

(EPA) put into effect national regulations and requirements for the safe disposal of coal combustion residuals (CCR), including a requirement that a qualified engineer demonstrate that each impoundment and landfill of CCRs have adequate structural stability for both static and seismic loads. If it is determined that TVA's CCR impoundments do not meet the minimum required factors of safety, it will be necessary for TVA to either close or remediate these facilities at considerable cost.

Moreover, the EPA has implemented recordkeeping regulations requiring TVA to make public all work performed by their qualified engineers. Enforcement of this new regulation is reliant upon citizens' and States' suits, meaning all work performed must be defensible to external peers and the general public in a court of law.



Geocomp Role & Accomplishments

Geocomp is developing and performing enhanced seismic assessments of TVA's CCR facilities. Using a "Best Practices" approach aimed at eliminating inherent over-conservatism in conventional methods, Geocomp has demonstrated that both the Shawnee and Allen Fossil Plants meet the EPA requirements for seismic stability. The use of conventional methods would have led to non-conformance of EPA regulations.

The "Best Practices" approach includes:

- Realistic assessments of in-situ pore pressures based on field measurements with piezometer strings so that the correct effective stresses are used in analyses. *This factor alone could improve seismic stability by 30% or more.*
- Determination of appropriate cyclic shear stress using a 2-D nonlinear dynamic analysis to calculate the horizontal shear stress from input earthquake time histories. *This model results in more realistic and often lower driving forces that can significantly improve post-shaking stability.*
- Selection of pseudo-static coefficients corresponding to a displacement level within the tolerance of the analyzed facility. *This approach can result in improved pseudo-static stability for cases where it is reasonable to prescribe an allowable level of displacement for seismic loading.*