Science Publications

American J. of Environmental Sciences
Quarterly Publication

Title: Geo-Seismic Environmental Aspects Affecting Tailings Dams Failures

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Source: American J. of Environmental Sciences 4(3): 212-222 , 2008

Abstract: Seismic performance evaluations of tailings dams are essential for characterizing the geo-environmental risks posed by these earthen structures, which should include the geotechnical hazards implied by slope instability failure, free board loss and the potential release of contaminants. The observed damage is more important when liquefaction occurs on the dam body and foundation, which often leads to cracking, settlements, tilting and general distortion of dam geometry. Analyses based on limit equilibrium are generally sufficient to establish hazard zones. However, numerical models with solution schemes formulated in the time domain, which are capable of taking into account the kinematics of soil movement more realistically, are needed to quantify the geotechnical risk. This paper reviews the main geotechnical earthquake engineering aspects to account for when designing tailings dams and describes the application of a practice-oriented simplified constitutive model, which implemented in a lagragian finite difference platform, is capable of predicting the accumulation of pore pressure in fine-grained saturated materials due to earthquake loading, the reduction of shear strength and the corresponding permanent displacements. The model uses the Mohr-Coulomb failure criterion coupled with an incremental pore pressure generation scheme. Pore pressure is accumulated as a function of the number of stress cycles. The secant soil stiffness and hysteretic damping change with loading history. The numerical simulation is able to properly capture the kinematics of dam failure and provides the parameters to assess potential environmental impacts on the nearby areas of the dam.