LABORATORY MODELLING OF FRACTURED CLAY FOR HAZARDOUS WASTE STUDIES

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Abstract

The integrity and permeability of a clay mass that acts as a waste confining layer will be controlled by local defects such as desiccation cracks, fissures and fractures. In the Gulf Coast region, growth faults associated with natural geological processes and fluid withdrawal accelerate the production of local defects. Laboratory permeability tests conducted on recompacted samples or small undisturbed samples are unlikely to contain representative pattern of cracks and fissures and significantly under-predict the hydraulic conductivity of clay (natural deposits or liners) by several orders of magnitude. Although large-scale *in-situ* permeability tests may provide correct permeability information in accessible soils (near-surface), the time period required to conduct tests makes them impractical and hence it is essential to develop laboratory tests procedures to model closely the field conditions.

Several methods of simulating cracks in the laboratory clay samples were investigated by using double ring-rigid wall permeameters. By inserting syringe needles of various sizes (gage numbers) and lengths defects were introduced into the compacted clay samples (simulating cracks) and the preliminary results indicate that the permeability of clay could be increased in a controlled manner. Using this technique, several tests are underway to investigate the effect of crack length, size and density on the permeability of Kaolinite clay. Relationship between permeability and crack length have been developed and the concept of effective clay thickness and effective permeability is introduced based on crack length. Numerical simulations based on a finite element model are being used to verify the experimental results.

POLYMER CONCRETE IN HAZARDOUS WASTE MANAGEMENT: APPLICATIONS

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Abstract

There is no universal waste treatment or immobilization process that will handle all the variation of waste produced, which is estimated to be between