CONSOLIDATION AND COMPRESSIBILITY PROPERTIES OF NON-PLASTIC TAILINGS.

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Abstract

The safe operation of tailings dams requires a thorough understanding of the mechanical behaviour of tailings. These mechanical properties can consist of consolidation and compressibility, which vary with particle size distribution, density, mineralogy and mining technology. Both these properties have a direct effect on the shear strength, by way of influencing the in-situ densities and pore pressures existing in tailings dams.

This study aimed to characterize the compressibility and consolidation properties of non-plastic platinum tailings by testing two gradations of remoulded specimens in a 100 mm diameter Rowe-Barden consolidation cell. Laboratory reconstituting methods included moist tamping and slurry deposition upon which the effect of fabric was analysed. Stepped loading and constant rate of loading methods of testing were conducted on specimens at different densities from which the effect of loading was investigated. The study also explored the goodness of fit of five models recently proposed for modelling compression curves.

The results confirmed that the compressibility was in the same range as documented tailings showing a direct correlation with the D_{50}. However, the consolidation behaviour showed little dependence on the particle size distribution. It was also found that high density specimens were less compressible and their compressive behaviour independent of the loading method. The highest discrepancy was observed when comparing low density stepped loading and constant rate of loading tests compression curves. The five models captured the compression curves of the experimental and documented tailings fairly well in comparison with conventional models and offer an alternative to modelling the compressive behaviour of tailings.