Hydrogeological Characteristics of Co-disposed Tailings and Coarse Rejects from Coal Processing

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ABSTRACT

The co-disposal of tailings with coarse processing rejects into coal mine spoil piles provides mine site operators with the opportunity to forego the need to establish and operate a stand-alone tailings dam. This is achieved by partially dewatering the tailings slurry to a paste, mixing the paste with gravel-like processing rejects, then transporting and disposing of the mixed rejects in the mine spoil pile using mine haul trucks. The mixed rejects may be dumped from spoil tipheads amongst alternating loads of mine spoil or in small impounding cells. The introduction of mixed rejects into the spoil pile represents a departure from routine spoil conditions, as the mixed reject materials may contain significant fines contents with high degrees of saturation. These properties may facilitate the development of undrained behaviours, which are reasonably well appreciated in the study of tailings dams, but less so in a mine spoil pile context where experience is mostly centred around drained material behaviours.

The purpose of this paper is to therefore investigate the hydrogeological characteristics of tailings, coarse and mixed rejects from coal processing to enable better understanding of the potential undrained behaviours in coal mine spoil piles. This is achieved by analysing the results from permeability and oedometer testing of saturated tailings and reject materials. Particular focus is given to the effect that tailings content has on the behaviour of mixed rejects, the transition point between drained and undrained material behaviours, and the change in properties with increasing stress to simulate increasing depth of burial within a mine spoil pile. The implications of the findings are discussed with respect to spoil pile stability.