Preventing tailings dam failures with a different approach to tailings storage design

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ABSTRACT

Some fifty years ago Canadian Professor Eli Robinsky proposed his idea of thickened tailings deposition, in which the hydraulic transport and deposition processes of thickened tailings slurries would be exploited to deposit the particles in conical stacks, without large dams being required to contain the tailings. This would avoid the geotechnical failure risks of conventional dammed storages, whilst also delivering other advantages such as water savings and cheaper rehabilitation of such facilities. Since then, some 60 tailings storage facilities have been built around the world using his idea.

A number of other advances have been made in more recent years that have made Robinsky's approach more practicable. Foremost of these is that a number of methods of predicting the beach slopes that form on such tailings deposits have been presented. This has resulted in a more reliable application of Robinsky's approach. It was later shown that the discharge of unthickened tailings slurries could also produce conical deposits, thereby alleviating the need for high degrees of thickening. It has also been noticed over many years by numerous workers in the mining industry that the splitting of the flow results in steeper beach slopes. Fitton (2017) presented an empirical model to enable the beaching impact of this splitting of flows to be predicted for exploitation. This paper presents examples of these advances being applied in the mining industry, and shows how dam failure disasters such as those that have occurred in Brazil in recent years can be avoided with the adoption of these approaches.