Applying Hydro-Cyclone Classification for Tailings Management in Australia

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# ABSTRACT

The Global Industry Standard on Tailings Management (GISTM) has a stated goal for new tailings storage facilities (TSFs) to “minimise the volume of tailings and water placed in external tailings facilities”. One method that can be used to achieve this goal is to use the sand fraction of the whole tailings to construct part (or all) of the perimeter containment dams which reduces the volume of “wet” tailings to be contained in the TSF.

Hydro-cyclone technology can be used to “classify” the whole tailings into coarse (or sands) and fines (or slimes) fractions with the coarse fraction subsequently used to build earthfill dams to contain the fines fraction. This technique has been used since the 1950’s for tailings management and continues to be in widespread use in several of Australia’s peer mining jurisdictions including in North America, South America, and Southern Africa. The resulting “cyclone sand dams” have been successfully built to modern design standards with consideration for a range of extreme conditions including high-seismicity sites in Chile to high-rainfall sites in Panama. Despite being a well-established technique, the application of tailings classification to operations in Australia has been very limited with the only significant example of its use being at Alcoa’s Western Australian bauxite processing operations to contain residue mud.

The objective of this paper is to identify and critically examine potential reasons for the lack of use in Australia through a comparison to conditions at comparable operations where tailings classification is used. The basic considerations for use of hydro-cycloning such as tailings characteristics and the management of the coarse and fine fractions are also discussed to provide context. This assessment is based on the author’s experience in the application of this technique to operations in the Americas and more recently in the detailed study of its application to existing and proposed TSFs at Australian projects. This paper is intended to support tailings professionals to consider alternatives to more typical tailings management techniques practices in Australia.