

Design considerations for an iron tailings filtration plant and their conveying and disposal systems

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Key words: tailings, filtration, conveying, disposal, designing

ABSTRACT

In recent years, there has had a greater recurrence of studies and projects that consider tailings filtration followed by deposition on a pad over the ground to reduce the consumption of fresh water, the space required for disposal, and, eventually, to reduce the costs of the project. In addition, this technology could be required to meet new environmental restrictions to extend the life of mine of existing plants.

This article is intended to describe the most relevant technical aspects of the design and implementation of an iron ore tailings filtering system and its final overland disposal as well as physical and metallurgical surveys, and laboratory and pilot testing. Furthermore, it is presented how these activities are inserted in the project development to rationalize the resources.

The case under study considers an iron minerals wet magnetic concentration processing plant. The outcome tailings are dewatered by means of thickeners, where the overflow water is recycled back to the plant. The underflow slurry is pumped into intermediate storage tanks before proceeding with further dewatering and final disposal.

The project consists of a tailings filtration plant, belt conveying systems, a temporary stockpiling system, trucking loading and transportation system, moisture-conditioning facilities (spreading and airing), and final disposal facilities (compacting).

Due to the high adherence of the filtered tailings that governs the belt conveying system design, the operating humidity range has to be established. Besides, proper technical aspects such as planning, executing and analyzing both the laboratory and the pilot testing data to validate process design parameters; selecting filters; defining spare filtering capacity; handling the out-of-range humidity filtrate; sizing the belt conveying system; configuring the equipment involved, have to be considered.