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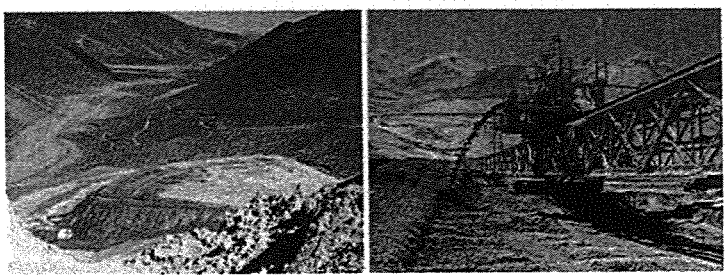

Rosemont Copper Company
Filtered Tailings Dry Stacks
Current State of Practice
Final Report

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1.0 Summary

Most of the world's concentrators or milling operations use conventional tailings processes which result in tailings impoundments. These impoundments store tailings slurry that typically arrives at the impoundment with solids contents ranging between 25% and 60% depending on the degree of thickening that is carried out prior to deposition. These engineered impoundments require construction and maintenance to insure structural integrity for the retention structures. In addition, these facilities must be designed and constructed to manage large quantities of water.

As the mining industry is increasingly scrutinized on its stewardship of the natural environment, beneficial use of available water resources as well as a commitment to alternatives beyond impoundments is often sought. The amount of water that is "lost" to the voids in the stored tailings, to seeps, or through evaporation from the tailings impoundments is something being increasingly viewed by critical regulatory and public eyes that insist on evaluating whether there are viable alternatives for any given proposed mining development. This pressure to seek alternative tailings management approaches exists today and the future will likely only see these pressures intensified.

Conventional tailings impoundments remain the primary alternative for the majority of operating and proposed mines around the world. These facilities are developed using tailings slurries from the milling process. However, with advances in dewatering technologies over the past few decades, tailings slurry is actually only part of a continuum of tailings "states" available to the modern tailings designer. Development of large capacity vacuum and pressure filter technology has presented the opportunity for storing tailings in an unsaturated state, rather than as conventional slurry or in a paste consistency associated with thickened tailings. For the minority set of projects that can use a non-slurried tailings alternative to optimize use of available water and to streamline permitting and/or operating conditions, filtered tailings are often an excellent alternative.

Filtered tailings are transported by conveyor or truck and placed, spread and compacted to form an unsaturated, dense and stable tailings stack (often termed a "dry stack"). Dry stack facilities don't typically require a dam for a retention structure and as such no associated tailings pond. Each project needs to assess the potential applicability for filtered tailings based upon technical, economical, and regulatory constraints. Experience shows the most applicable projects are those that have one or more of the following attributes:

1. Are located in arid regions, where water conservation is crucial (e.g. Western Australia, Southwest United States, much of Africa, many regions of South America including Chile)
2. Have flow sheets where economic recovery (commodity or process agent(s)) is enhanced by tailings filtration
3. Are located in areas where very high seismicity precludes some forms of conventional tailings impoundments
4. Are located in cold regions, where water handling is very difficult in winter

5. Have topographic considerations that exclude conventional dam construction and/or viable storage to dam material volume ratios

6. The operating and/or closure liability of a conventional tailings impoundment are in excess of the incremental increase to develop a dry stack

7. Are located in areas where construction materials for conventional dams do not exist or are very expensive to supply.

Moreover, filtered tailings stacks generally require a smaller footprint for tailings storage (e.g. much lower bulking factor), are easier to reclaim, and can have lower long-term (closure) liability in terms of potential environmental impact.

Filtered tailings (dry stacks), although new to many mining jurisdictions, are becoming more common both for operating mines and for projects in the evaluation stage (e.g. feasibility). The upper bound; in terms of operating throughput to date, is approximately 20,000 tpd and most operating dry stacks are developed for mines with a throughput less than 10,000 tpd. Dewatered tailings systems may have less application for operations where tailings ponds must serve dual roles as not only solids storage but as water storage reservoirs as well. This is particularly true in temperate climates where water balances must be managed to store annual snowmelt runoff or seasonal period of high precipitation to provide water for year round operation.

Filtered tailings are not a panacea for the mining industry for tailings management. However, under a growing number of site and regulatory conditions, filtering offers a real alternative for tailings management that is consistent with the expectations of the mining industry, its regulators, and the public in general. In the past few years, the capacity of filtration units has increased and unit cost for filtering tailings has commensurately decreased. However, economic considerations rarely indicate a preference for dry stacked tailings facilities over conventional slurry impoundments. As the method becomes more common, the economics will continue to improve.

2.0 Tailings Continuum

Figure 2.1 shows the continuum of water contents available for tailings management and includes the standard industry nomenclature. Decreasing water content increases placement expense because hauling or conveying is required rather than pumping. However, as the water content decreases, the tailings are able to be placed in self-supporting structures such as stacks.

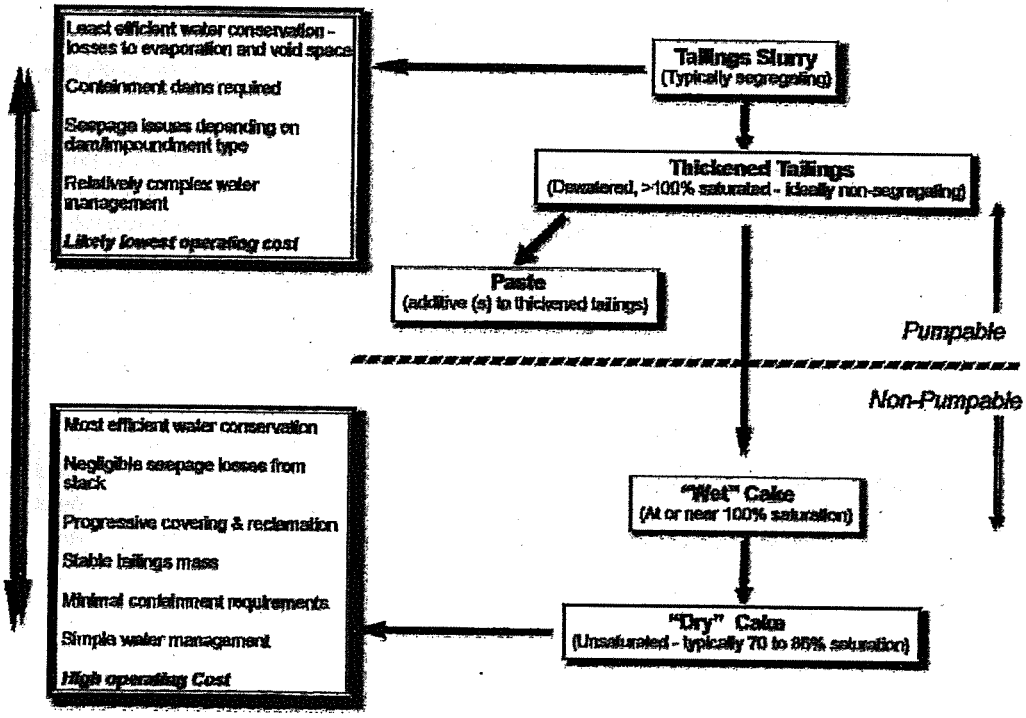

Figure 2.1 Tailings Continuum

Filtered tailings are typically taken to be the dry cake stage. Dry cake material has enough moisture to allow the majority of pore spaces to be water filled (70-85% saturation) but not so much as to preclude optimal compaction of the material.