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Capping of Fines Dominated Tailings Deposits

Background

Fine tailings produced from surface mined operations are normally discharged to a tailings impoundment where they settle and form fluid tailings (FT) with 10 to 30 wt% solids contents. The FT is dredged and dewatered to reduce the total volume occupied by the fluid tailings and transport the dewatered FT to a dedicated deposition area for further dewatering and consolidation. The fines dominated deposits are expected to be capped in some manner. Caps may be used to provide separation between underlying tailings materials and overlying reclamation materials, accelerate consolidation of the tailings, sever a beneficial role as part of the reclamation substrate and facilitate physical access to the deposits for the purpose of placing reclamation materials.

Statement of Research Opportunity

COSIA is inviting proposals for robust, cost-effective "Soft Tailings Capping" technologies required to safely and efficiently convert soft fines-dominated tailings deposits more than 10 m deep into stable terrestrial landforms.

Successful technologies will safely and cost-efficiently aid with:

- Deposit preparation for access, potentially by means of remote operation
- Dewatering performance improvement
- Material placement
- Instrumentation/monitoring/modeling of the above

Fines dominated materials are contained in some form of fluid containment structure. The dimensions for these structures are in practice highly dependent on the details of the ore body and mine/tailings plan. For this exercise, consider fines dominated deposits placed in three structures:

- One structure with a size of 2 km by 2 km by 50 m depth. Typical fill time for such a structure would be 10 to 15 years.
- One structure with a size of 1 km by 1 km by 25 m depth. Typical fill time for such a structure would be 1 to 2 years.
- One small structure of 0.5 km by 0.5 km by 10 m depth. This could be considered a residual MFT area that is left over after much of the material in a pond is converted.

Desired Results

The desired results of this research include:

- Development and delivery of tailings caps that fully complement reclamation needs
- Reduced capping costs while enhancing cap performance
- Identify best practices for tailings capping design and practice

Additional information can be found on COSIA's website in the Innovation Opportunity Area relating to "Capping of Tailings Deposits" (www.cosia.ca)