

## **A Method for Oil Sands Tailings Consolidation**

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A method for oil sands tailings consolidation to a trafficable surface soon after its disposal was developed. Fine tailings (either mature fine tailings or free fine tailings) was thickened to a tailings mud, then the tailings mud and coarse sand were placed in alternative layers in a 100 L container, water released from the inter-layered deposit was withdrawn twice a day from bottom center of the container. Surprisingly, the lab experimental result showed that the inter-layered fine mud and coarse sand deposit reached a ground pressure of approximately 10 PSI within 3 days after its placement when its overall solid content was still less than 70% (or water remaining in the deposit was great than 30 % by weight). A parked tracked tractor exerts a ground pressure of approximately 4-8 PSI depending on track width, length, and tractor weight. This means that the inter-layered tailings deposit can support any kinds of tracked tractors for vegetation and forestation activities a few days after its disposal. It did not matter how much free water entrained in the fine mud or in the wet coarse sand while inter-layering, the free water accumulated quickly at the top and was withdrawn soon after the whole inter layering was completed

However, it is well know that composite tailings deposit is not trafficable even though solid content reaches 80%. The mechanism behind is that in composite tailings deposit, coarse sand and fines are well mixed, the fine clay particles, sitting in the pore of coarse sand particles, play a role of lubricating the coarse sand particles, while In the inter-layered tailings deposit, water is in the pores of both coarse sand and fine mud. The wet coarse sand holds weight similar to sand on any beach with full of water covering.

The inter-layered tailings technology has a huge implementation potential. All fresh tailings can be processed and 80% of warm water (40-50 °C) can be immediately recycled within a plant compared with current 80% of cold water recycling from tailings ponds, recovering huge amount of heat whereby reducing consumption of fuel for heating up the recycle water at approximately 8-9 barrels of water per barrel of bitumen and greenhouse gas emissions. No requirement for expansion of both dyke and storage pond.