

## Use of Paste Technology for Sediment Transport and Disposal

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**Background/Objectives.** Paste technology is often used in mining applications where tailings are transported by pipeline and placed at high solids concentrations. The same technology can also be used for transport and disposal or beneficial reuse of dredged sediments. Hydraulically dredged sediment is often pumped at a solids weight concentration of 3 to 12%. Mechanically dredged sediment can often be pumped at higher concentrations (around 35% solids) utilizing a centrifugal pump, but in some situations pumping with even less water is needed. Utilizing positive displacement pumps can allow paste pumping at a much higher sediment solids content at or near the in situ solids content of the sediment. This approach can improve the sustainability of a project by reducing the amount of water used to create a slurry and reduce the number of pumps used.

**Approach/Activities.** If sediment transport at a relatively high solids concentration is desired, testing is performed to determine if the material characteristics are amenable to pumping as paste. Paste requires a reasonably high fines content to provide adequate non-Newtonian properties during pumping. Paste materials have very high frictional losses and can be transported at low velocities without particles settling on the pipe invert. Rheology testing is performed on the sediment over a range of solids concentrations to measure parameters required in hydraulic analyses (such as viscosity and shear stress). Hydraulic analyses are then performed for a range of solids concentrations to optimize the sediment transport system. Using the same rheology data, sediment deposition can be simulated for both subaerial and subaqueous deposition. If desired, the sediment can also be placed as slurry by mixing water from the disposal pond into the paste immediately before deposition. Sediment deposition as slurry and recycling of makeup water can be simulated using hydrodynamic and sediment transport modeling.

**Results/Lessons Learned.** This presentation will discuss the characteristics of paste, laboratory testing to measure paste characteristics, hydraulic analysis, system optimization, system components, barge-to-pipeline transloading, subaerial and subaqueous disposal, and provide a case example. Relatively fine-grained dredged sediment can often be pumped as paste at or near its in situ solids concentration. Paste is a non-settling material that allows transport at low velocities. Because of these material characteristics, system stoppages do not normally result in pipeline clogging or difficulties during restart of pumping. The use of high solids paste pumping of dredged material may be a preferred alternative to standard hydraulic pumping methods of fine-grained dredged sediments where water is a limiting factor. It also can provide a greener alternative by reducing the use of water and the number of pumps.