

Low-Cost Dewatering of Dredged Sediment Using The **VACUUM BAG** Method ^{pat. pend.}

Large amounts of organic sediment have been and will continue to be dredged from harbors, rivers, and estuaries because of contamination with heavy metals and PCB's. Excess water in the produced slurry makes incineration uneconomical, so it is typically disposed in landfills. But even after months of gravity settling, water content is often in the range of 100% to 200% (on a weight of solids basis) and it remains semi-liquid. In spite of extensive research, no other low-cost method has been developed to remove a sufficient amount of water in dredged organic sediment to make handling at landfills efficient or incineration or usable land building feasible.



On most hydraulic dredging projects, sediment-water slurry is pumped into either settling basins or tubes made of porous geotextile fabric to accomplish some gravity dewatering. From this stage, it is not much additional work using simple equipment and readily available materials to further consolidate dredged sediment under atmospheric pressure using the "Vacuum Bag" method. **Within several days to weeks, and consuming little energy cost compared to other methods, Vacuum Bagging can reduce the volume by 40% and weight by 25%, producing a stiff, physically stable material.**



Sediment "slurry" from hydraulic dredging.



Organic sediment dewatered by vacuum bagging.

Water removal rate and potential is described by classical soil mechanics "consolidation" theory. **Dewatering potential can be predicted for a material, and production dewatering planned, from small scale tests that are routinely performed in geotechnical laboratories.** At medium and small scales, we expect Vacuum Bag dewatering to cost about \$10 per final ton if the "bag" materials are *not* reused. On a large scale and with a reasonable amount of reuse of the materials, that cost may come down to less than \$5 per final ton, making the Vacuum Bag method of dewatering both efficient and economical in a wide variety of applications and settings.

Enhanced Dewatering of Dredged Sediment Using The **VACUUM BAG** Method pat. pend.

Vacuum Bagging uses atmospheric pressure to squeeze out the water from sediment or sludge having substantial organic content, just like compressing a sponge. This atmospheric pressure is applied uniformly around the outside of an air-impermeable membrane ("bag") enclosing the sediment by applying vacuum to a porous medium located between the outer membrane and material. The 2,000 pounds per square foot of uniform atmospheric pressure that is available (at sea level) can even be supplemented by hydrostatic pressure in submerged applications. This basic principle can be configured in many different ways, including:

