

Dredge Material Stabilization Using the Pozzolanic and Sulfo-pozzolanic Reaction With Lime By-products and CCP's to Make an Engineered Structural Fill

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Abstract

Large contracts or RFP's are being issued to remove and find beneficial uses for dredge material. One of the challenges is to find economical and environmentally suitable means to stabilize and solidify (S/S)-the solids so they can be reused for structural fill, minefill and/or cover soil. This lab study demonstrates the geotechnical methodology and results of using lime kiln dust (LKD), Class F coal fly ash, and dry FGD by-products. New spray dryer FGD units could provide an inexpensive S/S additive and an opportunity for CO₂ credits.

These industrial, sustainable by-products were investigated to determine their potential for stabilizing and solidifying the dredge solids from the Cox Creek CDF (confined disposal facility) for Baltimore, MD with the objective of making a structural fill material. Another lab study utilized harbor dredged material from the USCOE Ft. Mifflin Confined Disposal Facility, Philadelphia, PA.

The performance of the spray dryer ash is compared with a blend of LKD and Class F fly ash. Enough lime alkalinity needs to be added to take advantage of the pozzolanic and sulfo-pozzolanic, cementitious reaction potential. In order to make good structural fill the moisture of the dredge spoil must be reduced as close as possible to the optimum moisture content for compaction to near maximum dry density. Strength and swell measurements with curing time are presented. Raising the pH to highly alkaline levels 9-11 for pozzolanic hydration reactivity coincide with pH levels that stabilize leachable heavy metals, including oxyanions.

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