

Mixing Reservoir Sediment with Fly Ash to Make Bricks and Other Products

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ABSTRACT:

Taiwan (Republic of China) relies heavily on reservoirs for water supply, irrigation, and hydropower. The sedimentation of such reservoirs in Taiwan approaches 15,470,000 m³ annually. Dredging has been used to remove the deposited sediments, in order to maintain reservoir capacity for water. However, how to dispose of or utilize the dredged sediment presents a serious problem to Taiwan and many other nations. Reservoir sediments usually contain silt, clay and some organics. Without treatment or processing, such sediments cannot be used as aggregate materials for construction or other purposes. Because the sediment is rich in clay and organic contaminants, disposing it without treatment causes pollution problems. The development of reclamation technologies to transform reservoir sediments into reclaimed products has many benefits: radically reducing wasted sedimentation, minimizing cost of sediment management, and reaping economic benefits from the useful products made of the dredged sediments. It is highly important to Taiwan and many other nations.

Preliminary tests at University of Missouri-Columbia have demonstrated that by mixing reservoir sediment with Type-C fly ash at 1 to 1 weight ratio, and by compacting the mixture at 10,000 psi, a strong material is produced which may be used as bricks or blocks for construction or gardening. A more detailed study, sponsored by the Government of Taiwan, is currently being conducted in Taiwan at the National Chiao Tung University. The objective of this research project is to compact reservoir sediments mixed with fly ash into strong and water-durable solid products such as bricks. The sediment was compacted alone and in mixture with Type-F fly ash, which is the most commonly available type in Taiwan, at different flyash-to-sediment ratios. CaO was added in some experiments to enhance the cementing property of the Type-F fly ash used. Future experiments will be conducted with Type-C fly ash, which is available from some power plants in Taiwan. The paper will present results of these tests, and will discuss how to produce bricks and other construction/gardening materials by using this flyash-sediment compaction process.

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