**Chowdhury, M. R., (2011). *Fluid Mud Underflows in Coastal Dredge Disposal*. Ph. D. Dissertation, Clemson University, SC, USA.**

-: Summary:-

My doctoral dissertation research focused on determining the fundamental physics of an important environmental fluid mechanics phenomenon that occurs in typical coastal dredge disposal operations. Each year large volumes of cohesive sediments, in the form of mud slurry, are dredged from rivers, waterways, ports, and harbors around the world primarily to maintain and enlarge their navigability. The dredged mud slurry is then transported to a designated aquatic disposal site to dump. An integral part of assessing the environmental impacts during such disposal operations is to predict the dispersion and fate of the discharged mud slurry. A number of past studies revealed that the disposed slurry descends in the water, impinges the bottom, and flow away as an underflow from the impingement point.

The main goal of my doctoral dissertation research was to understand the dynamics of the fluid mud underflows based on a thorough experimental and theoretical investigation. The experimental part of the investigation involved conducting experiment in three different experimental set-ups: rectangular flume for constant volume release, rectangular flume for constant flux release, and a square pool for radial constant flux release of fluid mud. The experiments in the rectangular flume generated two-dimensional underflows, while those in the pool generated radially axisymmetric three-dimensional fluid mud underflows. A good understanding of the dynamics of the underflows was obtained based on the analysis of the acquired experimental data of the experiments. It was found that, as the underflows propagated, they experienced several key propagation phases, the flow dynamics of which had been thoroughly analyzed. One of the key results of the experimental investigation was that that the propagations of underflows were significantly influenced by the non-Newtonian rheology of released fluid mud. The theoretical part of the investigation included experimental evaluation of the existing mathematical models and development of new models for the propagation of the underflow. In particular, a significant part of the research was devoted to analyze the viscous propagation of the underflow, when the effects of the non-Newtonian rheology were prominent, because experimental study on the viscous propagation of non-Newtonian underflow was non-existent. The results of this research were appeared in three peer reviewed journal articles and several conference proceedings. Two more journal articles on the results of the research are in the process of submission.