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Construction, Monitoring, and Data Analysis of a Nearshore Mixed-Sediment Mound, Mobile Bay Entrance, Alabama

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14. ABSTRACT

As part of the U.S. Army Corps of Engineers' Dredging Operations and Environmental Research (DOER) Program, the U.S. Army Engineer Research and Development Center's (ERDC) Coastal and Hydraulics Laboratory (CHL) and U.S. Army Engineer District, Mobile, have constructed a mixed-sediment dredged material mound offshore of Mobile Bay, AL. The mound was located in 9.1 m (30 ft) of water just to the southwest of the ebb shoal of the Mobile Bay entrance. The purpose of the field investigation was to provide data to advance our understanding of the geotechnical properties of dredged material before, during, and after dredging, and for verification of Corps numerical models, which predict the fate of dredged sediments during the many phases of dredging. Of greatest interest is the long-term fate of mixed sediments (i.e., dredged material with a fraction of fines equal to or greater than about 50 percent) placed at a nearshore location. This report describes the construction, monitoring efforts, and initial study results. Wave, current, sediment samples, and multibeam bathymetry have be collected to assess the long-term movement and changes in the mixed-sediment disposal mound. Analysis of the data has related the flow patterns and bathymetric change to the alteration in grain-size patterns from the native sediment to the placed material. This mixed-sediment from the Mobile River had a distinctly characteristic black, fine-grained, cohesive sediment consistency, which acted as a cohesive sediment and was distinctive from the fine tan native sands. The

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15. SUBJECT TERMS

ADCP data	Dredge material placement monitoring	Sediment erosion rates
Bathymetric change	Mixed-sediment mound construction	Sediment samples
	Mobile Bay entrance	Wave modeling

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cohesive nature of this river material resulted in little change in material distribution during the dredging, hauling operation, and deposition from the split-hull barge, and 1-year after placement there was little change in mound morphology. A slight mixing of river sediment was found with the surrounding native sediment. Bulk property and erosion rate studies of the dredged sediments showed high concentrations of manganese and smectite, causing significant increases in the critical shear stress and decreases in the erosion rates of these placed sediments. Given the cohesive nature of these dredged sediments and the low magnitude of the typical waves and currents at this site, it appears that storm induced changes are needed to affect significant sediment transport and change depositional patterns at Mobile Bay entrance. Data from this study will provide a “no change” data point for sediment fate model validation.