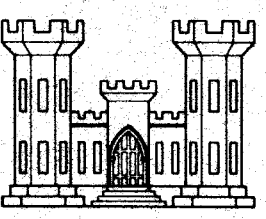
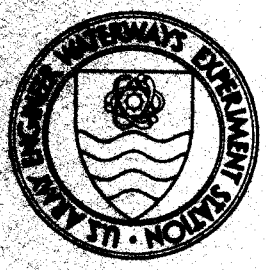


DREDGED MATERIAL RESEARCH PROGRAM



CONTRACT REPORT D-74-5

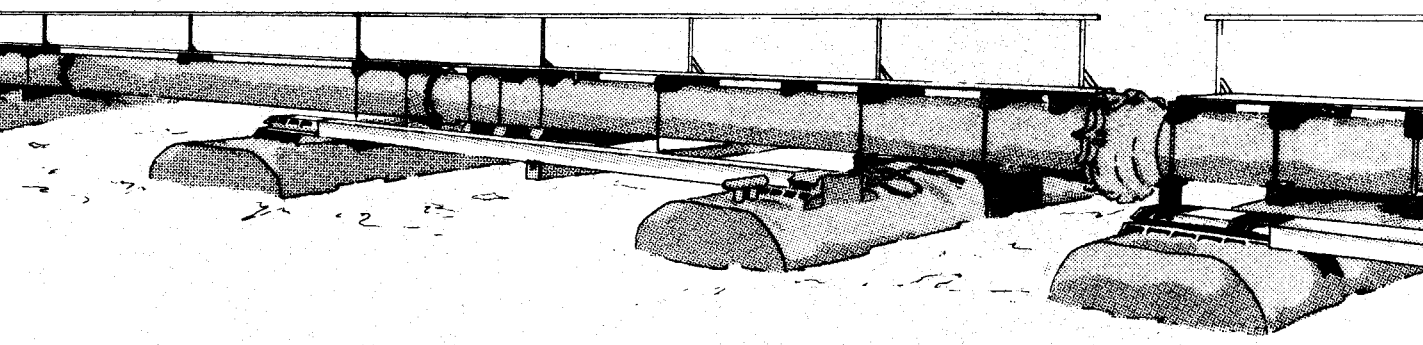
DEMONSTRATION OF A METHODOLOGY FOR DREDGED MATERIAL RECLAMATION AND DRAINAGE

by

Carl W. Garbe, David D. Smith, Sri Amerasinghe

Dames & Moore
500 Sansome Street
San Francisco, Calif. 94111

September 1974
Final Report



Prepared for Environmental Effects Laboratory
U. S. Army Engineer Waterways Experiment Station
P. O. Box 631, Vicksburg, Miss. 39180

Under Contract No. DACW39-73-C0139

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DEPARTMENT OF THE ARMY
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS
P. O. BOX 631
VICKSBURG, MISSISSIPPI 39180

IN REPLY REFER TO: WESYV

30 September 1974

SUBJECT: Transmittal of Contract Report D-74-5

TO: All Report Recipients

1. The contract report transmitted herewith represents the results of a field demonstration of a dredged material treatment concept evaluated as part of Task 5A (Dredged Material Densification) of the Corps of Engineers' Dredged Material Research Program (DMRP). This task, included as part of the Disposal Operations Research Project of the DMRP, is concerned with developing and/or testing promising techniques for dewatering or densifying (i.e. reducing the volume of) dredged material using mechanical, biological, and/or chemical techniques prior to, during, and after placement in containment areas.

2. Rapidly escalating requirements for land for the confinement of dredged material, often in the midst of high-land-value urbanized areas, have dictated that significant priority be given within the DMRP to research aimed at extending the life expectancies of existing or proposed containment facilities. While increased life expectancies can be achieved to some extent by improved site design and operation and to a greater extent by removing dredged material for use elsewhere, the attractive approach being considered under Task 5A is to densify the in-place dredged material. Densification of the material will not only increase site capacity but also will result in an area more attractive for various subsequent uses because of improved engineering properties of the material.

3. The methodology described in this report involves the almost continuous conditioning of a layer of newly deposited dredged material slurry by a tracked vehicle to prevent the formation of a desiccation crust and thereby accelerate the evaporation of water by natural processes. The procedure was developed by Dames & Moore and has been used successfully to densify dredged material at sites in San Francisco and Houston. A field demonstration under more rigorous environmental conditions and with more intensive documentation and monitoring was deemed advisable by the DMRP planning staff and hence a field demonstration was accomplished at a site at Monroe, Michigan, the results of which are presented and evaluated in this report.

WESYV 30 September 1974
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4. Dredged material consisting of a fat clay was involved in the field demonstration and was pumped to a depth of 20 in. into a 2-acre prepared site divided into two test areas and a control pond. Conditioning by tracked vehicles was performed for up to 23 days with water contents of the material carefully monitored along with several soils and meteorological parameters. In spite of unanticipated and complicating operational problems (described in the report) and about 2 in. of rain which fell during the demonstration, very high water losses occurred in both test areas under different durations of conditioning.

5. The feasibility of this mechanical conditioning methodology was established further by the demonstration, and considerable insight was gained as to improvements necessary in operational aspects. As the DMRP proceeds, attention will be directed to identifying other situations where the methodology can be tested to define further the range of conditions of material, climate, and other factors under which it can be effective. A controlled laboratory experiment already has been initiated by the DMRP seeking to quantify the rates of water loss so that agitation or conditioning frequencies and duration can be optimized for various types of dredged material slurry.

G. H. HILT
Colonel, Corps of Engineers
Director

Unclassified

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REPORT DOCUMENTATION PAGE

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Disposal areas
Dredged material

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

A controlled field demonstration was conducted to evaluate the effectiveness of a methodology for reducing the volume and improving the physical characteristics of dredged material in confined disposal areas. The procedure involves the almost continuous conditioning of a layer of dredged material slurry by a tracked vehicle to accelerate evaporation of water in order to create a layer of soil from the slurry. The soil layer is then compacted with conventional construction equipment. A two-acre demonstration site was selected near Monroe, Michigan. The site was cleared; the in situ silty sand was compacted and leveled;

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20. ABSTRACT (Continued)

and a 30-in.-high dike was constructed around the site. The site was divided into two test areas and a control pond. Material dredged from the nearby River Raisin was pumped into the test areas and the control pond to a depth of 20 in. The solid phase of the material was a dark-gray fat clay. The dredged material was allowed to settle overnight and then approximately 2 in. of free water was decanted over weirs in the dike, resulting in an 18-in. layer of slurry. The water contents of the slurry after decanting were 245 and 387 percent in Areas 1 and 2, respectively. Two tracked vehicles were used to condition the slurry; a rubber-tired tractor was used for a short time. Conditioning was accomplished by operating the vehicles with the blade or bucket lowered about 3 in. into the slurry. The water content in Area 1 was reduced from 245 to 66 percent at the time the conditioning was terminated at 250 coverages (8 days of conditioning) because severe foundation deterioration resulted in miring of equipment. In the larger Area 2, the water content dropped from 387 percent to 36 percent after 350 coverages (23 days of conditioning). The water content of material in the control pond decreased from an initial 425 percent to about 186 percent at the conclusion of the demonstration. During the demonstration, approximately 2 in. of rain was recorded; there were few days of sunny weather. The demonstration showed the feasibility of such conditioning. Should the method be used on a large scale, special equipment should be developed for processing the slurry. The concept of partitioning a containment area into several smaller areas should be considered where staged planning would permit filling operations in some of the areas while previously filled areas were being conditioned.

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