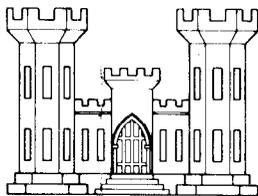
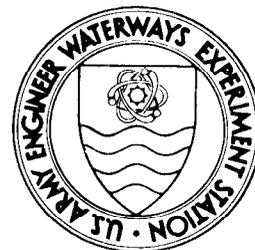


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DREDGED MATERIAL RESEARCH PROGRAM



CONTRACT REPORT D-74-6

CONTAINMENT AREA FACILITY CONCEPTS FOR DREDGED MATERIAL SEPARATION, DRYING, AND REHANDLING

by

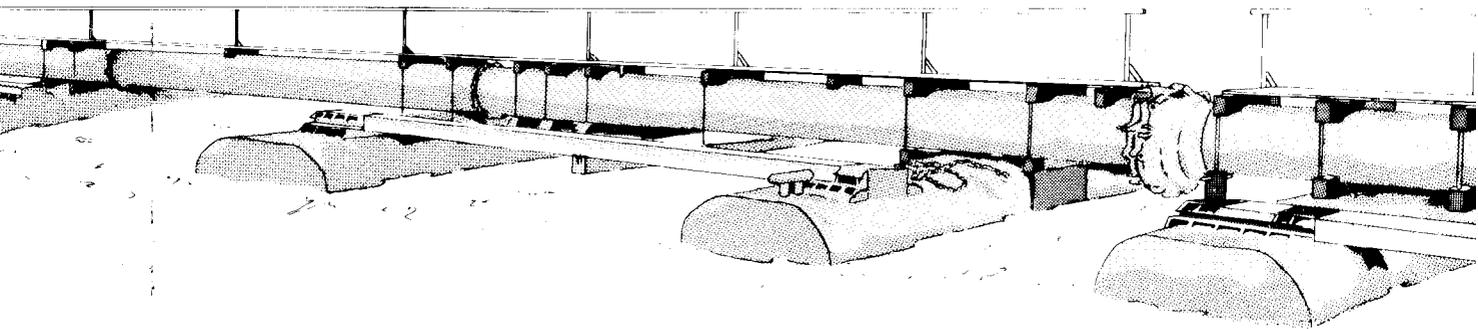
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Hittman Associates, Inc.
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October 1974

Final Report

Approved For Public Release; Distribution Unlimited



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

Under Contract No. DACW39-73-C-0136

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IN REPLY REFER TO: WESYV

31 October 1974

SUBJECT: Transmittal of Contract Report D-74-6

TO: All Report Recipients

1. The contract report transmitted herewith represents the results of one of five research efforts (work units) initiated to date as part of Task 5C (Disposal Area Reuse Research) of the Corps of Engineers' Dredged Material Research Program (DMRP). Task 5C is included as part of the Disposal Operations Research Project of the DMRP, which, among other considerations, includes the development of methods of extending the useful life of confined disposal areas.
2. Confining dredged material on land is a disposal alternative to which practically no specific design or construction improvement investigations, much less applied research, have been addressed. Being a form of waste-product disposal, dredged material placement on land seldom has been evaluated on other than purely economic grounds with emphasis nearly always on lowest possible cost. There has been a dramatic increase in the last several years in the amount of land disposal necessitated by confining dredged material classified as polluted. Attention necessarily is directed more and more toward the environmental consequences of this disposal alternative as well as to sociopolitical issues.
3. DMRP work units are in progress developing improved facility design and construction and concepts for increasing facility capacities for both economic and environmental protection purposes. Other work units are developing improved facility operation and management procedures. However, the total picture would be incomplete without considering concepts for reclamation of potentially valuable materials. To this end, the investigation reported herein was accomplished under contract with Hittman Associates, Inc. The report presents concepts for the separating, drying, and rehandling of dredged material in conjunction with active dredging projects, as well as concepts for rejuvenating the storage capacity of confined disposal areas which have already been filled. This study is considered a preliminary step leading to implementing permanent reusable disposal sites.

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4. The study shows that separating dredged material into sand, silt, and clay fractions is feasible with current technology. Furthermore, specification grade sand and gravel can be produced for costs generally less than the average market value of the same material produced commercially. Offsite transport of fine-grained materials (silt and clay) is possible with hydraulic techniques that are less expensive than truck transport. Although concepts for dewatering are presented, dewatering of the fine-grained materials, especially clays, will require more study.

5. Work units already have been initiated under the DMRP and others are being planned that directly address some of the problems recommended as topics of research by this study. A field study has been conducted to verify or modify theoretical concepts for silt separation as presented in the report and the results of this field study will be reported separately. Related studies will determine the availability of, and regional needs for, materials of various specifications, as well as the legal, institutional, and policy constraints associated with the marketing or donation of dredged material. Task 5A is the focal point of efforts to develop dredged material dewatering and densification techniques. Task 2C will result in facility management and operational guidelines for eliminating or minimizing adverse conditions and various other tasks will develop ultimate land use and control techniques.



G. H. HILL

Colonel, Corps of Engineers
Director

Unclassified

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this study was to define and evaluate system concepts which could be applied at containment area facilities for the separation, handling, and drying of dredged material. The objectives of this effort were to determine methods by which dredged material could be removed to increase the life expectancy of disposal areas. A further goal was to provide separated materials that could be used for construction materials, landfill, or other productive uses. There are a number of methods by which sand and gravel (Continued)		

20. ABSTRACT (continued).

can be separated from dredged slurries at full dredge flow conditions. These include separation basins with dragline or secondary dredge rehandling, and the use of hydraulic scalpers and classifiers both with and without attendant thickeners and hydrocyclones. Facilities can be designed using commercially available equipment used in the sand, gravel, and mineral processing industries. Using this equipment, it should be possible in most cases to produce, from dredged material, washed and blended sand and gravel which meets construction specifications. The selection of the method for sand and gravel separation for a given location will depend upon the characteristics of the material to be dredged, the primary dredge size, and the total quantity of material involved. For long-term operations or where significant fractions of sand and gravel are involved, a semipermanent installation with thickeners and hydraulic scalpers will provide the greatest recovery of sand and gravel at the lowest cost. Where the material has only a small fraction of sand, thickeners with hydrocyclones will generally be the least cost system. For short term operations, the use of separation basins with secondary dredge removal to portable scalpers, will provide the least investment and greatest mobility. The processing cost for the sand and gravel separated from dredged material will generally be less than the average market value of the same material produced commercially. The removal of the sand and gravel fractions will reduce the containment basin area required to attain return water quality goals and the quantity of material to be stored. To further reduce the storage requirements, separation basins can be used to selectively separate the remaining silt and clay. By using secondary dredges, the separated material can be removed from the basins and transported for off-site utilization or disposal using booster pumps. By concentrating the solids in this manner, the pumping power for off-site transport will be a small percentage of the power that would be required to transport the slurry from the primary dredge. The cost of transporting the solids as a concentrated slurry will be less than truck transport of the same quantity of dry solids. The cost differential would be even greater when the costs of handling the material for truck transport are included. Electroosmotic pumping appears to be a feasible, although rather expensive, alternative for the dewatering of the fine-grained dredged material. Containment basins with sand or gravel drain layers at their bottom should help to partially dewater these fines. Simple rehandling of the silt and clay fraction of the dredged material by dragline also provides an efficient means of dewatering. Commercially available mechanical equipment which may be applicable for fine-grained dredged material dewatering are mineral thickeners followed by rotary drum vacuum filters. The majority of the separation and handling techniques outlined in this report use existing technology and equipment. However, they should be demonstrated on a small scale in order to develop criteria for full scale applications. These demonstrations could best be conducted as part of scheduled dredging operations using either rented or contractor's equipment. In this report, design information is presented on the various separation and handling concepts in sufficient detail to permit adaptation to most applications. The report also includes examples of the steps involved in the planning and design of separation systems for typical facility applications. An example of the restoration of an existing, filled containment area is also presented.

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