PD-FC
This will require your ~~of~~ careful consideration
Thanks
BB

5/7

IB
ASK
PD BB F

PD-FC
89-65
S: 5/19/89

Jim Baxter

Dear Colonel Bonine

I am enclosing a drifter card from your berm experiment South of Dauphin Island. This is the second drifter I have found in the same location and have seen a number of others which were picked up before I could get to them.

I sent one of these cards in in February and have not had any return information so I'd like to insure feedback on this one please.

As a property owner who has seen terrible beach erosion in his "front yard" and as President of the Property Owners

Association I am most [illegible] in this experiment and how well you think it is doing.

My thanks for your help.

Sincerely

[illegible]

MOBILE HARBOR
FEEDER BERM

- PURPOSE
  - National Effort (initiated by WRSC)
  - Reduced Disposal Cost (if possible, dispose closer to project)
  - Beneficial Uses (sand in littoral drift zone; other berms- fish attractors, wave breaks)
- BERM CONSTRUCTION
  - Disposal Site Selection (haul distance, dredge draft, littoral drift zone)
  - Monitoring Feature (aided monitoring for sand movement)
  - Achieved (two split hull hopper dredges, 1300 c.y., 14 ft. loaded; started 12 Jan. completed 23 Feb. 87; 464,000 c.y. placed on 19 ft. contour; 6-7 ft. high, 5,000 ft. long, 400-700 ft. base width)
- MONITORING
  - Objectives (document volume and direction of sand movement)
  - Methods (hydrographic surveys, current meters, wave gages, SBD, bottom samples, side scan sonar)
  - Results (no major storms to cause movement,Florence recently, data pending,1-2 ft. loss of berm height in some areas)

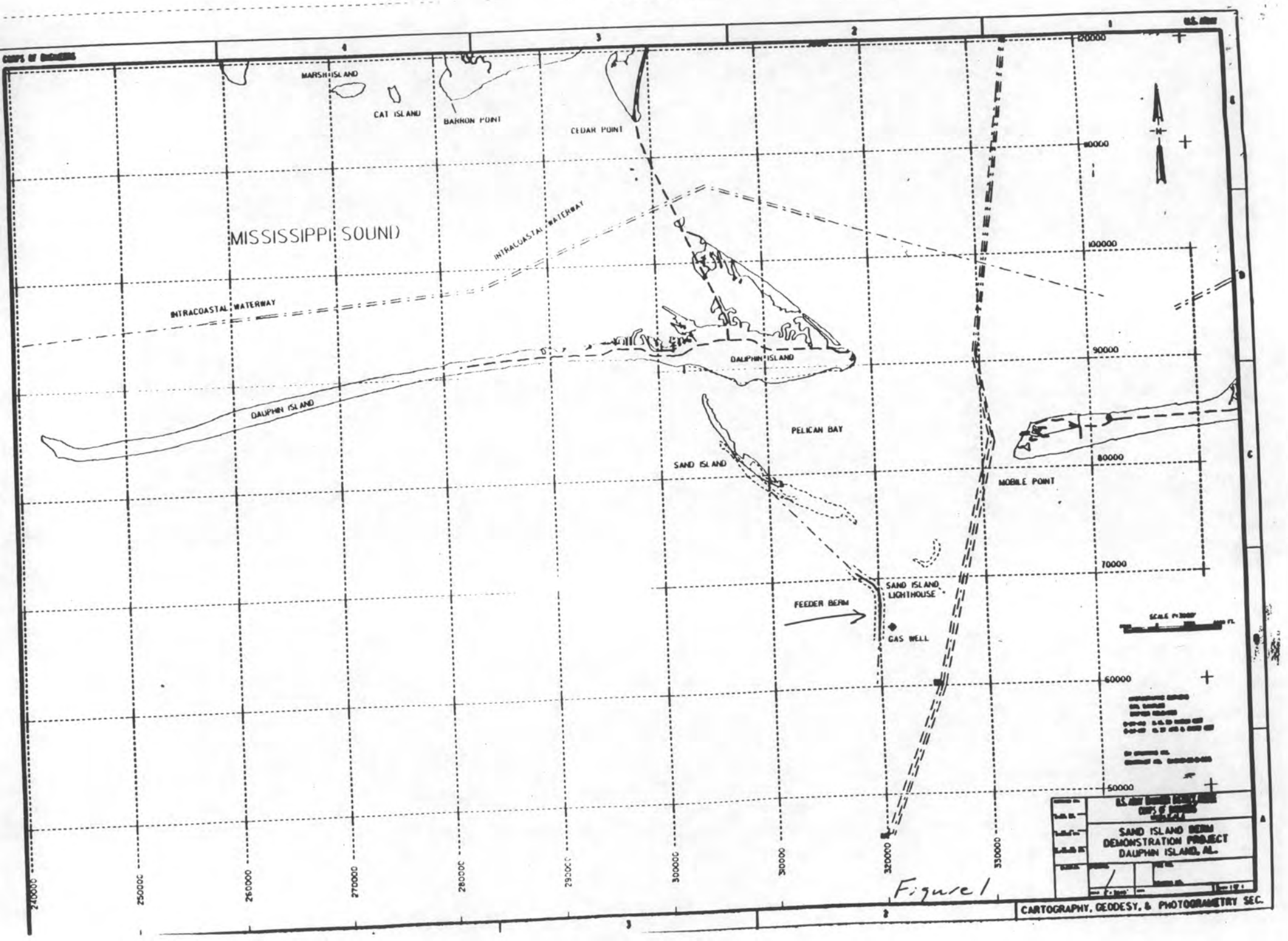
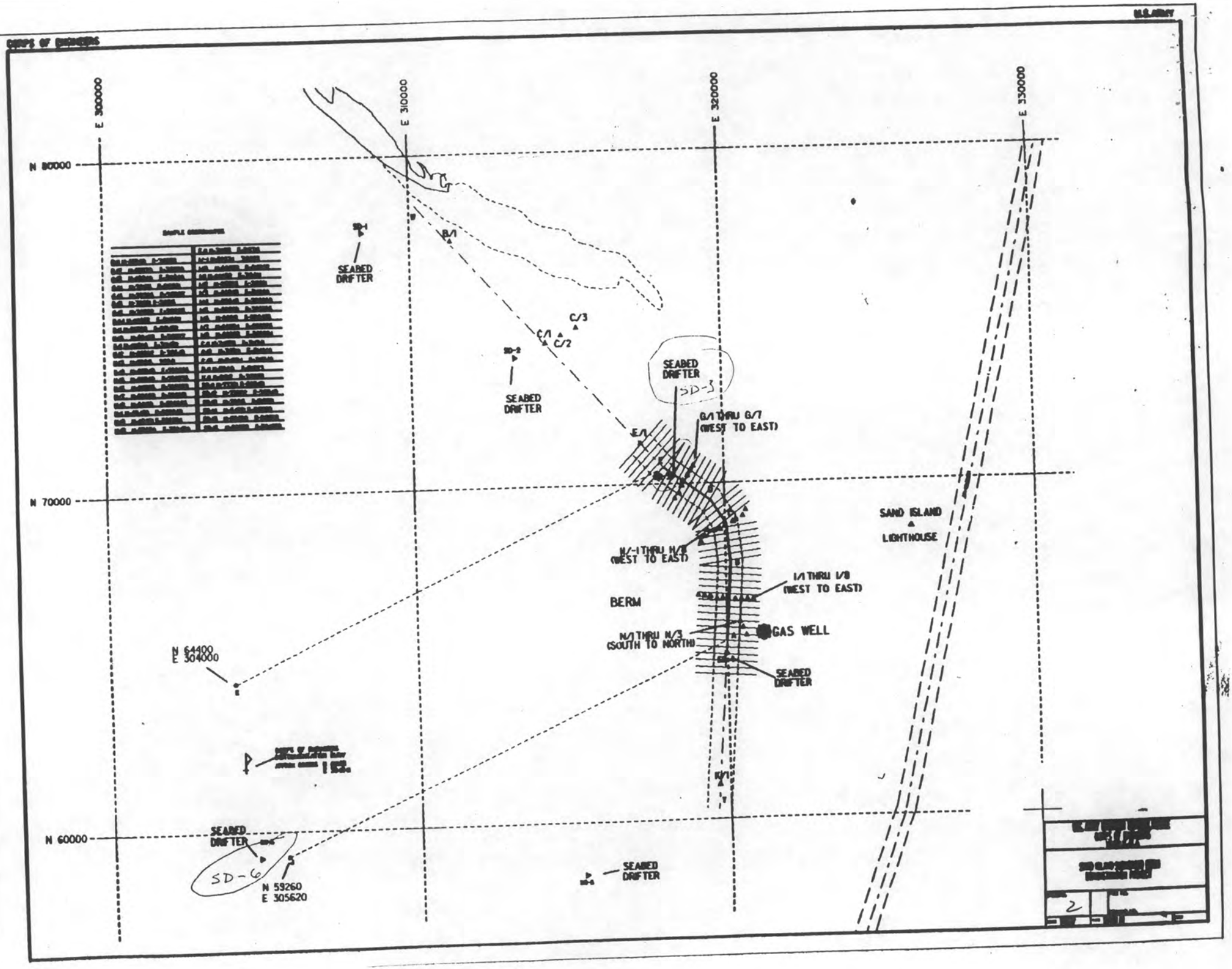

MARSH ISLAND
CAT ISLAND
BARRON POINT
CEDAR POINT
MISSISSIPPI SOUND
INTRACOASTAL WATERWAY
INTRACOASTAL WATERWAY
DAUPHIN ISLAND
DAUPHIN ISLAND
PELICAN BAY
SAND ISLAND
MOBILE POINT
SAND ISLAND LIGHTHOUSE
FEEDER BERM
GAS WELL
SAND ISLAND BERM DEMONSTRATION PROJECT DAUPHIN ISLAND, AL.
CARTOGRAPHY, GEODESY, & PHOTOGRAMMETRY SEC.

Figure 1


E 300000
E 310000
E 320000
E 330000
N 80000
N 70000
N 60000
SEABED DRIFTER
SD-1
SD-2
SD-3
SD-6
C/3
C/1
C/2
E/1
G/1 THRU G/7 (WEST TO EAST)
H/-1 THRU H/8 (WEST TO EAST)
I/1 THRU I/8 (WEST TO EAST)
BERM
N/1 THRU N/3 (SOUTH TO NORTH)
GAS WELL
SAND ISLAND
LIGHTHOUSE
N 64400
E 304000
N 59260
E 305620
2

News Release

US Army Corps of Engineers
Waterways Experiment Station

Release No.

For Release

Contact: PUBLIC AFFAIRS OFFICE

Phone: (601) 634-2504

SEABED DRIFTERS

If you find what looks like a red Frisbee with a 14-inch plastic tail, the U.S. Army Corps of Engineers wants to hear from you.

Several thousand of these "Frisbees" (technically known as seabed drifters) are being released offshore of Sand Island, Ala. These seabed drifters help to monitor movement of sand placed in that area as a result of dredging the Mobile Harbor Entrance Channel. This is part of a scientific experiment conducted by the Corps to use natural currents to transport the sand toward shore.

Bundles of drifters, weighted with sandbags, are dropped overboard from boats. The bundles are held together with salt rings that will dissolve, thus releasing the drifters. The individual drifters will then disperse with the bottom currents.

-more-

SEABED DRIFTERS 2-2-2-2

Drifters may be washed ashore from Louisiana to Florida. Each has a unique serial number and a prepaid postage information card attached to its tail or stem. Anyone finding a drifter is asked to complete the printed form and deposit it in any convenient mailbox. The form asks for information regarding location, date, and time of recovery. The seabed drifter itself should be properly disposed of or may be retained as a souvenir.

A few of the drifters have small sonic transmitters attached to their tails. The transmitters are similar to those used by biologists to study the migration of fish and marine mammals. Different pulse rates and frequencies give each transmitter a unique signal. Hydrophones can detect the signals up to a mile away. Short term movement can thus be tracked.

These studies are being conducted by the Corps' Mobile District and the Coastal Engineering Research Center at the Corps' Waterways Experiment Station (WES) in Vicksburg, Miss.

The placement of sand directly on beaches to relieve erosion problems is technically achievable, environmentally safe, and often provides the most economical means of protecting a long stretch of shore. However, beach nourishment is expensive, especially where sand must be transported long distances. The present study investigates natural currents as an alternative means of moving sand from the vicinity of navigation channels to beaches where the sand is an asset.

-more-

3-3-3-3

SEABED DRIFTERS

At present, little is known about sand movement off Alabama's coast. Waves drive longshore currents that move sand eastward and westward along the shore. This longshore current is strongest inshore of breaking waves. Farther from shore, the interaction of winds, tide, and waves moves sand in even more complicated and less predictable patterns.

The offshore sand shoals, the enormous Mobile Bay ebb tidal delta, the nearshore bars, beach, dunes, and even the barrier islands themselves are all part of an active sand system. The present study looks at creative ways to determine natural sand movement and evaluate ways to improve the overall benefits of the Corps of Engineers Harbor Maintenance Program.

Drifter recovery information, combined with other measurements, improves the prediction of sediment transport patterns. Public participation in the seabed drifter program will be a key element in uniting navigational, ecological, and shore protection interests.

WES is the largest research and development laboratory within the Corps. It is a complex of six separate laboratories with a total annual budget exceeding $130 million for research and development.

If you would like more information about the seabed drifters, you may call Paul Bradley, Mobile District, (205)690-2578.

-30-

DREDGED MATERIAL UNDERWATER BERMS

K. Paul Bradley* and Edward Hands**

ABSTRACT.

A primary goal of the Corps of Engineers national dredging program is to cost effectively maintain harbors and utilize the dredged material as an environmental resource. One attractive alternative to the traditional relocation of dredged material is the construction of prominent underwater deposits also called berms. There are two viable concepts for berm construction. One is known as a feeder berm and the other is a stable berm. The Corps of Engineers Mobile District and Waterways Experiment Station are supporting the national demonstration program by constructing and monitoring both a feeder and stable berm in conjunction with dredging Mobile Harbor, Alabama. A feeder berm was constructed in 1987 by dredging sandy maintenance material and placing it along the 19-foot contour to supplement the littoral sand budget. This berm is currently being monitored to determine when and how it disperses. The other berm is being constructed in about 40 feet of water with clayey, new work material from the Mobile Harbor deepening. A monitoring program will determine berm stability, its potential to improve fishery habitat, and its contribution to wave energy dissipation. Results of monitoring both berms are expected to have nationwide application in the continuing development of a more cost-effective and environmentally beneficial dredging program.

INTRODUCTION

The Corps of Engineers national dredging program involves excavation of a tremendous volume of material each year for channel maintenance and construction. The annual quantity of maintenance material excavated nationally is about 285 million cubic yards at a cost of over 400 million dollars. The Water Resources Development

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ATTACHMENT 2

Act of 1986 will result in an additional expenditure of about 800 million dollars for about 350 million cubic yards of channel improvement dredging through 1991.

Since 90 to 95 percent of the material dredged under the Corps program is non-contaminated, emphasis is being placed on utilizing dredged material as an environmental resource (Murden, 1988). By applying design and location criteria, dredged material can be placed to form bathymetric features, known as berms, to provide environmental and economic benefits such as those listed in table 1. The Corps of Engineers is evaluating the practicality of these potential benefits by conducting large-scale tests in association with channel dredging.

TABLE 1

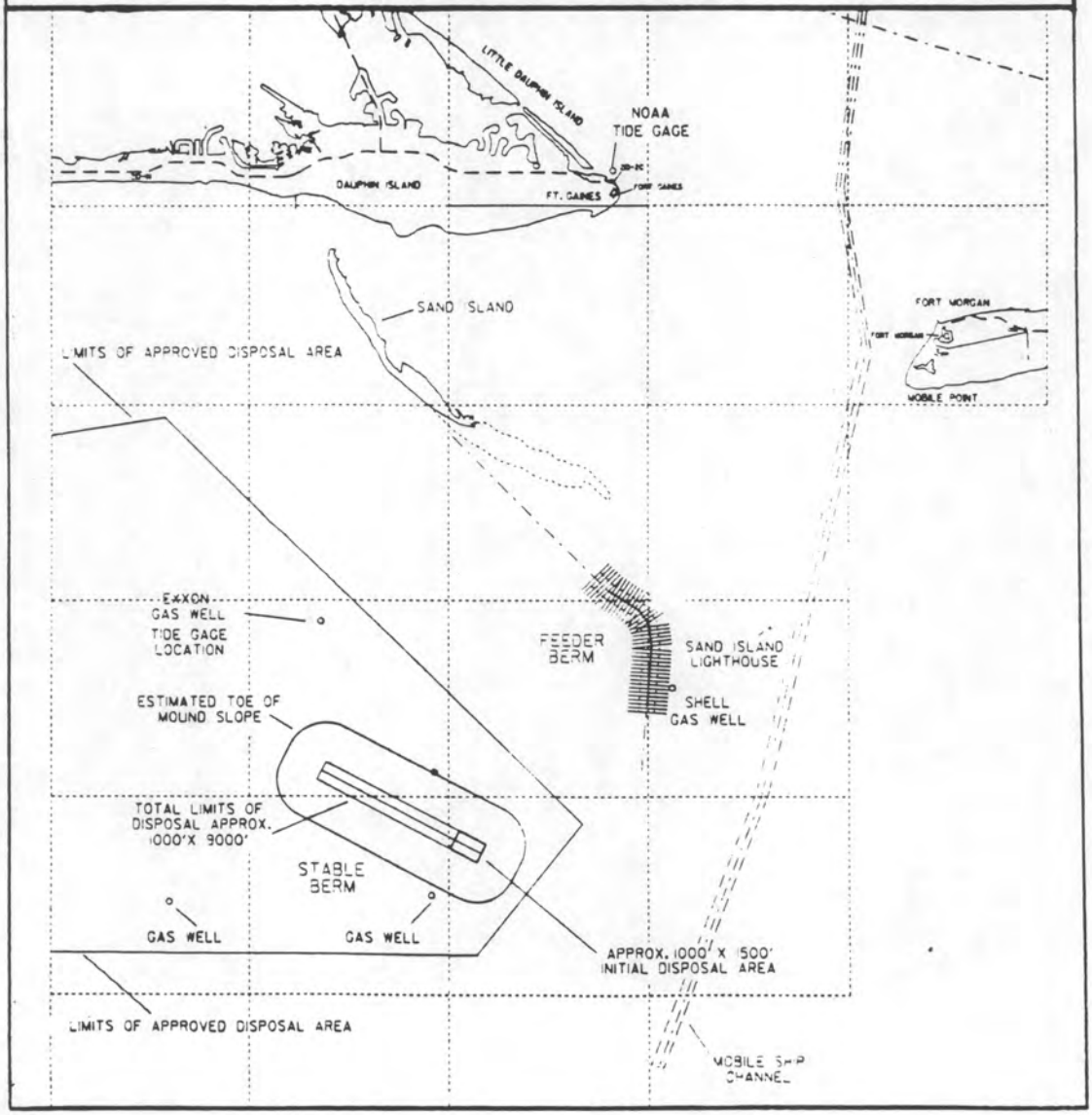
POTENTIAL BENEFITS FOR MOUNDING DREDGED MATERIAL

- Enhance fisheries
- Stockpile material for later use
- Reduce damages of wave impact and run-up.
- Augment the sand budget on an eroding coast.
- Improve capability to monitor the fate of the deposit.
- Bolster or form foundation for offshore structures.
- Channel the migration of fluid muds
- Reduce haul distance and disposal costs

In 1982 the Norfolk District of the Corps of Engineers conducted a pilot study to determine if mounding could be achieved by placing maintenance material with conventional hopper dredges and positioning equipment (Hands and DeLoach, 1984). Based upon positive implications of this study., a national demonstration project was approved in connection with dredging projects at Mobile, Alabama. The Corps of Engineers Mobile District and Waterways Experiment Station have jointly developed and are implementing this test program which consists of constructing and monitoring two berms. Locations of the berm construction sites, shown on Figure 1, were determined based upon the characteristics of the dredged

FIGURE 1

LOCATION OF FEEDER AND STABLE BERMS
MOBILE HARBOR, ALABAMA



material, proximity to the dredging project, and potential environmental benefits.

BERM PLANNING, DESIGN, AND CONSTRUCTION

FEEDER BERM The feeder berm was planned to take advantage of the opportunity for nearshore placement of sandy material dredged from maintenance of the Mobile Harbor entrance channel. This would provide a chance for the material to remain in the nearshore coastal regime and by natural processes supplement sand available for reducing shore erosion. Historically, material dredged from the entrance channel has been placed in an open water site outside the active zone of transport. The feeder berm location and placement design included application of Section 404 guidelines of the Clean Water Act of 1977 and other appropriate environmental documentation by the Mobile District.

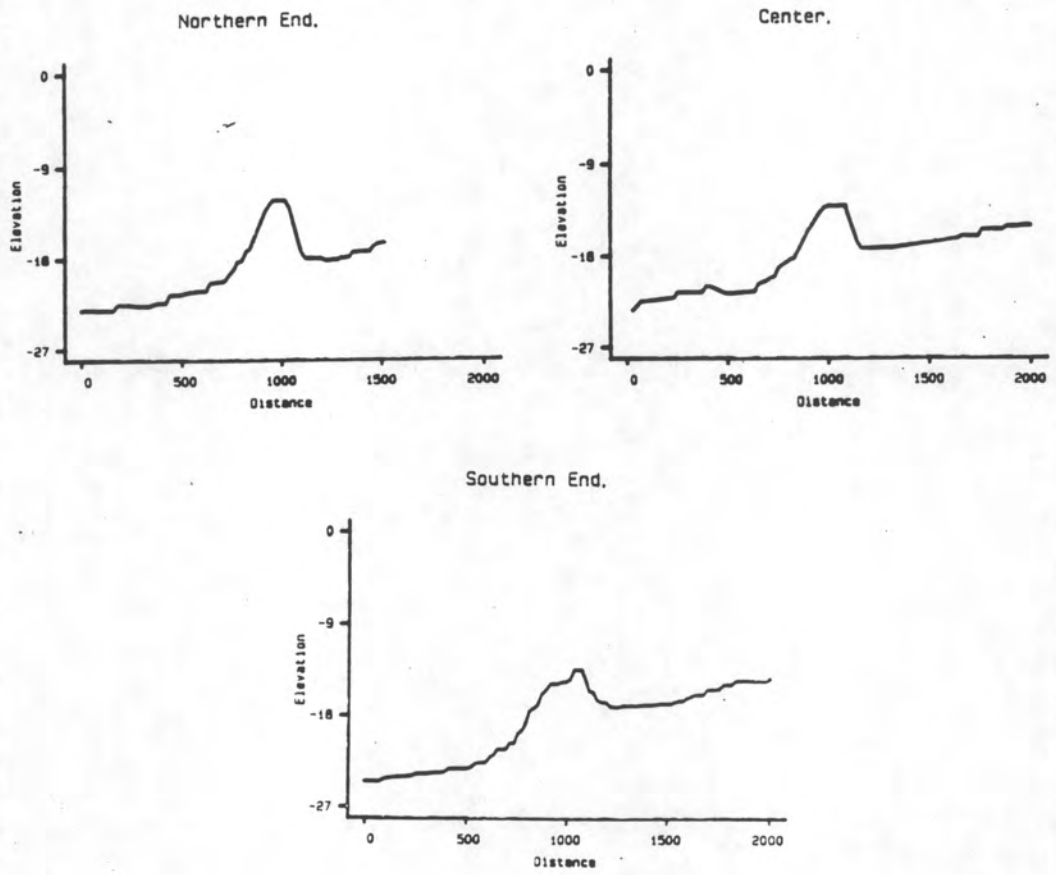
Although a berm configuration was not necessary to accomplish the environmental benefits of the disposal operation, it was planned in order to accommodate monitoring by providing an underwater feature prominent enough to identify sediment movement through conventional bathymetric surveys. Considering draft requirements of the available hopper dredges and the need to retain sand in the shallow active littoral zone, the disposal site had to be located in water depths between 14 to 24 feet. A 500-foot wide disposal corridor was planned in order to allow sufficient maneuverability for the hopper dredges to avoid delays during material placement. We anticipated a potential spread of the material to form a base as much as 1000 feet wide. For an estimated 400,000 cubic yards of maintenance material the conceptualized configuration was a six-foot high and one-mile long berm.

The feeder berm was constructed in February 1987 with two split hull, shallow draft (14 feet) hopper dredges disposing generally along the 19-foot depth contour. Approximately 464,000 cubic yards of sand were placed at the berm site resulting in a 6000-foot long berm with a characteristic relief of 6 to 7 feet. As indicated on Figure 2, typical cross-sections from the first post disposal survey on March 3, 1987 show that the berm closely resembled the conceptualized configuration.

The Mobile District and the Coastal Engineering Research Center laboratory of the Waterways Experiment Station have been monitoring the feeder berm for about two years since its construction to determine if the placed material stays in the littoral zone as intended. Monitoring elements include bathymetric surveys, side-scan sonar, bottom sediment samples, aerial photography, waves offshore near the berm, near bottom currents, and seabed drifters. Initial bathymetric surveys were run to document geometry of the constructed feature. Subsequent bathymetric and side-scan sonar surveys were intended to document changes in the shape and position of the berm. Sediment samples were taken to (1) establish how the

FIGURE 2

FEEDER BERM TYPICAL CROSS SECTIONS



placed material differed from ambient sediment, (2) help determine the predominate direction of migration, and (3) find out whether transport affected only certain grain sizes. Aerial photography was taken to investigate wave patterns and turbidity associated with erosion of the berm and to illustrate surrounding coastal and shallow water features. Waves and bottom currents were measured to better understand the complicated interaction of forces dispersing the sediment. Current-following drogues, known as seabed drifters, were released throughout the monitoring period to provide information on bottom currents and potential direction of sediment movement.

Monitoring data from the feeder berm is currently being analyzed. In general the results show no massive dispersion and only a gradual movement of the placed sediments during the two year monitoring period. The greatest concentration of seabed drifters were found at the eastern end of Dauphin Island indicating a shoreward directed bottom current. It is presumed that material will continue to move from the berm at a slow rate with eventual transport toward shore by normal currents. A major storm could however cause rapid transport of the sediments and disrupt the initial pattern. Plans are now being made for long term monitoring of the feeder berm and consideration of the best location for future disposal of dredged material from the Mobile Harbor entrance channel as well as other similar dredging projects.

STABLE BERM. The stable berm is being constructed in conjunction with the dredged material disposal plan for Mobile Harbor deepening. This project involves dredging large quantities, about 18.7 million cubic yards, of silty-clay type material. As such, a site was chosen beyond the littoral zone to avoid the possibility of impacts to beaches and nearshore sand bottom aquatic habitat.

The dredged material disposal site was designated under authority of Section 103 of the Marine Protection, Research, and Sanctuaries Act based upon evaluations contained in an Environmental Impact Statement (EIS) completed in 1985. The EIS described two possible disposal options. One entailed wide-spread placement of material over the large disposal area. This technique has proven successful in estuarine areas by minimizing changes to biologically productive shallow bottoms. Another technique described by the EIS involved disposal as near as possible to the channel, and in the smallest area practicable. This was the least expensive option and it also provided an opportunity for habitat enhancement since construction of a feature on an otherwise relatively flat and homogeneous aquatic bottom could create a fish attractor and provide habitat for other aquatic organisms that previously could not exist at the location. The Mobile District efforts combined with the goals and support of the national dredging program resulted in development of the dredged material disposal test for construction and monitoring of the stable berm to determine whether the feature remains stable, contributes to wave dissipation, and/or provides improved fisheries habitat.

The stable berm was designed with the expectation of achieving a 20-foot tall feature in a water depth of 40 to 45 feet. With a disposal site drop zone specified at 1000 feet wide and 9000 feet long, the anticipated exterior slopes were estimated to result in a berm about one mile-wide and 2.5 miles long at its base. This would be the largest underwater feature ever constructed.

Stable berm construction began in February 1988 with initiation of the Mobile Harbor deepening contract. The work is being accomplished with the clamshell dredge Chicago, and four 6000 cubic

yard dump scows which transport the material to the berm site. An initial step in the dredged material placement process required building a monitoring test section at the eastern end of the disposal site as shown on Figure 1. This 1500-foot section of the berm was completed in July 1988. The disposal operation has since moved to the opposite end of the disposal site and is progressing southeasterly to join with the test section in about May 1990. The test section allows monitoring to proceed early in the construction process and provide feedback prior to project completion.

Major monitoring elements for the stable berm include bathymetric surveys, subbottom profiling, side-scan sonar surveys, sediment profiling camera surveys, sediment samples, wind and wave gages, and fisheries investigations. This monitoring program serves two purposes including meeting the Environmental Protection Agency requirements for monitoring offshore disposal areas and elements necessary to document beneficial aspects of the disposal plan. The first monitoring survey was completed in August 1988 and monitoring will continue through February 1990. Although it is too early in the program to draw detailed conclusions, the results to date indicate that construction of the berm, as designed and using silty-clay material, is feasible and it appears the berm is becoming an attractor for a more diverse fishery. Subsequent monitoring will determine the berm's long-term stability and overall potential for environmental benefits.

CONCLUSIONS

Results of the monitoring programs for both berms are expected to have nationwide application. In addition to the potential physical and fishery benefits, application of the berm concept could result in significant cost savings for future new work and maintenance projects by reducing haul distance for placement of the dredged material. The test program at Mobile Alabama is expanding the knowledge of berm construction techniques and associated environmental benefits. It has proven that underwater features can be constructed in accordance with specified design criteria, using various types of dredged material, and with minimal restrictions on the conventional use of hopper dredges or dump scows. Berm monitoring techniques have been refined. Environmental agency and public response to both berm projects has been positive. Other specific attributes of the berms will be identified as additional data are collected and analyzed.

ACKNOWLEDGEMENTS

The authors thank Messrs. Charles C. Calhoun, Jr., James Kelly, Pat Langan, Dave Mathis, Hugh McClellan, and Thomas W. Richardson for guidance on monitoring both berms. Mr. James Reaves is contract monitor for all hydrographic surveys. His assistance has also been crucial in the other phases of data collection. We thank Messrs. T. Neil Mclellan and F. Dewayne Imsand for helpful discussions particularly on the deeper berm. Monitoring is being conducted by the United States Army Corps of Engineers as a cooperative activity between the Mobile District and the Dredging Research Program. Permission was granted by the Chief of Engineers to publish this information.

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APPENDIX
CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

Multiply	By	To Obtain
feet	0.3048	meters
cubic yards	0.765	cubic meters