

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

1

Diver Hands-on Cultural Resource Assessment
of Selected Magnetic Anomalies at the North Wharf
Military Ocean Terminal, Sunny Point, North Carolina:
A Report of Negative Findings

AD A139382

Prepared by:
Environmental Resources Branch
U.S. Army Engineer District
Savannah, Georgia

In Cooperation With:
U.S. Army Engineer District
Wilmington, North Carolina

DTIC
ELECTE
MAR 26 1984
S B D

Richard J. Anuskiewicz
Investigator

July 1983

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

DTIC FILE COPY

84 02 29 034

TABLE OF CONTENTS

I. Acknowledgements	ii
II. Abstract	iii
III. Introduction	1
IV. Survey Methodology	2
A. Remote Sensing Instrumentation Array	
V. Diver Hands-on Methodology	4
VI. Results	6
VII. Recommendations	10
VIII. References Cited	11

TABLES AND FIGURES

I. Figure 1, Locational Map	Follows Page 2
II. Figures 2, 3, 4, and 5	Follows Page 9
III. Table 1	7



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
PER LETTER	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

ACKNOWLEDGEMENTS

The magnetometer survey and diver hands-on evaluation at Military Ocean Terminal, Sunny Point (MOTSU), required the support and patience of many individuals and two Corps of Engineers Districts. A special thanks goes to Mr. Richard Kimmel of Wilmington District. Richard provided this author with the much needed advice, encouragement, office and field support, and the requisite internal District coordination to make the project successful. In addition, he revised and edited this final report.

To Captain Francis Rinehart and the crew of the survey vessel WANCHESE, I express my sincere appreciation. In addition, thanks go to Mr. Craig Schillinger, launch operator, for serving as magnetometer technician and providing surface support to the divers.

ABSTRACT

In April 1983, the U.S. Army Engineer Districts of Wilmington and Savannah pooled their resources and expertise to conduct a proton magnetometer survey and diver hands-on survey of selected areas near the Military Ocean Terminal, Sunny Point, North Carolina (MOTSU). This study was conducted for MOTSU in accordance with required cultural resource compliance procedures.

Preliminary analysis and interpretation of the survey data was conducted by an archeologist from the U.S. Army Engineer District, Wilmington, and personnel from the Underwater Archaeology Unit (UAU) of the Division of Archives and History of North Carolina. The data analysis located and identified twenty-eight (28) specific magnetic targets with a broad range of magnetic intensities. Further study was recommended in order to attempt to identify the source of the 28 magnetic targets during the survey.

A diver hands-on evaluation was conducted by U.S. Army Engineer District, Savannah Dive Team under the supervision and participation of an underwater archeologist. The hands-on evaluation located and identified 20 of the 28 magnetic targets. All anomalies found and identified were representative of modern marine or terrestrial debris, and cultural resource clearance is recommended for the proposed project.

INTRODUCTION

MOTSU has proposed the expansion by dredging of (1) a section of the old northern channel extending from the north wharf to the Cape Fear River channel, (2) a turning basin at the intersection of the northern channel and the Cape Fear River, and (3) the connecting channel between the south and central wharves (figure 1). Other new work associated with harbor improvements has been reviewed by State and Federal archeologists and has been found to occur in areas which have been previously disturbed to a degree that reasonably precludes the possibility of encountering significant cultural materials.

In accordance with U.S. Army Technical Manual (TM) 5-801-1, Section 1-3 and U.S. Army Regulatory (AR) 200-1, and the National Historic Preservation Act of 1966, as amended, MOTSU is required to initiate procedures for the identification, evaluation, protection, and enhancement of significant cultural resources that may be impacted by the proposed dredging activities. In order for the dredging activities to proceed, MOTSU requested the combined support of the U.S. Army Engineering Districts of Wilmington and Savannah to provide cultural resource management (CRM) compliance for this project.

In April 1983, under the guidance and direction of Mr. Richard Kimmel, the U.S. Army Engineer District, Wilmington, conducted a proton magnetometer remote sensing survey of the proposed project area. After data analysis and coordination with Messrs. Richard Lawrence and Mark Wilde-Ramsing of the Underwater Archaeology Unit of the North Carolina Division of Archives and History, a diver hands-on evaluation was conducted. This hands-on evaluation was performed by the U.S. Army Engineer District, Savannah Dive Team, under the supervision and participation of under archeologist Mr. Rik Anuskiewicz.

The diver hands-on evaluation resulted in the location and identification of only non-significant modern marine and/or terrestrial ferrous debris. Therefore, this document is a report of negative findings and will only address the survey methodology, survey instrumentation array, marine positioning system, diver hands-on methodology and evaluation results.

SURVEY METHODOLOGY

The remote sensing survey strategies were influenced by several factors including time and equipment constraints, size of the survey area, depth of water, project planning phase, and size and type of magnetic anomaly (cultural resource) anticipated (Anuskiewicz 1980b, 1981). Of these, the size of the project area, water depth, and anticipated cultural material to be found within the project area were the most influential variables in determining the survey methodology.

The project area size (figures 2, 3, and 4) is relatively small in comparison with several previous large scale ocean remote surveys observed by this author. Arnold and Claussen (1976) have successfully used a wide lane-spacing interval (50m) for such large scale ocean search patterns. Though efficient for large scale ocean operations, their lane spacing interval would not be acceptable in a riverine or estuarine environment affected by heavy siltation and tidal influence. Historic materials on the bottom of rivers can be covered by deep siltation in a relatively short period, all but obscuring or masking only the largest of magnetic targets.

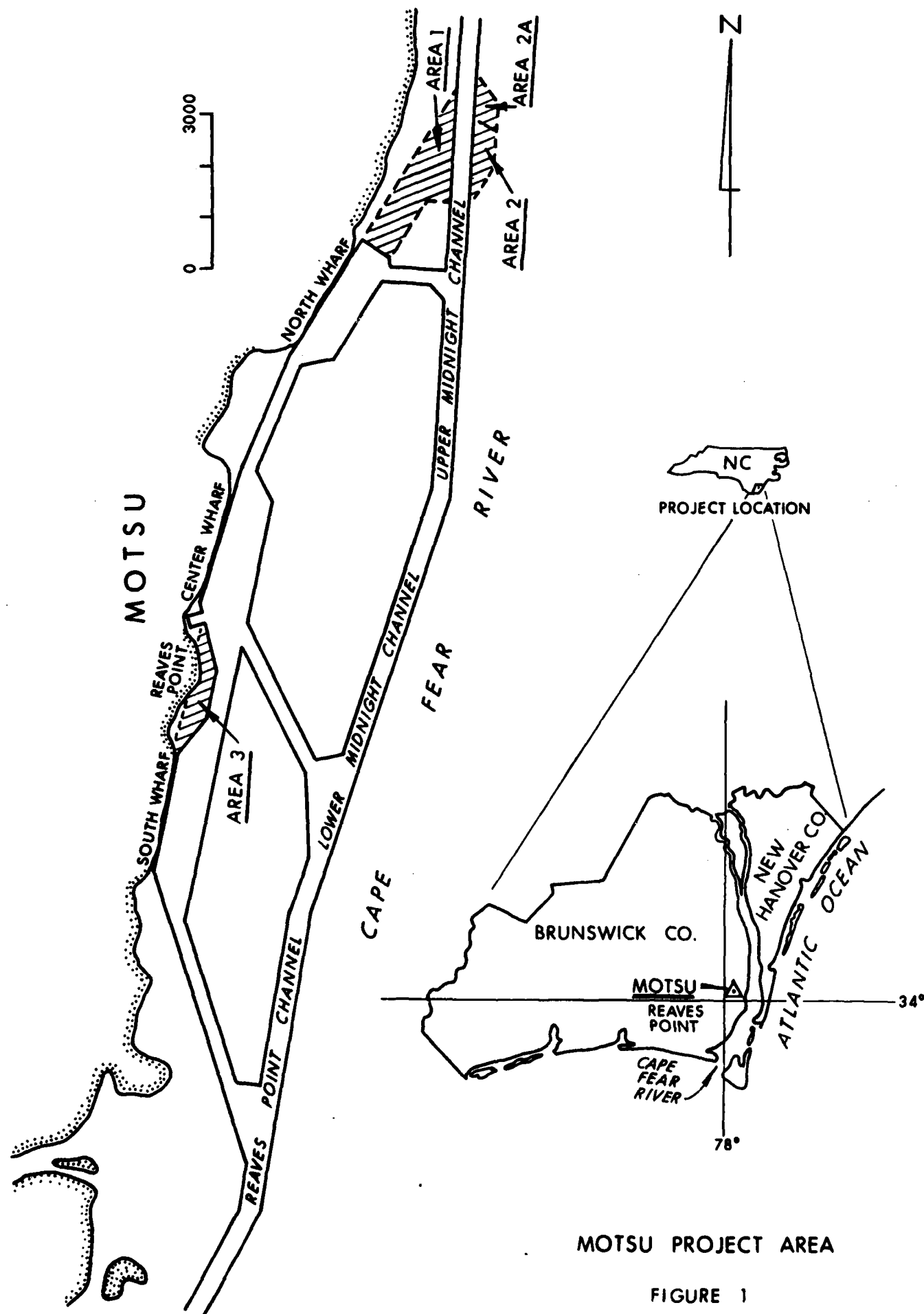
In addition, the area to the north of the North Wharf at MOTSU is rich in cultural history. Just north of the North Wharf is the National Register of Historic Places (NRHP) property Brunswick Town Historic District. The Historic District contains Old Brunswick, Fort Anderson, and Brunswick Town State Historic Site. This district has been influenced by development and occupation which included Colonial and Civil War period maritime use dating back some 250 years.

Two shipwrecks have been documented near the Historic District. The earliest is the FORTUNA, an invading Spanish ship which sank in 1748. Its crew was loading contraband from Brunswick Town when an explosion of unknown origin caused her to sink suddenly in the harbor. During the Civil War, the U.S.S. THORNE was lost to a Confederate torpedo off Fort Anderson. Unlike the FORTUNA, however, the THORNE was later salvaged and removed. Numerous other vessels have met their demise in the vicinity of the lower Cape Fear. Unfortunately, the documentation is insufficient to allow for accurate relocation of wreck sites.

The aforementioned factors were useful in developing the following survey strategy and field survey methodology. Prior survey experience in the Cape Fear River, just south of the project area (Anuskiewicz 1981), was another major factor. It was, therefore, decided that a 15m (50 ft.) lane spacing interval would be employed. This lane spacing interval, when operationalized, would ensure intensive survey coverage by providing maximum sensor measurement overlap of the study area.

REMOTE SENSING INSTRUMENTATION ARRAY

The magnetometer instrumentation array consisted of three major components: Magnetometer hardware including LCD digital display and hard



MOTSU PROJECT AREA

FIGURE 1

copy analog strip chart recorder; towfish (sensor); and shielded electrical tow cable (Albright 1980:5). The magnetometer used for the MOTSU survey was a Geo Matrics 806-M with a marine sensor. The magnetometer hardware included the Solteck VP-6723s, two-pen, portable analog strip chart recorders which created a permanent record of the magnetic intensities that were taken at the sample rate of one reading per second (Arnold 1975:55). On this system the magnetometer readings are fed into the survey vessel's computer/processor through a binary coded decimal (BCD) interface cable. The towfish (marine sensor) was affixed with floatation and towed on the surface approximately 20m behind the survey vessel. The survey vessel used for this survey, the WANCHESE, was an 8m Mon Ark, all aluminum, specifically prepared hydrographic survey craft.

The marine positioning system utilized for this study was a Motorola Mini Ranger III. This system is comprised of an on-board receiver-transmitter, two on-shore battery-operated radar transponder reference stations, and a cassette magnetic tape recorder. This marine positioning system is also interfaced into the magnetometer hardware and provides provenience for each magnetometer reading recorded on the magnetic tape and a continuous updated vessel position and course. The Mini Ranger III translates distance readings into coordinates for the ship's track plotter (Anuskiewicz 1981:16).

The processor-plotter system is a part of the marine positioning system but works independently. This separate component of the Mini Ranger III system includes a small computer processor designated as the Motorola Data Processor M-6800. Distance readings, in coordinate format, are read into the data processor and channeled through a preprogrammed computer producing three types of hard copy output: a magnetic tape, teletype printout, and an X-Y plot on a plotter. The Motorola Data Processor M-6800 contains the built-in Tektronix 4923 magnetic cassette drive which stores magnetic readings and their location coordinates (Arnold 1979:11). Interfaced with the data processor is the Texas Instrument Silent 700 Electronic Terminal Data Keyboard Typewriter. This electronic terminal typewriter provides two functions. It is used as a data input instrument to enter the ship's positioning calibration data into the preprogrammable mode and it prints hard copy output of time, position, and mean average of magnetic intensities at the program timed interval.

DIVER HANDS-ON METHODOLOGY

Methodological considerations in determining the hands-on field methods were: known cultural resources in the area; distribution of the magnetic targets within the study areas; and distribution of the magnetic intensities of the individual magnetic targets. With the above considerations in mind, Mr. Kimmel, in coordination with the Underwater Archaeology Unit of the Division of Archives and History of North Carolina, selected 28 magnetic targets for evaluation. The magnetic contours and selected anomalies are shown in figures 2, 3, 4, and 5.

Positioning for the magnetic targets was reprogrammed into the survey vessel WANCHESE. Buoys for marking the magnetic targets were prepared by attaching a marker buoy to a 1/2-inch nylon line and then tying the line to a 110-kilogram (50 lb.) concrete block. The marker buoys were placed amidship at the precise location of the positioning system's receiver-transmitter antenna. The survey vessel ran the preprogrammed lane intervals and dropped a buoy overboard at the precise moment the vessel passed over the preprogrammed plot. This buoy placing method was extremely accurate. It was seldom that the divers had to swim more than 10m in any one direction in their search pattern to find the source of a magnetic target.

After the buoy markers were dropped, the magnetometer was redeployed from a small survey boat (6m) to recheck the position of the buoys for maximum magnetic intensity. This technique helped further pinpoint the magnetic target.

The Savannah District Dive Team used a two-man buddy search technique to locate, identify, and evaluate the buoyed areas of cultural resource interest in this blackwater environment. Two types of buddy-team search techniques were initiated. The first technique utilized was the two-man circle search. One diver was deployed to the bottom of the river and maintained position next to the concrete block anchor. The second diver carried to the bottom a cave-diving search reel and a 1m iron stake. Once on the bottom, the second diver gave the lead end of the cave-diving reel to the first diver who then looped the line around his wrist, thereby keeping in contact with the second diver at all times. The second diver with the cave-diving reel then panned out approximately 2m of line and swam until it was taught. Then, that diver drove in the iron stake into the bottom sediment as a reference pole. When this was completed, the second diver, through preestablished rope pull signals, began to swim a 2m circle search until he either found something or returned to the stationary iron stake. The same search sequence was repeated at 2m intervals until underwater debris was located or the search was abandoned.

The second underwater diver search method utilized for this hands-on study was the transect method. This method was used in the vicinity of the north channel (figure 2) due to the great number of confusing anomalies. This method includes the establishment of two underwater anchor stations with a 1/2-inch nylon line between the stations. Once the two underwater

anchor stations were established, two divers were deployed to the bottom by going down the anchor buoy line. Once on the bottom, the divers held on to the transect line between the two bottom anchors and swam parallel to the transect anchor line. This technique was extremely useful when searching in a strong current. Bottom anchor transect buoys are deployed in line with the current. The current will pull the diver along the transect anchor line. This technique proved to be very successful in the deeper water, strong-current area near the Cape Fear River shipping channel.

If the divers could not locate the magnetic target, two types of probing techniques were utilized. The first technique was the diver probe technique. This consisted of swimming along in the circle search or transect search pattern and the diver probing with a 1.5m stainless steel probe. The probe used for this study was 12mm in diameter with a welded 15cm "T" on one end and sharpened point on the other. The diver would simply force the probe into the bottom sediment by twisting and turning the "T" end of the metal probe to search for buried cultural materials. The second type of probing system used for the study was an air probe. This type of probing technique was initiated on the surface from a support barge. This probing system contains two elements: an air hose, and 10-20m of 1/2-inch galvanized steel pipe. The hose is attached to the air compressor and to an 8-10m length of the galvanized pipe. The support barge is positioned alongside the buoy. Then, two support personnel on the barge (with the air compressor on and air rushing through the pipe probe) physically probe the bottom sediment from the surface of the barge. This technique was also successful during this study. The advantage of this technique over the diver probe technique is that the compressor airflow can penetrate up to 5m of the bottom. In addition, if the air probe locates an object, it can be left in place for diver inspection.

Also used in the diver hands-on evaluation was the air-lift dredge technique. Both this method and the air probe were used on Anomaly #1 in Area 2. This system contained four elements which include: an air compressor, 20-40m of quick disconnect rubber air hose, a 10cm (4-inch) air-lift dredge, and a floating sieve. This system was used in conjunction with both types of probing techniques. Standard SCUBA equipment was not used when employing this technique because of the need to communicate with the surface support. A Superlight 17 diving helmet was used to interface with surface hardwire radio communication. The air supply was a set of twin 80-cubic-inch SCUBA tanks connected to the second stage of the Superlight 17 helmet regulator. This system provided important radio communication between the diver and tender when the diver was operating the air-lift dredge. When the air-lift dredge was in operation the effluent dredge material was air-lifted in to a stainless steel floating sieve. The floating sieve, built around an aluminum frame, is a 1-meter square box and is 1/2-meter deep. Floatation was provided by two empty 55-gallon drums. The 55-gallon drums were framed around two sides of the sieve. The air-lift effluent pipe was attached near the top of the sieve frame and a downward directional nozzle directed the air-lift effluent into the bottom of the sieve. The directional nozzle and velocity of the dredge effluent served to agitate the material being dredged, thereby self-cleaning the sieve.

RESULTS

Table 1 represents the results of the swim search reconnaissance, probing and air-lift dredging, and a physical description of the ferrous material located, identified, and evaluated. As previously stated, the Savannah District Dive Team located 20 of 28 magnetic targets buoyed for a hands-on verification.

The preponderance of debris located, identified, and evaluated reflects several types of common modern ferrous materials used to provide daily operational support for several equally common classes of sea and river-going vessels that frequent the project area and areas contiguous to it. These vessel classes are the medium size fishing vessel (10 to 20m), ocean cargo vessels that load and unload cargo at the North Wharf (100 to 150m), and the associated cargo support water craft which include cargo barges tugboats, and the MOTSU security patrol boat.

TABLE 1

Interpretation of Magnetic Targets, MOTSU North Wharf Entrance Channel and Cape Fear River Shipping Channel Turning Basin.

<u>Survey Area</u>	<u>Anomaly Number</u>	<u>Station(S) Offset (O)</u>	<u>Determination</u>
I	1	S - 15325 O - 100	Wooden pilings and associated various sizes of metal debris; a large piece 3'x4' piece of flexible corrugated sheet metal.
	2	S - 15340 O - 150	"
	3	S - 14950 O - 200	Small metal debris encrusted with marine fouling; small strand (1.5m) of 1/2-inch metal cable.
	4	S - 14650 O - 200	Large coil of wire cable, buried with a shackle on one end.
	4	Did	Buoys disappeared.
	5	Not	
	7	Dive	
	8	S - 15525 O - 250	8-foot section of 2-inch galvanized pipe.
	9	S - 14650 O - 300	20- to 30-foot section of dredge pipe, approximately 2 ft. in diameter.
	10	S - 16050 O - 300	Wire rope with associated section of dredge pipe.
	11	S - 16000 O - 300	Wire rope section and large piles of rock 1-2 meters high.
	12	S - 16350 O - 400	A square or "U" shaped section of pipe mostly buried, covered with marine fouling.
	13	S - 15750 O - 350	Did not find. Only feature able to identify were several large piles of irregular shaped rocks (not ballast stones).

TABLE 1--Cont'd

<u>Survey Area</u>	<u>Anomaly Number</u>	<u>Station(S) Offset (O)</u>	<u>Determination</u>
II	1	S - 1750 O - 480	Did not find. Used the diver probe, air-lift system.
	2	S - 1775 O - 565	"
	3	S - 2085 O - 320	Did not dive on.
IIA	1	S - 3400 O - 400	7-8 foot section of 1-inch galvanize pipe.
	2	S - 3070 O - 465	Large piece of metal siding or roofing (corrugated) buried with two sections sticking out.
	3	S - 3000 O - 505	"
	4	S - 3275 O - 540	Metal chair (we think) with the four legs sticking up, also some small tubular debris with little marine fouling.
	5	S - 3425 O - 560	Did not find.
	6	S - 2465 O - 710	Wire rope cable 1/2 to 3/4 inch in diameter, several sections exposed, most of it buried.
III	1	S - 3890 O - 300	Buoy disappeared, did not dive on.
	2	S - 4050 O - 200	Associated dredging debris, dredge pipe, cable, and a possible section of a pantoon float.
	3	S - 4010 O - 245	"
	4	S - 3850 O - 205	Modern metal debris, square tubing with little or not marine fouling.

TABLE 1--Cont'd

<u>Survey Area</u>	<u>Anomaly Number</u>	<u>Station(S) Offset (O)</u>	<u>Determination</u>
III	5	S - 3840 O - 150	Buried selection(s) or wire cable (1"), a lot of marine fouling and rust on cable.
	6	S - 3825 O - 55	Did not find. Used probes, etc. Must be deeply buried.

RECOMMENDATIONS

Area 1: The northern channel is the most disturbed of the study areas. A confusing array of anomalies are created by debris resulting from the original construction of the channel, dewatering of disposal area 1, maintenance dredging, and refilling of the channel. These activities have created physical and magnetic disturbances which have either destroyed or masked any resources which may be present.

Given the degree of past disturbance, it is recommended that construction proceed in this area, with the condition that an archeologist be present to monitor the removal of previously undisturbed material.

Engineering interests are reminded that the divers have reported large piles of rock in the former channel. Furthermore, there are unverified reports of barges being sunk in the channel as part of the 1964 closing.

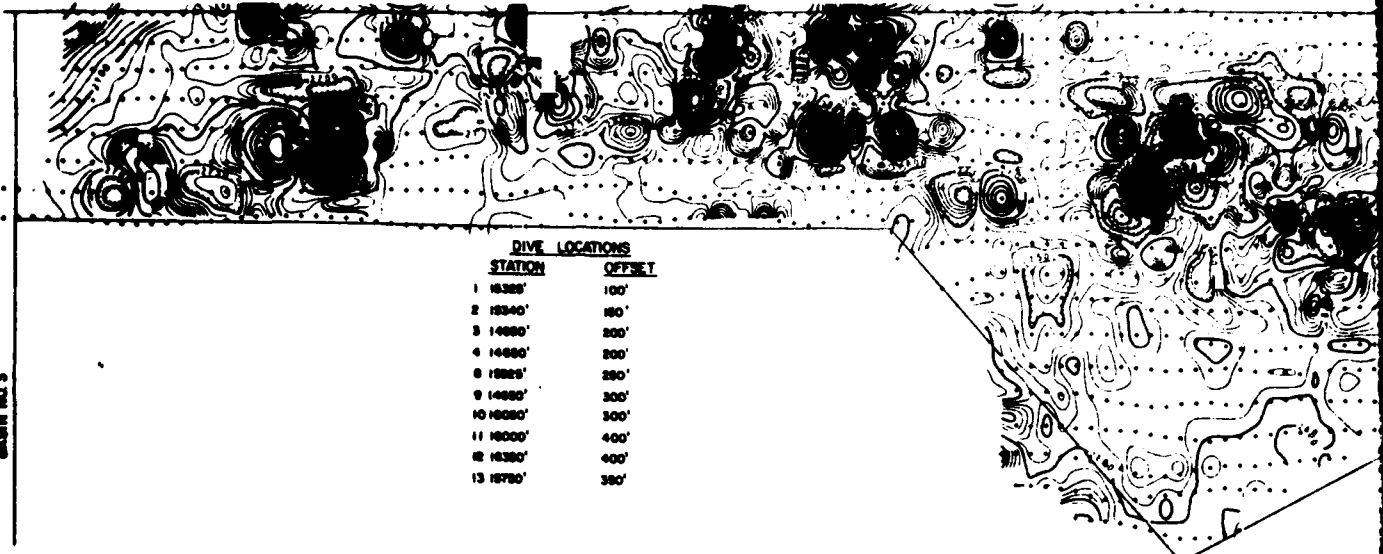
Areas 2, 2A, and 3: Investigations within the proposed turning basin and Reaves Point have not produced historic cultural materials. However, the divers noted that several of the recently deposited items were partially buried. Whereas older historic materials may be buried to an even greater degree, it is recommended that construction proceed with caution and that the Wilmington District, Corps of Engineers, Environmental Resources Branch be notified of construction schedules so that dredged material may be occasionally inspected, if such inspection is not precluded by the dredging methods used.

REFERENCES CITED

- Albright, Alan B.
1980 Underwater Archaeological Survey of Wando River. Research Manuscript Series 160. Institute of Archaeology and Anthropology. University of South Carolina, Columbia.
- Anuskiewicz, R. J., E. G. Garrison, C. Bond, C. Giammona
1980 A Cultural Resource Assessment of Selected Magnetic Anomalies; Fort Pierce, Florida Beach Erosion Control Project. Report submitted to U.S. Army Engineer District, Savannah.
- Anuskiewicz, R. J.
1980a Magnetometer Survey of the Frederica River at Fort Frederica National Monument. Report prepared for U.S. Department of the Interior, National Park Service, Fort Frederica National Monument.
- Anuskiewicz, R. J. and Thomas W. Yourk
1980b Torras Causeway Magnetometer Survey. Report prepared for the Georgia Department of Transportation.
- Anuskiewicz, R. J.
1981 Magnetometer Survey and Cultural Resource Assessment of Selected Magnetic Anomalies; Military Ocean Terminal, Sunny Point, North Carolina. Report submitted to U.S. Army Engineer District, Wilmington, North Carolina.
- Arnold, J. Barto III and Carl J. Clausen
1975 An Airborne Magnetometer Survey for Shipwrecks and Associated Underwater Test Excavations. Paper presented to the Tenth Conference on Underwater Archaeology. Nashville, Tennessee.
- U.S. Department of the Interior
1979 The National Historic Preservation Act of 1966, as amended.
- U.S. Department of the Army
1975 Technical Manual 5-801-1, Historic Preservation Administrative Procedures. U.S. Government Printing Office, Washington.
- U.S. Department of the Army
1978 Army Regulation 200-1 Environmental Protection and Enhancement, Section 8, Historic Preservation. U.S. Government Printing Office, Washington, DC.

CORPS OF ENGINEERS

14100
14150
14200
14250
14300
14350
14400
14450
14500
14550
14600
14650
14700
14750
14800
14850
14900
14950
15000
15050
15100
15150
15200
15250
15300
15350
15400
15450
15500
15550
15600
15650
15700
15750
15800
15850
15900
15950
16000
16050
16100
16150
16200
16250
16300
16350
16400

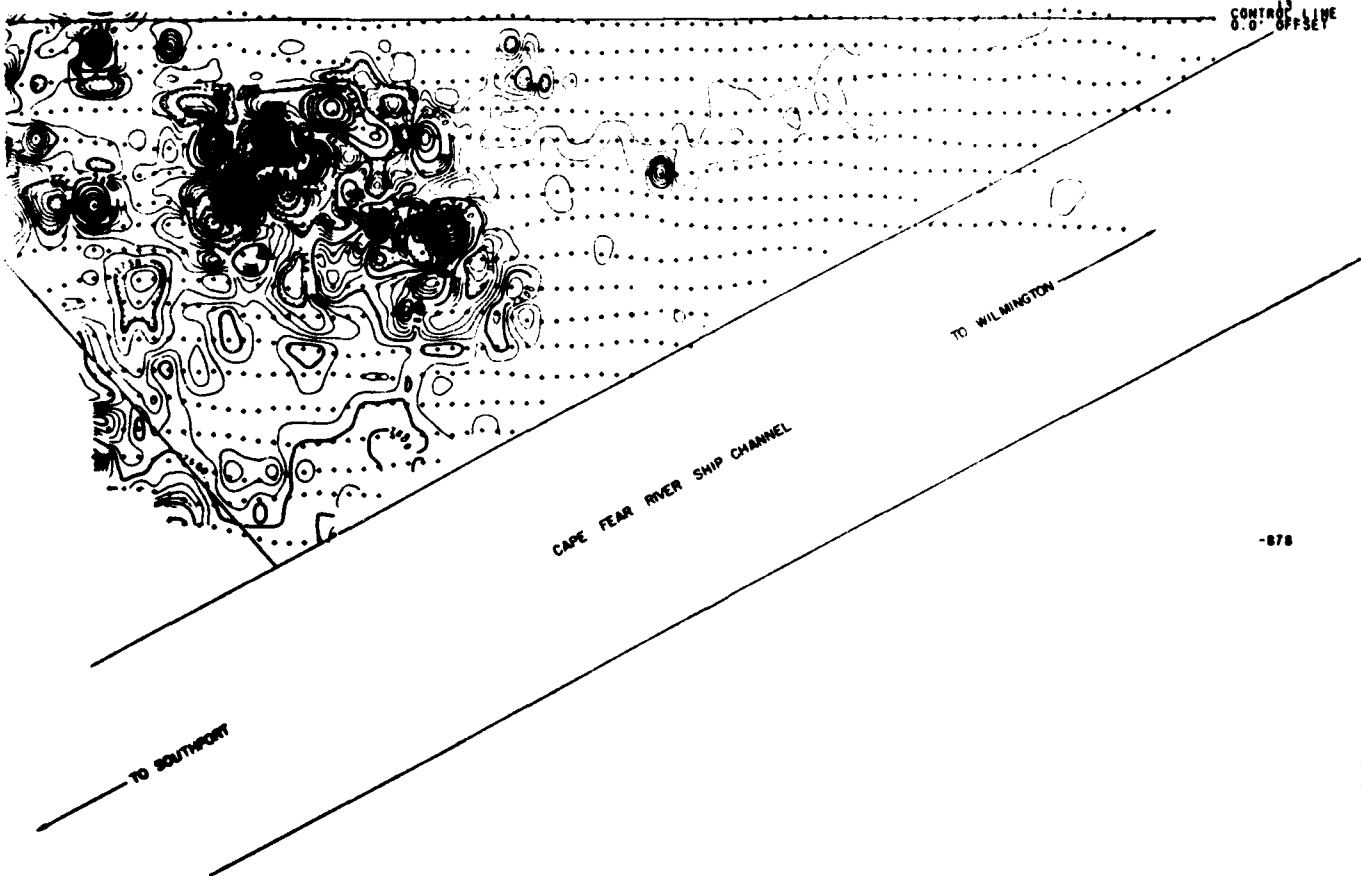


BASIN NO. 3

DEAL BAROMETRIC SURVEY 11-12 APRIL 1983 AREA 1
 CONTOUR INTERVAL 10'
 CONTOUR IN GAMMAS 1200.
 NOTE: ACTUAL GAMMA READINGS REDUCED BY 50,000 GAMMAS FOR CONTOURING.

TO SOUTHPORT

15650
 15700
 15750
 15800
 15850
 15900
 15950
 16000
 16050
 16100
 16150
 16200
 16250
 16300
 16350
 16400
 16450
 16500
 16550
 16600
 16650
 16700
 16750
 16800
 16850
 16900
 16950
 17000
 17050
 17100
 17150
 17200
 17250
 17300
 17350
 17400
 17450
 17500
 17550
 17600
 17650

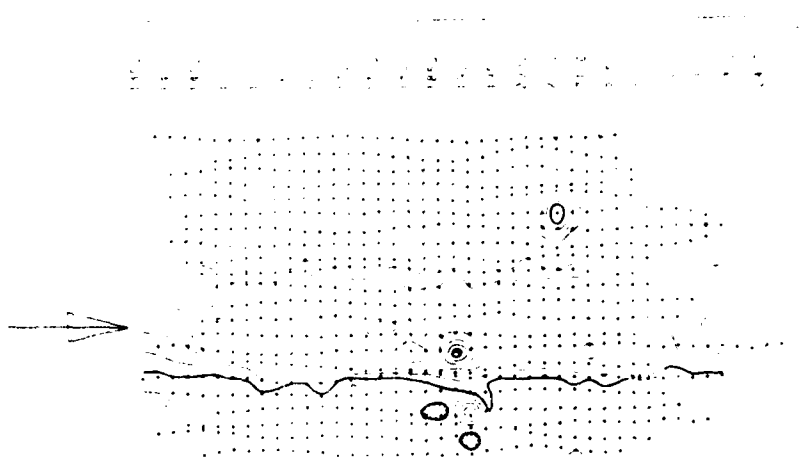


-678

FIGURE 2: AREA 1
NORTH WHARF CHANNEL

MILITARY OCEAN TERMINAL, BERRY POINT, D.C.		
MAGNETOMETER SURVEY		
SURVEYED 11-13 APRIL 1963		
14 1 SHEETS	SHEET NO. 1	SCALE 1:1000
U. S. ARMY ENGINEER DISTRICT, WILMINGTON, D.C. APRIL 1963		
SUBMITTED:		APPROVED:
_____ CAPT. JOHN W. BRYAN		_____ LT. COL. J. G. BROWN
DESIGNED BY: BRYAN		FILE NO. MDY 105-
DRAWN BY: BRYAN		
CHECKED BY: BRYAN		

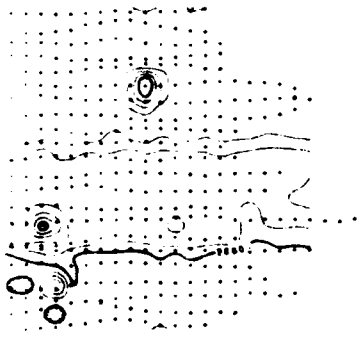
J



AREA OF CONTACT WITH AIR IS 1000
SCALE OF 1/4" = 1' HORIZONTAL
SCALE OF 1/4" = 1' VERTICAL
NOTE: ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED

ENTER VALUE

- 187
- 1800
- 1900
- 2000
- 2050
- 2100
- 2150
- 2200
- 2250
- 2300
- 2350
- 2400



DIVE LOCATIONS

<u>STATION</u>	<u>OFFSET</u>
1 1750	400
2 1775	868
3 2095	320

10 BY 50,000 GAMMA FOR CONTOURING.

FIGURE 3 AREA 2
SOUTH PORTION OF TURNING BASIN

MILITARY DISTRICT OF WASHINGTON

MAGNETOMETER SURVEY

SURVEYED 11-13 APRIL 1963

SHEET NO. 1 SCALE 1:1200

U. S. ARMY ENGINEER DISTRICT, WASHINGTON, D. C. APRIL 1963

SUBMITTED: _____ APPROVED: _____

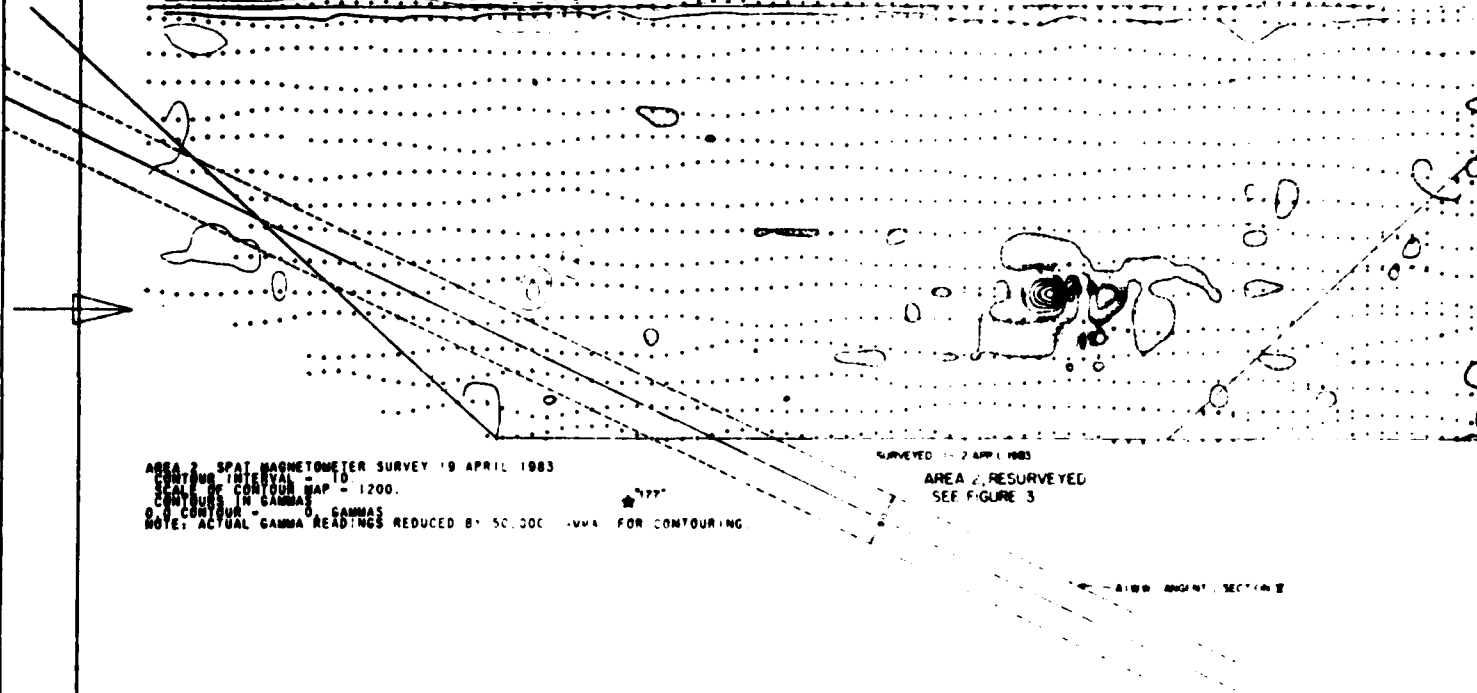
ENGINEER DISTRICT WASHINGTON, D. C. FILE NO. HD-105

2

CORPS OF ENGINEERS

CAPE FEAR RIVER SHIP CHANNEL

200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 2000 2050 2100 2150 2200 2250 2300 2350 2400



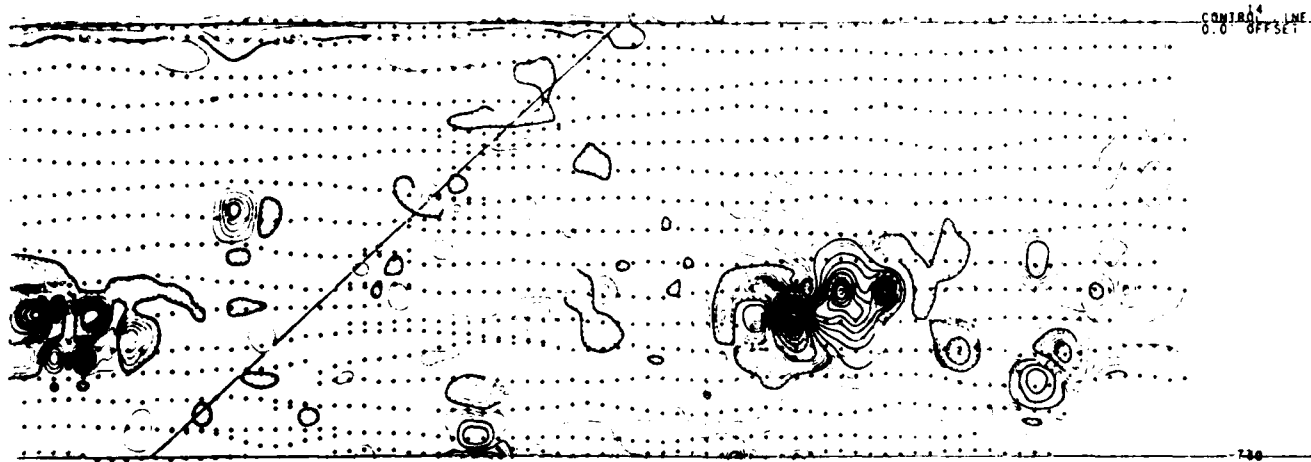
AREA 2 SPAT MAGNETOMETER SURVEY 19 APRIL 1983
CONTOURING INTERVAL - 10
CONTOUR MAP - 1200.
CONTOUR IN GAMMAS
NOTE: ACTUAL GAMMA READINGS REDUCED BY 50.00C UVA FOR CONTOURING.

SURVEYED 19 APR 1983
AREA 2, RESURVEYED
SEE FIGURE 3

SECTION 1
SECTION 2

CAPE FEAR RIVER SHIP CHANNEL

1700 1750 1800 1850 1900 1950 2000 2050 2100 2150 2200 2250 2300 2350 2400 2450 2500 2550 2600 2650 2700 2750 2800 2850 2900 2950 3000 3050 3100 3150 3200 3250 3300 3350 3400 3450 3500 3550 3600 3650



SURVEYED 19 APRIL 1983

AREA 2-A

3
RVEYED
3

DIVE LOCATIONS

STATION	OFFSET
1 3400'	400'
2 3070'	485'
3 3000'	806'
4 3275'	840'
5 3425'	860'
6 2485'	70'

FIGURE 4 AREA 2-A
NORTH PORTION OF TURNING BASIN

MILITARY BICENTENNIAL COMBAT POINT, D.C.

MAGNETOMETER SURVEY

SURVEYED 11-19 APRIL 1983

IN 1 SHEETS SHEET NO. 1 SCALE 1:1200

U.S. ARMY ENGINEER DISTRICT WILMINGTON, D.C. APRIL 1983

SUBMITTED: _____ APPROVED: _____

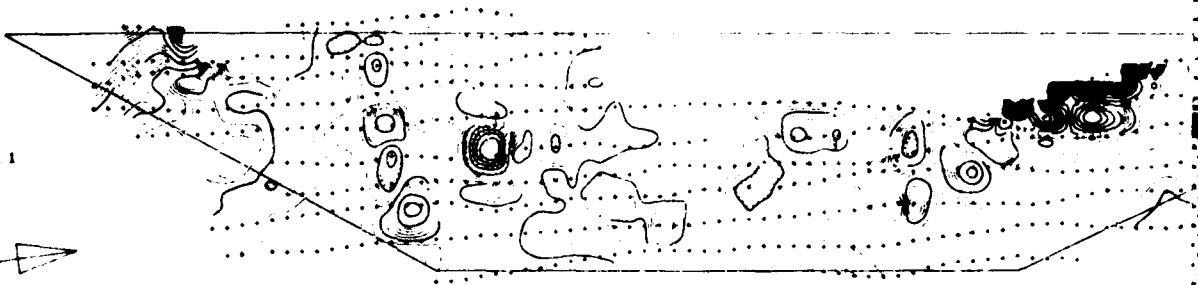
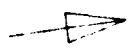
SURVEYED BY: MARGARET
DRAWN BY: S.M.
CHECKED BY: S.M.

FILE NO. 401 105

2

3350
3400
3450
3500
3550
3600
3650
3700
3750
3800
3850
3900
3950
4000
4050
4100
4150
4200
4250
4300
4350
4400
4450
4500
4550
4600
4650
4700
4750
4800
4850
4900
4950
5000
5050
5100
5150

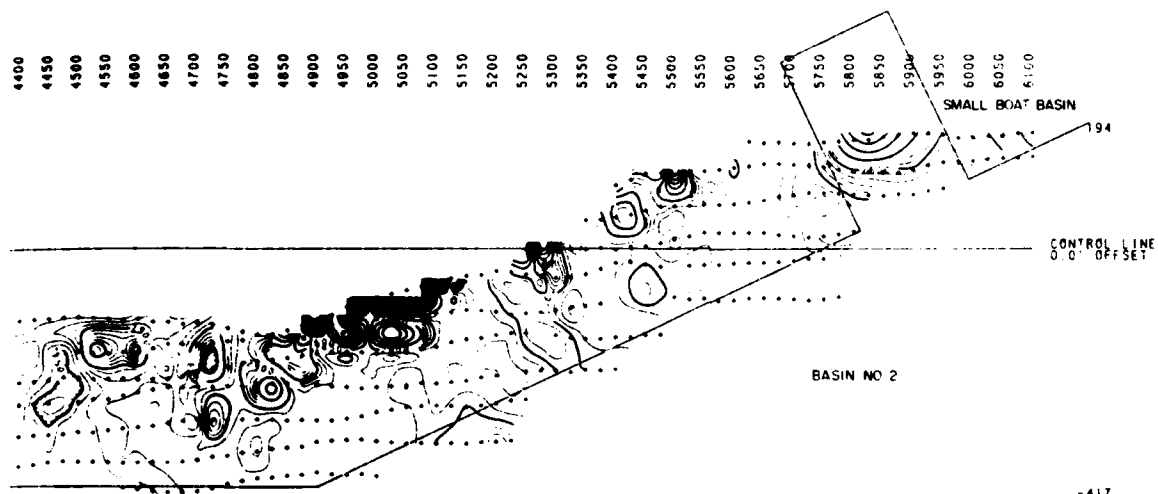
BASIN NO 1



AREA 3 SPAT MAGNETOMETER SURVEY 13 APRIL 1983 CONNECTING CHANNE FOR BASINS 1 & 2
 CONTOUR INTERVAL = 10
 SCALE OF CONTOUR MAP = 1:200
 CONTOURS IN GAMMAS
 0.0 CONTOUR = 0 GAMMAS
 NOTE: ACTUAL GAMMA READINGS REDUCED BY 50,000 GAMMAS FOR CONTOURING.

DIVE LOCATIONS

STATION	OFF
3890'	300
4080'	200
4010'	245
3880'	208
3840'	180
3825'	55



OR BASINS 1 & 2

-417

DIVE LOCATIONS

STATION	OFFSET
3800'	300'
4000'	200'
4010'	245'
3800'	205'
3840'	150'
3825'	56'

FIGURE 5 AREA 3
REAVES POINT CHANNEL

MILITARY OCEAN TERMINAL, GREAT POINT, S.C.

MAGNETOMETER SURVEY

SURVEYED 11-13 APRIL 1963

IN 1 SHEETS SHEET NO. 1 SCALE 1:1200

U. S. ARMY ENGINEER DISTRICT, WILMINGTON, S.C. APRIL 1963

SUBMITTED: _____ APPROVED: _____

SURVEYED BY: WANCHER
DRAWN BY: SLP
CHECKED BY: SLP

FILE NO. MOT 105-

2

END

FILMED

4-84

DTIC