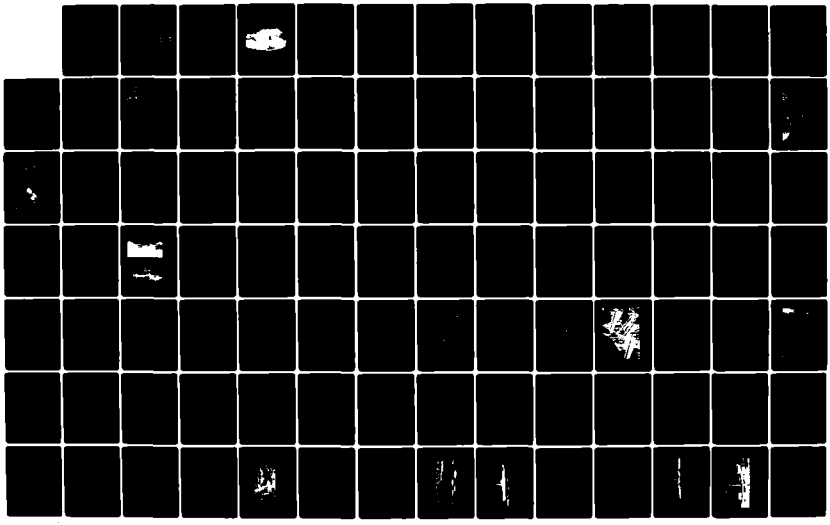
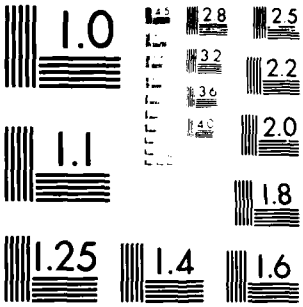
AD-A148 542 IDENTIFICATION AND EVALUATION OF SUBMERGED ANOMALIES MOBILE HARBOR ALABAM..(U) ESPEY HOUSTON AND ASSOCIATES INC AUSTIN TX J B IRION ET AL. OCT 84 84066 1/2

UNCLASSIFIED CDESAM/PDEC-84/004 DACW01-83-C-0124 F/G 13/10 NL





MICROCOPY RESOLUTION TEST CHART

AD-A148 542

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: COESAM/PDEC-84/004
2. GOVT ACCESSION NO.:
3. RECIPIENT'S CATALOG NUMBER:
4. TITLE (and Subtitle): Identification and Evaluation of Submerged Anomalies, Mobile Harbor, Alabama
5. TYPE OF REPORT & PERIOD COVERED: Final
6. PERFORMING ORG. REPORT NUMBER: 84066
7. AUTHOR(s): Jack B. Irion and Clell L. Bond
8. CONTRACT OR GRANT NUMBER(s): DACW01-83-C-0124
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Espey, Huston and Associates, P.O. Box 519, Austin, Texas 78767
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Corps of Engineers - Mobile Dist., P.O. Box 2288, Mobile, Alabama 36628
12. REPORT DATE: ~~November~~ OCTOBER, 1984
13. NUMBER OF PAGES: 115
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office):
15. SECURITY CLASS (of this report): Unclassified
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE: Unclassified
16. DISTRIBUTION STATEMENT (of this Report): Unlimited

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

DTIC
ELECTE
DEC 17 1984
S D
B

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report): Unlimited

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

18. SUPPLEMENTARY NOTES:

19. KEY WORDS (Continue on reverse side if necessary and identify by block number):
magnetic anomalies, underwater archaeology, harbor defenses, Civil War history, Confederate Corps of Engineers, remote sensing

20. ABSTRACT (Continue on reverse side if necessary and identify by block number):
An archaeological Phase II assessment of 12 magnetic anomalies has been completed as part of a planned harbor expansion and modification by the U.S. Army Corps of Engineers, Mobile District. The study resulted in the identification of a Civil War harbor obstruction which is potentially eligible to the National Register of Historic Places. The other 11 investigated anomalies were found to consist of madern harbor debris with no historic or archaeological significance.

DTIC FILE COPY

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Block 20 cont'd.

The archaeological and historical data developed during this study demonstrate that a section of the Confederate harbor obstructions of Mobile runs diagonally through a proposed Turning Basin. These obstructions consist, in part, of vessels which were loaded with brick and sunk across the old channel in the period 1862-1864. An investigated anomaly identified as TB-4-3 is believed to represent one of these vessels.

A mitigation plan for TB-4-3, the "brick obstruction", as well as suggestions for further lines of research along the rest of the line, are presented to the Corps of Engineers, Mobile District, for future planning of the Mobile Bay Project.

Report No. COESAM/PD-EC-84-004

IDENTIFICATION AND EVALUATION OF SUBMERGED ANOMALIES, MOBILE HARBOR, ALABAMA

Prepared for:

U.S. Army Corps of Engineers, Mobile District

Prepared by:

Espey, Huston and Associates, Inc.
Austin, Texas

Report No. COESAM/PDEC-84/004

Document No. 84066
EH&A Job No. 3829

IDENTIFICATION AND EVALUATION OF SUBMERGED ANOMALIES, MOBILE HARBOR, ALABAMA

Funded by:

U.S. Army Corps of Engineers, Mobile District
under the provisions of
Contract DACW01-83-C-0124

Principal Investigator:

Clell L. Bond

Authors:

Jack B. Irion
Clell L. Bond

Submitted by:

Espey, Huston & Associates, Inc.
P. O. Box 519
Austin, Texas 78767

October 1984

ABSTRACT

An archaeological Phase II assessment of 12 magnetic anomalies has been completed as part of a planned harbor expansion and modification by the U.S. Army Corps of Engineers, Mobile District. The study resulted in the identification of a Civil War harbor obstruction which is potentially eligible to the National Register of Historic Places. The other 11 investigated anomalies were found to consist of modern debris with no historic or archaeological significance.

The archaeological and historical data developed during this study demonstrate that a section of the Confederate harbor obstructions of Mobile runs diagonally through a proposed Turning Basin. These obstructions consist, in part, of vessels which were loaded with brick and sunk across the old channel in the period 1862-1864. An investigated anomaly identified as TB-4-3 is believed to represent one of these vessels.

A mitigation plan for anomaly TB-4-3, the "brick obstruction", as well as suggestions for further lines of research along the rest of the line, are presented to the Corps of Engineers, Mobile District, for future planning of the Mobile Bay Project.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the contributions and assistance of the many people who made this study possible.

U.S. Army Corps of Engineers representative Dorothy Gibbens lent her full support and cooperation, and provided much-needed logistical assistance.

Much of the credit goes to the archaeological field crew for often enduring long hours and unpleasant conditions to get the job done. The field crew included Stephen R. James, Thomas E. Jackson, Paul C. Teas, and Dennis Zabaldo. Ed Baxter assisted in organizing the initial set-up and the magnetometer surveys.

EH&A surveyors Lamar Hale, Ron Kurtz, and Richard Steubing contributed their dedication and technical experience to performing the positioning work required to relocate the anomalies.

Mr. Jerry Walker of Orange Beach, Alabama, provided two of the vessels employed in the project and shared his knowledge and experience of the bay with us.

Special thanks go to the scholars who contributed their knowledge of Confederate coastal defense and provided many useful contributions and suggestions to chapters dealing with the Confederate obstructions. Those deserving special mention are Mr. Dale Floyd of the U.S. Army Corps of Engineers History Division, Mr. Jack Friend of Mobile, and Mr. Bob Holcombe of the Confederate Naval Museum. Messrs. Caldwell Delaney and Roy Talon of the Mobile History Museum provided assistance and cooperation in examining the Maury Papers. Thanks are also due to the staff of the National Archives Army and Old Navy Records Branch and the Cartographic and Architectural Branch.

Lastly, we offer thanks to the people of Mobile who made us feel the magic of the place during our stay. In exchange, we dedicate to them this small contribution to their history.

Accession For
NTIS GRA&I
DTIC TAB
Unannounced
Justification
PER CALL JC
By
Distribution/
Availability Codes
Dist | Avail and/or Special
A-1

TABLE OF CONTENTS

		Page
	Abstract	ii
	Acknowledgments	iii
	List of Figures	vi
	List of Tables	vii
	Illustration Credits	viii
I.	INTRODUCTION	1
	Project Location	1
	Investigation Purpose	1
	Areas of Investigation	1
	Investigated Anomalies	3
	Scheduling and Personnel	7
	Research Strategy and Design	10
	Investigative Constraints	10
II.	ENVIRONMENTAL SETTING	13
	Climate	13
	Geology and Sedimentation	13
	Hydrology	14
	Preservation Potential and Archaeological Constraints	17
III.	CULTURAL SETTING	19
	Prehistoric Background	19
	Historic Background	21
	The Spanish Entrada	21
	The Colonial Period, 1701-1813	23
	The American Era	26
IV.	INVESTIGATIVE PROCEDURES AND TECHNIQUES	30
	Positioning and Survey	30
	Turning Basin	30
	Transshipment Facility	30
	New Positions of Transshipment Facility Anomalies	31
	Remote Sensing	31
	Excavation	33
V.	INVESTIGATED ANOMALIES	36
	Turning Basin - Upper Mobile Bay	36
	M-99-1	36
	TB-2-2	36
	TB-4-2	37
	TB-4-3	37
	TB-4-4	45
	TB-6-3	45
	TB-6-4	48
	TB-7-3	49

TABLE OF CONTENTS (Concluded)

	Page
Transshipment Facility - Lower Mobile Bay	49
B/C	50
D/E	50
F	52
VI. CONFEDERATE DEFENSE OF MOBILE	55
Introduction	55
The Strategic Importance of Mobile	60
"Preparation for a Great Struggle", 1861-1862	62
"A Stronghold of Rebellion", 1863-1864	66
"Damn the Torpedoes!"	74
"Take Mobile and Hold It"	78
VII. CONCLUSIONS AND RECOMMENDATIONS	87
Anomaly Summary	87
Turning Basin	87
The Presence of Cable in a Bay Environment	88
Context and Preservation Potential of Discovered Resources	88
National Register of Historic Places Eligibility Analysis	91
Recommended Excavation Plan	93
Suggested Research Topics	94
REFERENCES CITED	96
APPENDIX A: Vessel and Shipping Data	106
Vessels Sunk in the Lower Line of Obstructions, Upper Mobile Bay (Dog River Bar)	106
Vessels Employed by the Confederate Corps of Engineers, Mobile Bay, 1861-1865	107
Vessels Damaged on Confederate Obstructions Between October 19, 1865 and February 6, 1866	108
Federal Shipping Losses Due to Torpedoes in Mobile Bay Waters, 1864-1865	108
APPENDIX B: Description of Maps in National Archives Collection	111

LIST OF FIGURES

Figure		Page
cover	Torpedo Raft in Mobile Bay	—
1	Area Map	2
2	Turning Basin/Anchorage Area	4
3	Transshipment Facility	5
4	Aerial Photograph, Upper Mobile Bay, 1952	15
5	Aerial Photograph, Upper Mobile Bay, 1984	16
6	Utilized Techniques and Support Vessels	32
7	Magnetometer Chart, Anomaly TB-2-2	38
8	Magnetometer Charts, Anomaly TB-4-2	39
9	Magnetometer Charts, Anomaly TB-4-3	41
10	Plan View Sketch, Prop Wash Trench, TB-4-3	43
11	Magnetometer Charts, Anomaly TB-4-4	46
12	Magnetometer Charts, Anomaly D-E	51
13	Magnetometer Chart, Anomaly F	53
14	Sketch of Steel Wreckage Found at Anomaly F	54
15	Approaches to Mobile City by Water (Merrill 1866)	57
16	Obstructions, Mouths of Mobile and Spanish Rivers (Merrill 1866)	58
17	Vessels Sunk, Dog River Bar Obstruction (Merrill 1866)	59
18	Cross-Section of Channel Defense Works	64
19	Defense of the Bay Entrance	67
20	Chevaux-de-frise	70
21	E. C. Singer's Percussion Torpedo	72
22	Rain's Friction Torpedoes	73
23	Plan of Federal Attack	75
24	Artist's Rendering, Defeat of the Tennessee	76
25	View of Mobile and the Federal Fleet in the Bay	79
26	The Gun-Boat Genesee Provided with a Net-Work Against Torpedoes	80
27	Map of the Defenses of The City of Mobile	81
28	USS Milwaukee (1864-65)	83
29	USS Osage (1863-65)	84
30	CSS Albemarle, Prototype for the Huntsville	86
31	Magnolia, CSA-Utilized Vessel	109
32	Approaches to Mobile City by Water (1864)	113

LIST OF TABLES

Table		Page
1	Anomaly Descriptions	6
2	Bottom Time by Anomaly	9
3	Federal Shipping Losses Due to Torpedoes in Mobile Bay Waters, 1864-1865	110

ILLUSTRATION CREDITS

Figure	Source	Page
cover	Harper's Weekly, May 27, 1865, Naval Historical Center, Photo NH53872	—
4	National Archives	15
5	Corps of Engineers, Mobile	16
15	National Archives	57
16	National Archives	58
17	National Archives	59
18	Sheliha 1868	64
19	National Archives	67
20	Sheliha 1868	70
21	Sheliha 1868	72
22	Sheliha 1868	73
23	National Archives	75
24	Naval Historical Center, Photo NH1276	76
25	Harper's Weekly, Oct. 29, 1864, Historic Mobile Preservation Society, University of South Alabama Photo Archives	79
26	Harper's Weekly, Dec. 17, 1864, Naval Historical Center, NH57925130	80
27	National Archives	81
28	Naval Historical Center, Photo NH60651	83
29	Naval Historical Center, Photo NH60295	84
30	Naval Historical Center, Photo NH63375	86
31	Illustrated London News, May 4, 1861, University of South Alabama Photographic Archives	109
32	National Archives	113

I. INTRODUCTION

This report describes the cultural resources investigation of two groups of magnetic anomalies located in the upper and lower portions of Mobile Bay, Alabama. The study was conducted for the U.S. Army Corps of Engineers, Mobile District, by archaeologists employed by Espey, Huston & Associates, Inc. (EH&A).

Project Location

The Mobile Bay study area (Fig. 1) is located in the extreme southwestern portion of Alabama in the East Gulf Section of the Coastal Plain Province. The roughly L-shaped bay, which is bounded on the east by Baldwin County and on the west by Mobile County, is approximately 30 miles (48.3 km) long and averages approximately 10 miles (16.1 km) in width. The primary rivers associated with the estuary are the Tensaw and Mobile rivers, which enter the bay at its northern terminus. Dauphin Island and Mobile Point separate the bay from the Gulf of Mexico. The metropolitan city of Mobile is located at the northwestern portion of the bay, while the much smaller community of Fairhope is located on its eastern shore.

Investigation Purpose

This investigation was conducted for and funded by the U.S. Army Corps of Engineers (the Corps), Mobile District, under Contract No. DACW01-83-C-0124. The required work under this contract involved the relocation of previously reported (Mistovich and Knight 1983a) magnetic anomalies in Mobile Bay and the conducting of intensive surveys and testing to determine their physical and historic nature, and to assess their potential eligibility to the National Register of Historic Places (NRHP) as defined under 36 CFR 60. The work was conducted as part of the proposed Mobile Harbor Deepening Project and was authorized in partial fulfillment of the Mobile District's responsibilities for cultural resources under the National Historic Preservation Act of 1966 (PL 89-665) as amended, the National Environmental Policy Act of 1969 (PL 91-190), Executive Order 11593, and the Archeological and Historic Preservation Act of 1974 (PL 93-291).

This reported investigation follows and is, in part, based on the findings of a previously authorized baseline literature review and remote sensing survey which was conducted by OSM Archaeological Consultants, Inc. (Mistovich and Knight 1983a).

Areas of Investigation

The specific work tasks defined in the Corps contract were divided into three primary parts, entitled "Basic Contract", "Option 1", and "Option 2". The Basic Contract specified and defined the two groups of anomalies in the Upper Bay and Lower Bay, which are described in this report. Contract Options 1 and 2, which have not been exercised, respectively defined anomalies on the Inner Bar and Outer Bar channel segments of the Mobile Harbor project. Although neither of the options were authorized, the potential for their being exercised by the Corps determined, in part, the scheduling for the investigations which were conducted under the Basic Contract.

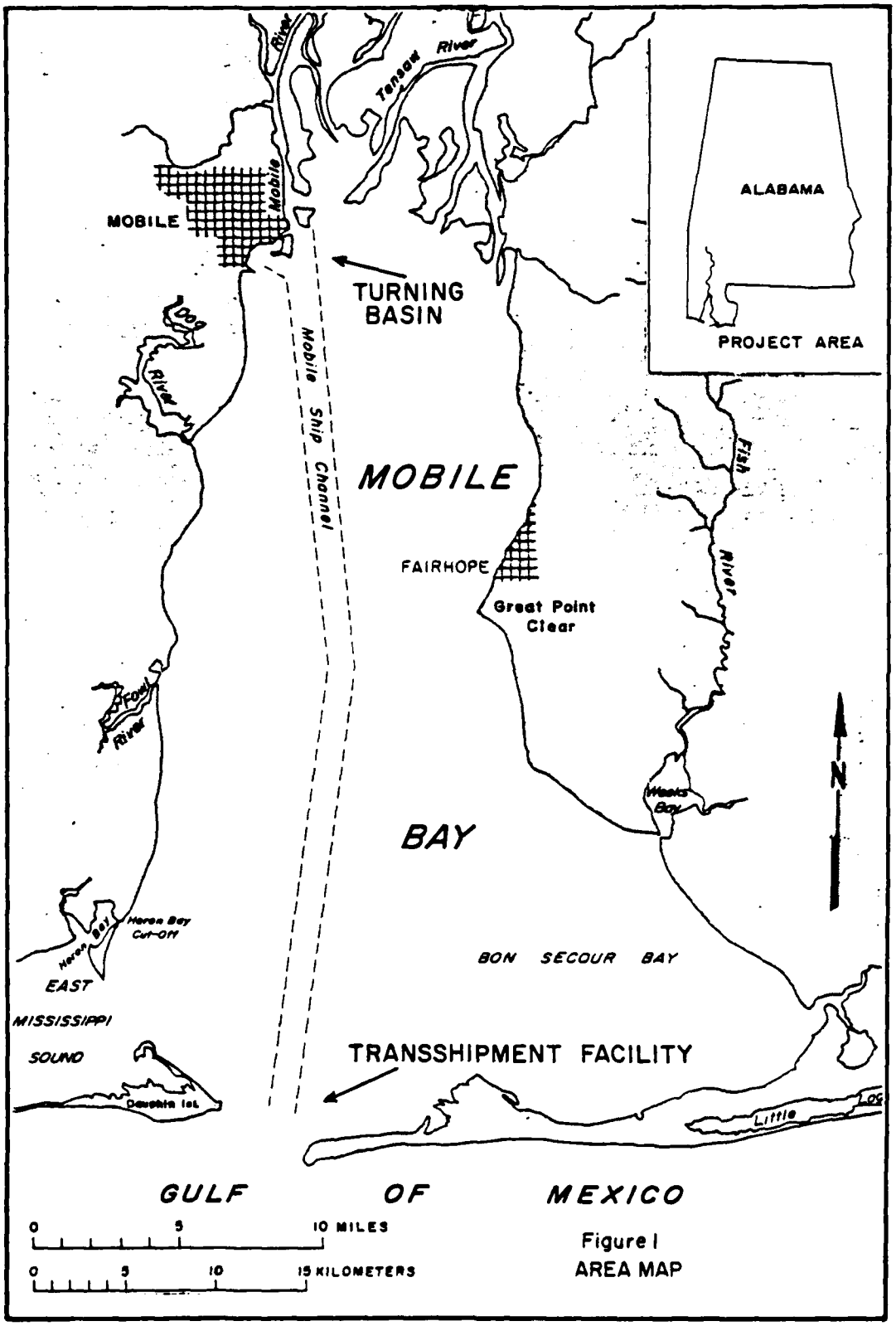


Figure I
AREA MAP

Under the terms of the Basic Contract, cultural resources investigations were to be conducted for seven (7) individual submerged anomalies located in Upper Mobile Bay in an area scheduled for construction of a Turning Basin. Those features in the Lower Bay selected for investigation included two (2) individual anomalies and one (1) cluster containing three (3) anomalies at the location of a proposed Transshipment Facility and associated channel.

The two widely separated bay areas are in considerably different bay environments. The proposed Turning Basin area is located at the extreme northern end of the bay immediately below Sand Island on the west side of the existing ship channel and west of the southern portion of McDuffie Island (Fig. 2). The tentatively planned Turning Basin will widen the existing channel in this area to a maximum of approximately 1,500 ft (457.2 m). Currently the water in the Turning Basin area of investigation is shallow, averaging only 3-15 ft (0.9-4.5 m), and tends to be turbid. The area and its water appear to be considerably impacted by nearby marine-related industries, including a coal terminal on immediately adjacent McDuffie Island. Modern industrial debris, including floating petroleum slicks and tars, were frequently observed during the conduct of the fieldwork. The bottom sediments in this area of investigation can be generally characterized as poorly consolidated silts and silty clays which frequently contain considerable quantities of loose organic debris, the latter consisting primarily of riverine induced rotting wood.

The proposed Transshipment Facility area is located on the east side of Mobile Channel, approximately 2 miles (3.2 km) north-northwest of Fort Morgan on Mobile Point (Fig. 3). Water depth in the immediate vicinity averages 17-25 feet (5.2-7.6 m) and the bottom consists primarily of firm silts and sandy silts. Water quality is considerably improved over the Upper Bay, with generally reduced turbidity and less industrial pollution.

Investigated Anomalies

The specific anomalies in the Upper Bay which were listed for investigation in the Basic Contract were described as TB-2-2, TB-4-2, TB-6-3, TB-6-4, TB-7-3, TB-4-4, and M-99-1. After initiation of fieldwork, it was discovered that the inclusion of anomaly TB-6-3 in the investigation was a typographical error, and that anomaly TB-4-3 should have been included in its place. Unfortunately, the error was not discovered until after the anomaly had been subjected to a preliminary field investigation. The details of that effort are included in this report. The anomaly descriptions, as provided in the Scope of Work, and the contract modification which corrected TB-6-3 to TB-4-3, are provided in Table 1.

It should be noted that the absence of mention of side-scan targets in Table 1 for most of the above listed anomalies does not necessarily preclude the presence of above-bottom protuberances, but also reflects the extreme shallowness of the water, which prevented the previous investigators from making side-scan correlations (Mistovich and Knight 1983a:153).

These anomalies were selected for investigation on the basis of their placement and magnetic signature. The Turning Basin itself is located in a heavy-traffic area and is in the vicinity of the pre-1914 ship channel. Two sunken vessels are recorded in this general area, the Thomas Sparks (ca. 1866) and the Seine (ca. 1856) (Mistovich and Knight 1982b:10). Additionally, the

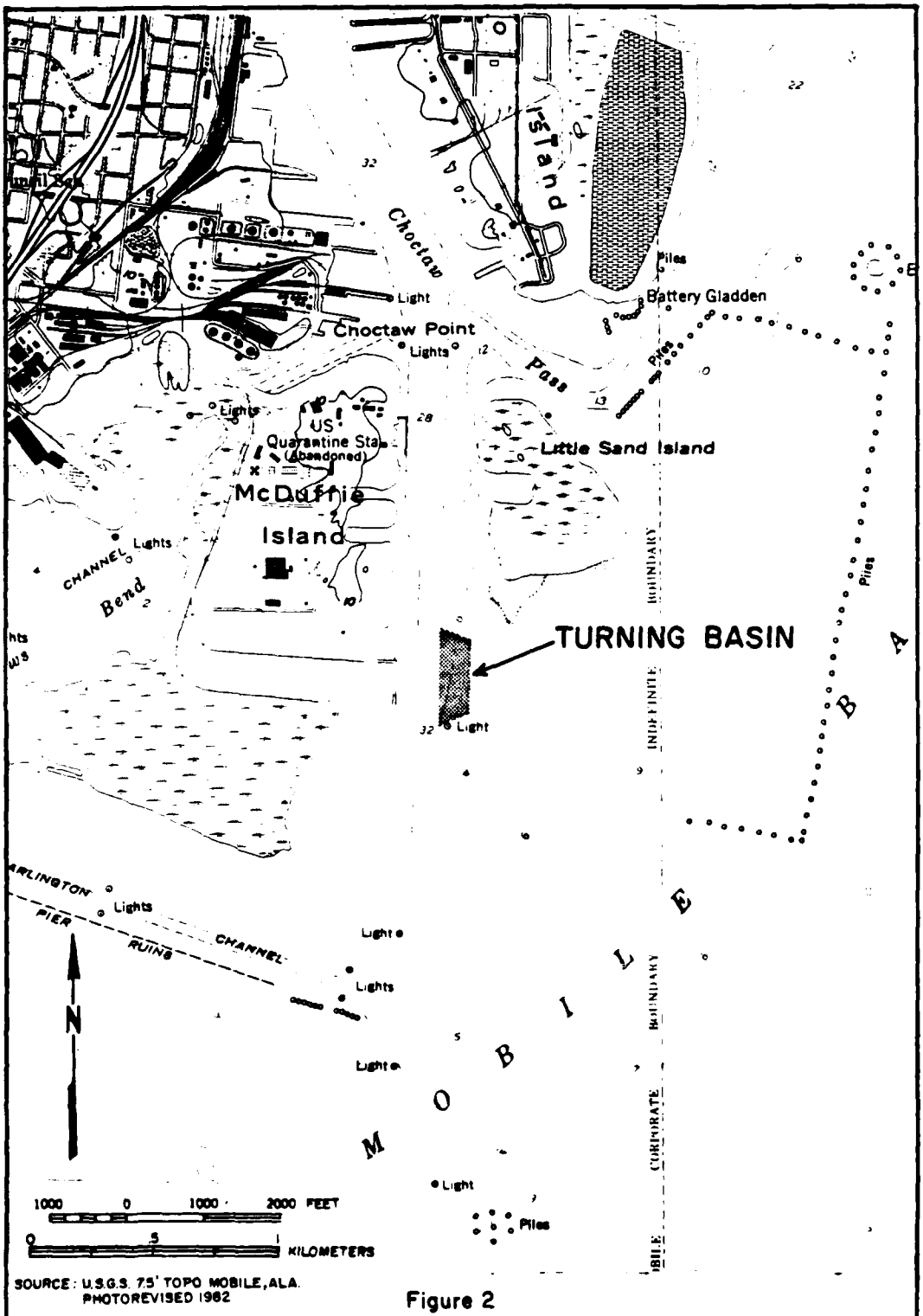


Figure 2

TURNING BASIN/ANCHORAGE AREA

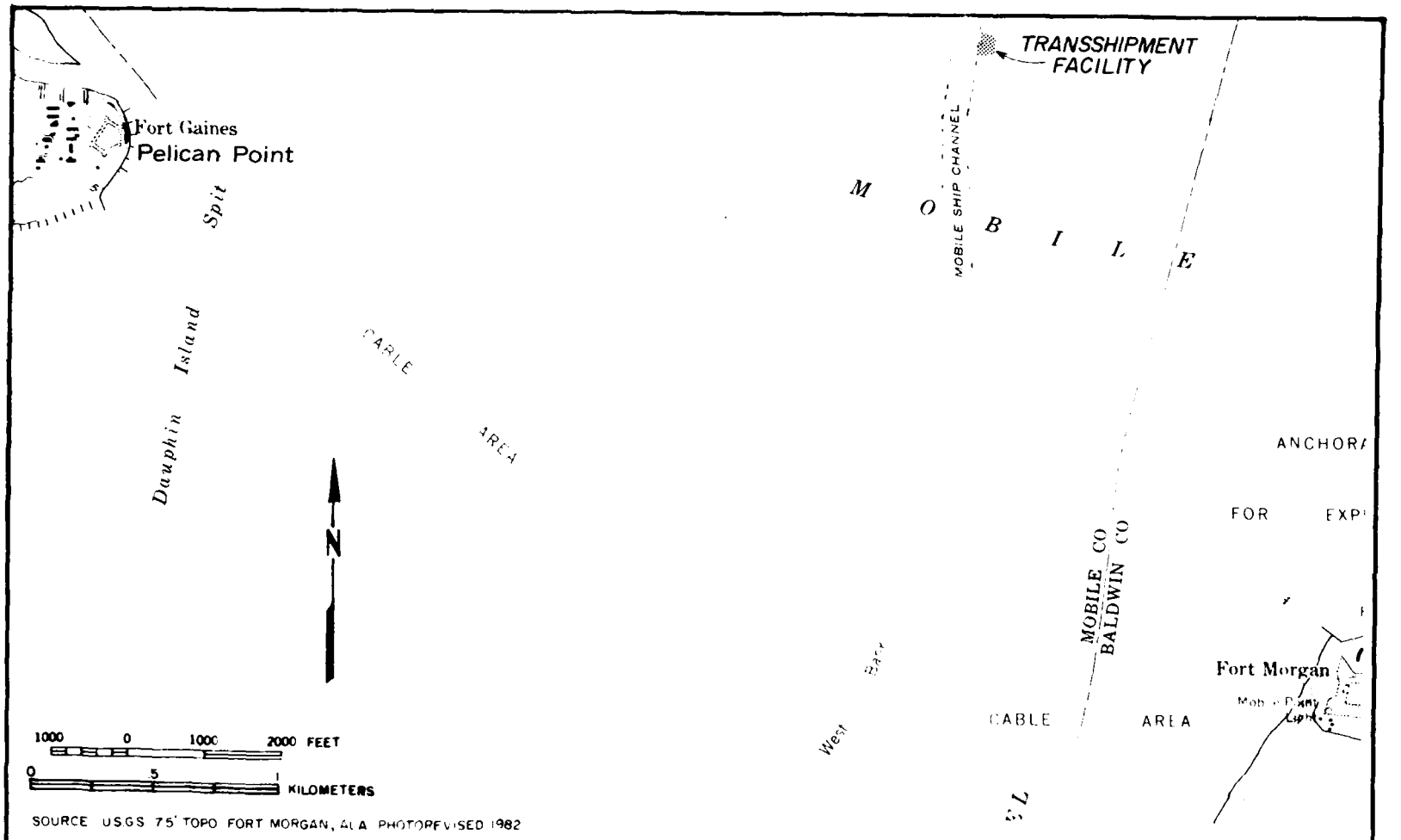


Figure 3
TRANSSHIPMENT FACILITY

TABLE 1

ANOMALY DESCRIPTIONS

Anomaly Number	Gammas Intensity	Side-Scan Target	Comment
	Turning Basin		
TB-2-2	105	None	Broad-based
TB-4-2	53	None	Negative spike
TB-4-3 (TB-6-3)	40	None	Negative spike
TB-6-4	195	None	Bi-polar
TB-7-3	35	None	Multiple peaks
TB-4-4	180	None	Negative spike
M-99-1	46	Debris	Bi-polar
	Transshipment Facility		
C-17-5	Full scale	Debris	Broad-based
E-28-1	Full scale	Scattered debris	Multiple peaks
Cluster A			
E-29-2	44	Double target	Double peaks
E-29-3	28	None	Broad-based
E-39-1	80	None	Positive spike

recommended anomalies exceed three seconds in duration, and are expressed in a complex multiple return (Mistovich and Knight 1982a:154).

Five anomalies in the Transshipment Facility were recommended for investigation: C-17-5, E-28-1, E-29-2, E-29-3, and E-39-1. These were recommended primarily because of their magnetic potency (C-17-5 and E-28-1) or because of their appearance in a cluster in a relatively "clean" magnetic area. The Scope of Work provided anomaly descriptions which are reproduced in Table 1.

Scheduling and Personnel

EH&A scheduled field operations to be conducted on the basis of a flexible six-day work week with the day off occasionally being called to compensate for down-days due to adverse weather conditions or equipment malfunction. Operations commenced on August 2, 1983 and concluded October 7, 1983 for the Basic Contract. The crew returned to Mobile on October 28, 1983 to conduct a magnetic resurvey of the two optional areas and remained on station pending a Corps decision on testing the optional areas of the Basic Contract. Due to a change of plans in regard to the development of these areas, the options were not tested and the field camp was broken down November 7, 1983.

A total of 68 calendar days was spent in completing the positioning, remote survey and underwater testing of anomalies under the Basic Contract. A total of 45 calendar days was spent in the Upper Bay area investigating eight anomalies, while 23 calendar days were spent in the Lower Bay investigating five anomalies. The former figure includes four days of set-up and three down-days due to an engine malfunction on the dive vessel.

EH&A's original Technical Proposal called for ten work days to be devoted to the task of relocating the anomalies in both the Upper and Lower bays, utilizing a Motorola Mini-Ranger III radar positioning system and a Geometrics 866 proton precession magnetometer. Five separate two-day periods were allotted to this task.

In theory, the positioning of only two to three anomalies at a time would reduce the number of buoys lost through current or theft. In practice, it was found that, despite the stiff current, most of the buoys remained secure. As a result, only two three-day periods were required for radar positioning of the anomalies: one period for the Upper Bay and one for the Lower Bay. It was found that three days were required by the survey team to locate benchmarks, convert the UTM's to distance-in-feet measurements, set up the transponder stations, and locate and mark the anomaly positions.

It was also found to be more efficient in practice to postpone remote sensing of the individual anomalies until we were actually prepared to excavate them. This permitted precise location of the anomaly and greatly facilitated their location by the diving team. While it was originally proposed to use the magnetometer only during the individual survey periods, it was found to be extremely convenient to have it on board at all times, as it contributed greatly to the rapid recovery of the anomaly sources. The precise location and marking of the anomalies generally required less than two hours per anomaly using the magnetometer.

The two areas of investigation under the Basic Contract were widely spaced, and therefore required a relocation of the field headquarters when the testing program was transferred from one area to the next. The selection of the Upper Bay Turning Basin as the initial test site was based on several logistical factors. First, its proximity to a large metropolitan center facilitated the initial gathering of supplies and equipment. Second, it enabled Corps personnel stationed in Mobile to more easily inspect the operation. Last, it anticipated the testing of the two offshore optional areas later in the season after the field headquarters had already been transferred to the mouth of the bay.

This was, perhaps, not the best plan from a weather standpoint. By the time operations began in the Lower Bay in late September, the bay was becoming increasingly choppy and muddy owing to the shift of the prevailing winds from easterlies to northerlies From this standpoint, it is recommended that future diving operations in the Lower Bay be carried out between the first of June and the end of August.

The field headquarters in the Upper Bay were located on Dog River, with the EH&A dive vessel being moored at the Dog River Marina. This marina was found to be convenient to the project area at a distance of 7 miles (11.2 km) by water, which represented a daily trip requiring less than 30 minutes each way. An additional 30 to 45 minutes were required daily to tow the dive barge from the Corps dock at Choctaw Point to its position over the site.

Gulf Shores, Alabama, served as headquarters for operations in the Lower Bay, with the dive vessel located about 30 minutes away by car at the Hook, Line and Sinker Marina at Mobile Point. The marina is located approximately 2 miles (3.2 km) from the project area. The slower vessel employed in this area required a boat-trip time of 20 to 30 minutes.

Although it had originally been proposed that a crew of eight, including the field supervisor and his assistant, be employed, it was quickly found that a crew of five to six functioned more efficiently; the additional divers were not used. Since the waters of Mobile Bay, particularly in its upper reaches, are both warm and shallow, diver stress was considerably reduced and the need for additional support divers was never felt. The actual calculated diver bottom times utilized for the investigation of each anomaly are provided in Table 2.

Conditions in the Lower Bay are such that a larger crew would be dictated if an extensive amount of excavation were to be carried out. The swift current and deeper water would necessitate relieving divers after a shorter bottom time than was customary in the Upper Bay. It cannot be overstated that the current was the major limiting factor to testing in the Lower Bay, but this, again, may be minimized by seasonal timing.

Five permanent crew members worked in both the Upper and Lower bays testing areas. These men were: Jack B. Irion (field director); Stephen R. James (assistant archaeologist); Thomas E. Jackson; Paul C. Teas; and Dennis R. Zabaldo. Ed Baxter assisted with the initial set-up of the project in Mobile. Richard Steubing, Ron Kurtz, and Lamar Hale. EH&A Survey Section, provided technical assistance during the radar positioning phases of the project.

TABLE 2

BOTTOM TIME BY ANOMALY

(In Order of Investigation)

Anomaly	Man-hours	Depth	Maximum Visibility
		Turning Basin	
TB-6-3	4.6	3 ft (0.9 m)	1 ft (0.3 m)
TB-7-3	12.1	6 ft (1.82 m)	1 ft (0.3 m)
TB-2-2	13.2	8 ft (2.43 m)	1 ft (0.3 m)
M-99-1	3.4	3 ft (0.9 m)	1 ft (0.3 m)
TB-6-4	25.2	10 ft (3 m)	3 ft (0.9 m)
TB-4-4	1.8	12 ft (3.6 m)	2 ft (0.6 m)
TB-4-2	30.2	12 ft (3.6 m)	3 ft (0.9 m)
TB-4-3	14.2	4 ft (1.21 m)	2 ft (0.6 m)
Subtotal	104.7		
		Transshipment Facility	
"F"	12.7	24 ft (7.3 m)	10 ft (3 m)
"E"	2.0	17 ft (5.1 m)	5 ft (1.5 m)
"B"	3.0	23 ft (7 m)	5 ft (1.5 m)
"D"	1.0	18 ft (5.4 m)	5 ft (1.5 m)
"C"	1.0	17 ft (5.1 m)	15 ft (4.5 m)
Subtotal	19.7		

Total Project Bottom Time - 124.4 man-hours

Research Strategy and Design

The primary emphasis of this investigation was directed toward the assessment of previously located magnetic anomalies in terms of potential NRHP eligibility. Because the entities to be investigated were originally discovered only through magnetic and side-scan sonar detection, it was assumed at the beginning of the study that the primary significance of any discovered resources might be in the realm of historic importance. Although the potential presence of prehistoric resources was not intentionally ignored, it was realized that the techniques of the original survey inherently precluded the discovery of such resources except by fortuitous chance.

Although a number of generalized research questions of an anthropological/historical approach had been proposed at the end of the baseline study (Mistovich and Knight 1983a:205-206), the specific formulation of the highly-touted culturally-oriented research designs and research questions (Shiffer and Gumerman 1977) seemed both inappropriate and unnecessary at the initiation of this investigation. For example, assuming that the anomalies result from the remains of sunken ships, the magnetic anomalies might have represented any of over 250 vessels which had been variously snagged, grounded, exploded, swamped, or destroyed in military action since the area was first settled in the early 1700's (Berman 1973; Hamilton 1910; Parker 1878; Mistovich and Knight 1983a). Wrecks from the Exploration and Colonial Era or the period of the War Between the States might be of special public interest. Other grounds for assessing a wreck's historical significance include uniqueness in the categories of architecture, commerce, invention, transportation, and sociocultural impact. Unfortunately, however, there was only a very limited quantity of evidence to suggest that any of the anomalies might represent anything other than modern debris. Further, because of project-specific contractual obligations which specified which anomalies would be examined, there could be no realistic development and testing of predictive models. It was the explicit research strategy of this study to further the cumulative data base on which subsequent research problems might be based by considering each anomaly as a cultural resource and, within existing technologies, to obtain specific information on:

1. areal and vertical extent of the anomaly and of the site it represents;
2. cultural-historical associations of the site and components of the site;
3. site function;
4. spatial and temporal variability, if any, within the site; and
5. degree of preservation, with respect to both the general condition of the site and the preservation of artifacts, and interdisciplinary data within the site.

Investigative Constraints

Although both marine and terrestrial archaeology share a similar theoretical base and interpretative procedures, the general techniques of data retrieval in marine archaeology are vastly different and tend to be closely tied to existing environmental conditions and are comparatively inefficient (Muckelroy 1978:25-48). On-site environmental conditions must be considered both in interpretation/evaluation of retrieved data and in planning any additional future work or mitigative actions.

Although not insurmountable, the environmental conditions of Mobile Bay are less than ideal for the conduct of marine archaeology and, to a degree, constrained and directed the outcome of this study.

The investigations in the Turning Basin were in relatively shallow water where depth varied between 3 and 15 ft (0.9-4.5 m). Water clarity is directly related to environmental and human factors, but was generally found to be poor. Wind, tide, discharged riverine particulate matter, and urban/industrial effluvium all contributed to limit the visibility under water to a maximum of 2 ft (0.6 m). Water temperature during the study period from August 1 to mid-September was found to be quite warm, and generally ranged from 80°F to 85° F (26.6°C to 29.4°C).

Minimal diving hazards were encountered in the Upper Bay. Strong ebb currents of a knot or more were occasionally experienced. In conjunction with heavy rains in the river basin, increased river outflow also washed down large logs and trees which proved to be something of a hazard to navigation and an annoyance when they resulted in snagged positioning buoys and diver-held lines and hoses. Significant and sometimes severe bottom turbulence was occasionally experienced as a result of the wake from freighters in the nearby channel. Due to the extreme shallowness of the project area, few of the abovementioned "hazards" caused any "life-threatening" problems to the archaeological crew, and the greatest hindrance to work was the almost total lack of visibility beneath the surface.

Water clarity in the Transshipment Facility of the Lower Bay was far superior to that encountered in the Upper Bay, varying from 3 ft (0.9 m) on a poor day to 20 ft (6 m) under optimum conditions. The water clarity was directly related to wind and tide. Flood tides, drawing in the clear Gulf waters, combined with an easterly wind produced the best diving conditions. Ebb tides, combined with north winds, tended to push suspended sediment from the Mobile River delta into the project area, resulting in a marked decrease in water clarity. Unfortunately, the latter conditions were far more prevalent during diving operations in the region in September and October.

The three primary impediments to diving operations in the Lower Bay were strong currents, stinging marine life, and storms. Ebb tides generated currents up to 2.5 kts flowing out of the bay through the Main Pass. This condition required divers to work while tethered to the vessel. Although the current appeared to be weaker on the bottom, it considerably impeded dredging operations by exerting a strong drag on the 2-inch hose leading to the dredge head. As a result, the dredge was difficult to control and quickly exhausted even two heavily-weighted operators.

Stinging jellyfish were a particular nuisance to divers due to the prodigious numbers in which they occur during the fall months. The most common species was the harmless "cabbagehead medusa" (Stomolophus meleagris), but other stinging varieties were represented in the hundreds, particularly during periods of slack tides. Divers were frequently stung on unprotected skin despite the wearing of full wet suits.

Increasingly hostile weather conditions proved to be another impediment to diving operations during the months of September and October. Mobile Bay's large surface-to-volume ratio renders it highly susceptible to change by

wind forces, particularly north winds which enhance river flow effects and water flow during ebb tides. During the study period, the prevailing winds shifted increasingly from the north, sometimes creating high seas which shut down the diving operations. Future marine archaeological studies of this type should take place during the months of May through August to take advantage of optimum weather conditions.

II. ENVIRONMENTAL SETTING

A number of comprehensive environmental studies have been conducted in and for Mobile Bay in the last few years, many in connection with Federal permit requirements for the oil and gas industry. A recent summary, published in April 1984, is contained within an environmental impact statement entitled Exploration and Production of Hydrocarbon Resources in Coastal Alabama and Mississippi (U.S. Army Corps of Engineers-Mobile District 1984). Another major study was undertaken by the Mobile District as a feasibility report of proposed channel enlargements in Mobile Bay (U.S. Army Engineer District-Mobile 1979). However, it is not the purpose here to attempt a restatement of data more thoroughly discussed elsewhere, but rather to emphasize those conditions which affect the archaeological working environment, the potential for preservation of archaeological material, and the feasibility of recovering this material.

Climate

The climate of the Mobile area is temperate bordering on subtropical, with summer temperatures moderated by sea breezes. Rainfall occurs throughout the year, generally in the form of hard showers of short duration (U.S. Army Corps of Engineers-Mobile District, 1984:3-2).

Average annual precipitation is 57 inches (144 cm) on the western shore of the bay and 64 inches (162 cm) on the eastern shore. The greatest amount of rainfall occurs between June and September (U.S. Army Corps of Engineers-Mobile District, 1984:3-2).

Prevailing winds in the area are seasonably variable. Winds from the south or southwest prevail from March through August and from the north or northwest for the remainder of the year. Due to the large surface area and shallow depth of Mobile Bay, it is extremely susceptible to the effects of wind direction and strength. Southerly winds generally resulted in favorable working conditions for archaeological diving, while northers tended to strengthen ebb currents and extend the discharge of riverine particulate matter. This resulted in strong currents of several knots and very poor underwater visibility in both the Upper and Lower bays.

Geology and Sedimentation

Mobile Bay lies in the East Gulf Coastal Plain. The coastal counties of Mobile and Baldwin include tidal marshes and areas described as Coastal Lowlands or Coastal Flatwoods. The interior is separated from the coastal area by an erosional escarpment with relief up to 100 ft (30.4 m).

The estuarine system is a drowned mouth-of-a-river valley, possibly a graben, that is filling with sediments introduced by the Mobile River system. This deposition has progressively narrowed the mouth of the bay and created the Mobile Bay-Mississippi Sound system.

An annual average of 4.7 million tons of suspended sediment is transported into the estuary (U.S. Army Corps of Engineers-Mobile District,

1984:3-66). The bay bottom is composed mostly of silty clays and clays. Coarse inorganic sands encircle the bay along the shores. A bay-wide sedimentation rate of 56 cm during the past century has been calculated. The southern shoreline and tidal inlet have been modified by the deposition and removal of sand from east to west by longshore currents.

Deposition is an extremely important factor in judging the potential quality of submerged archaeological remains. The rapid covering of a ship's hull by deposition of sediment frequently creates a reduced-oxygen environment suitable for the preservation of its organic materials. Muckelroy (1978:27) has noted, in reference to submerged archaeological sites, that "... the quality of the surviving remains will be determined principally by the nature and extent of the sedimentary deposits".

The sometimes rapid and dynamic depositional sequence in Upper Mobile Bay, as well as the modern development of the area, is partially illustrated by Little Sand Island in the two aerial photographs presented in Figs. 4 and 5, which, respectively, were taken in 1952 and 1984. Little Sand Island lies immediately to the north of the Turning Basin study area.

Hydrology

The average depth of Mobile Bay is 9.7 feet (2.95 m), with the maximum depth being about 60 feet (18.2 m) off Fort Morgan. Water depths in the two project areas ranged from between 3 and 15 ft (0.9 to 4.5 m) in the Upper Bay to between 17 and 25 feet (5.1 to 7.6 m) in the Lower Bay.

Two dredged navigation systems cross the bay, the Mobile Ship Channel from north to south, and the Gulf Intracoastal Waterway from east to west. An underwater levee parallels the sides of the upper third of the 40-ft (12 m) deep ship channel (U.S. Army Engineer District-Mobile 1979:B-46).

The hydraulic characteristics of the estuary are influenced by a variable volume of stream discharge, wind, and tidal conditions. The L-shaped morphology of Mobile Bay is also significant in regard to the movement of water. The narrow outlet into the Gulf acts to confine fresh water and restrict the flow of saline Gulf water into the bay (U.S. Army Corps of Engineers-Mobile District 1982:B-48).

The dredging of the Mobile Ship Channel has significantly altered the saline characteristics of Mobile Bay. By facilitating the landward movement of Gulf water into the bay, a salt wedge moves into the channel during flood tide. During periods of large river flow, the stratification of the waters over the channels is marked. The lens of fresh water riding over denser saline water below will accelerate ebb flows. The Coriolis effect, combined with the dredge spoil levee along the channel, forces the majority of the saline water to the east side of the bay. During low streamflow, salt water intrudes as far as 21 miles (33.6 km) up the Mobile River, while during high river discharge, salinity values can drop in the Lower Bay from 20 ppt (parts per thousand) to nearly zero (U.S. Army Corps of Engineers-Mobile District 1982:B-48).

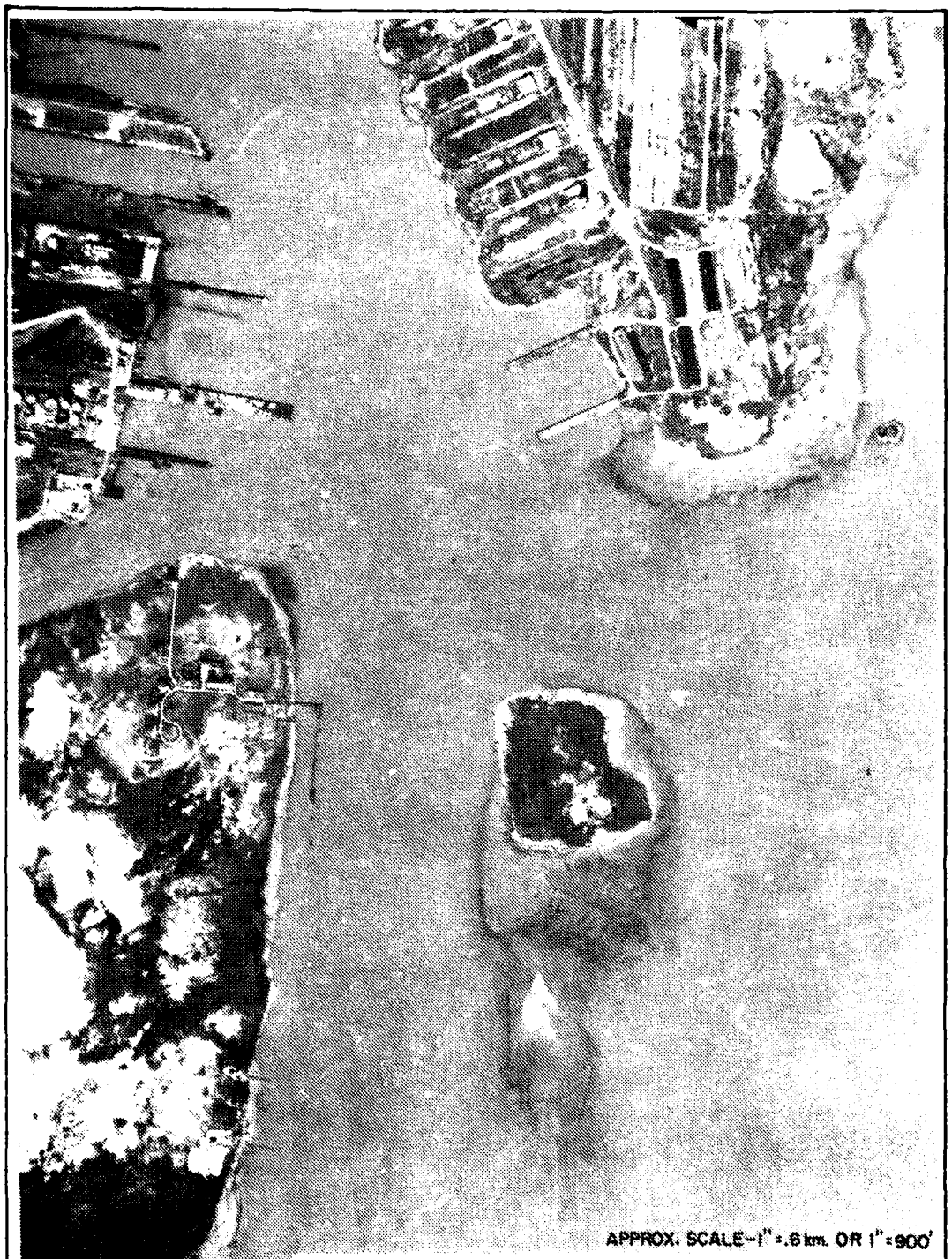


Figure 4

AERIAL PHOTOGRAPH, UPPER MOBILE BAY 1952

Courtesy U.S. Army Engineers, Mobile District

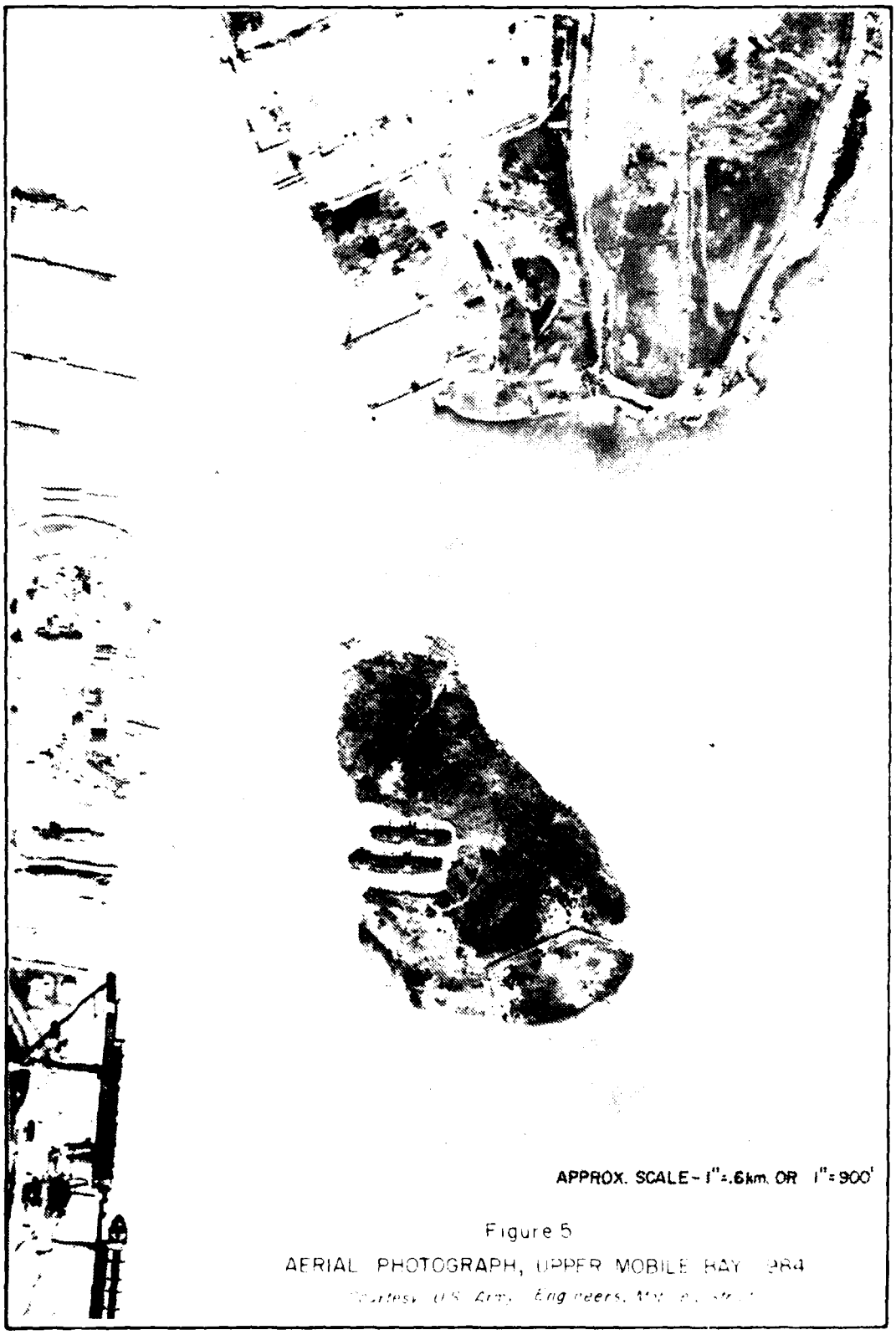


Figure 5

AERIAL PHOTOGRAPH, UPPER MOBILE BAY 1984

Courtesy U.S. Army Engineers, Mobile, Ala.

Preservation Potential and Archaeological Constraints

Of the anomalies tested in 1983, one was found to be an historic site potentially eligible for nomination to the NRHP. This anomaly, TB-4-3, is described in greater detail elsewhere, and was found to consist of an elongated mound of broken, hand-made brick. Historical research has indicated that the hull of a ship, one of several sunk as obstructions across the channel during the Civil War (1861-1865), may be pinned underneath.

The environmental conditions of Mobile Bay lead one to suspect that the hull of the vessel may be well-preserved and, therefore, capable of revealing details of antebellum riverboat construction. Often, one of the primary factors for the preservation of sunken wooden hulls, particularly those in warm salt and brackish water, is the protection that the hull is afforded by covering sediments. Presumably, soft clayey silts and muds such as those found in Upper Mobile Bay may provide nearly optimum preservation conditions. Pressed into the mud by its weight of bricks, the clayey bottom would both cushion and support the hull. In addition, both the bricks and other identified obstructions would serve to decrease water velocity, resulting in an increased flocculation of suspended particles. Presumably, the already high deposition rate would therefore be even higher, serving to quickly bury the exposed portions of the hull.

Unfortunately, during the deposition process, hull remains above the seabottom may have been subjected to depredation by marine organisms. The principal organism known to attack wooden hulls is the shipworm, of which the most common species, Teredo navalis, proliferates in Mobile Bay. The Teredo, actually a type of bivalve mollusk, can thrive in water with a salinity value of 9 ppt and can survive for months down to 4 ppt (Robert Dean, personal communication 1984). Salinity values in the study area can reach as high as 18 ppt during periods of low water flow from the Mobile/Tensaw river system between August and October. Teredo damage to at least the exposed portions of the hull cannot, therefore, be ruled out when considering the potential state of preservation of the ship. It is believed, however, that only minimal and seasonal damage would have occurred to the hulls. The ships were sunk during peak riverflow periods in May. Some deposition would have occurred during the three months before August when the Teredo becomes active again in the Upper Bay.

It has been suggested that Teredo damage, if it occurred, may have been minimal (Robert Dean, personal communication 1984).

Unfortunately, the very conditions which would act to preserve the hull also make data recovery extremely difficult. The heavy load of suspended sediment reduces diver visibility to nearly zero, necessitating every task to be performed largely by feel. In addition, the extreme shallowness of the water negates the one advantage of weightlessness which the diver has in working underwater. The extremely shallow water over certain areas of the site also limits the type and size of the vessels and equipment which can be deployed over it.

Strong ebb currents which occasionally flow through the area can be particularly annoying to the archaeological diver. Not only do they force the diver to expend effort to move himself and his equipment against them, but they also interfere with such tasks as measuring and drawing.

While environmental conditions in Mobile Bay are good for the preservation of shipwreck sites, these same conditions will dictate an innovative methodology to recover archaeological data under the restrictions of shallow water and low visibility. Proper timing of the excavation can, to some degree, lessen the impact of adverse environmental conditions.

III. CULTURAL SETTING

The following chapter provides a brief description of the prehistoric and historic setting of the Mobile Bay area. It is provided to place and understand both the resources that were discovered during this study and the many resources that are believed to potentially exist in Mobile Bay. Although no prehistoric materials were identified during this investigation, it is believed that the potential for such finds, either as subsided/inundated terrestrial sites or as representations of a prehistoric maritime industry, is great.

Prehistoric Background

Evidence of a Paleo-Indian population has as yet not been identified in the Mobile Bay area. No paleolithic material has been recorded in either of the two surrounding coastal counties (Baldwin and Mobile) although fluted points have been recovered in neighboring counties in both Florida and Mississippi. Thus far, the predominant area for the discovery of Paleo-Indian material in Alabama is the northwestern part of the state (Walthall 1980:30).

Although no fluted points from coastal Alabama are reported, their presence elsewhere along the Gulf Coastal Plain is noted (Aten 1983, Cockrell and Murphy 1978, Waller 1970). By analogy, documented coastal sites in Florida, Louisiana, and Texas (Gagliano 1977) argue strongly for the presence of inundated Paleo-Indian sites in Mobile Bay or offshore on the continental shelf.

The earliest evidence of the presence of prehistoric peoples in the Mobile Bay area is dated to the Archaic Period and has been secured by radio carbon to the last quarter of the fourth millenium B.C. (Trickey and Holmes 1971:121). The evidence consists solely of a deep shell layer at Bryant's Landing in the delta area which supposedly could only have arrived there by human agency but which is curiously devoid of any artifacts. Whether the near absence of Early and Middle Archaic materials represents actual prehistoric site density or research/publication bias has not been clearly demonstrated, and, as has been pointed out, many such sites may be inundated or buried beneath Holocene sediments (Mistovich and Knight 1983a:9, 187-198). In environmentally similar Tampa Bay, Archaic deposits have been mixed in with oyster shell dredged from the bay, indicating that at least some of the dead oyster reefs are actually Archaic middens (Knight 1976:146).

Pottery made its appearance in Mobile by 1100 B.C. and introduced the transitional Archaic Woodland Period, also known as the Gulf Formative (Knight 1976:146). This period was characterized by a fiber tempered pottery decorated with stamps, dentate stamps, and punctates. Also occupying the Gulf Formative, although appearing somewhat later than the fiber tempered ware is a little-known culture called Bayou LaBatre. This culture is characterized by its coarse sand-gravel tempered ceramics with tripodal and tetrapodal bases, scallop shell impressions and scallop shell rocker stamping (Trickey and Holmes 1971: 126). The Bayou LaBatre people continued to produce their traditional pottery forms in the Mobile region to the end of the Gulf Formative period about A.D. 100 (Walthall 1980:98). Mistovich and Knight (1983a:10) cite the occurrence of Bayou LaBatre settlements on Dauphin Island as suggestive of the development of water craft technology.

The Middle Woodland stage is introduced in Mobile with the appearance of Porter phase pottery types. The Porter phase falls between A.D. 1 and A.D. 500 and had earlier been considered to have a Hopewellian look (DeJarnette 1952). It is now regarded as a regional expression of the widespread Santa Rosa culture (Walthall 1980:156). The Porter peoples inhabited both the eastern and western shores of Mobile Bay and benefited from the extensive coastal trade between the Santa Rosa peoples to the east and Marksville to the west. Mobile Bay was of considerable economic importance during this period because of the major rivers that flow southward into the bay and Gulf of Mexico (Walthall 1980:161).

The McLeod ceramic complex appears sometime during the Woodland phase, but unclear stratigraphic contexts have rendered seriation problematical. Wimberly (1953) assigns it to the early part of this Woodland period but a problem arises in the presence of similar, stamped, sand tempered ceramics in later Woodland and Mississippian contexts (Knight 1976:147). Walthall (1980) suggests that McLeod is a local manifestation of Weeden Island ceramics.

Another type of ceramic tradition appearing during the Woodland phase is known as Mobile Cord Marked. Cord marked ware had earlier been linked to West Florida cord marked and placed on the Hopewellian level. At Bryant's Landing, however, a layer above Hopewellian was found which was predominantly cord marked and was dated by Trickey and Holmes (1971:127) to about 900 A.D.

The Late Woodland stage in Mobile is similar to Middle Woodland in that the area was subject to strong cultural influences from both east and west. Clay tempered ceramics common to the Lower Mississippi Valley are found associated with sand tempered wares common to the Florida area (Weeden Island). The local manifestation of the Weeden Island cultural system is known as the Tates-Hammock phase (Walthall 1980:171-2).

The Woodland stage is replaced in Alabama by the Mississippian culture. The Mississippian stage, introduced into Alabama about 900 AD, is marked by distinctive pottery forms and the construction of earthen platforms around a central plaza. It is also characterized by the use of the bow, floodplain horticulture, agrarian religious ceremonialism centered around a fire-sun diety, long distance trade, increased warfare and the emergence of highly organized chiefdoms (Walthall 1980:185).

Walthall (1980) suggests that Mississippian culture supplanted Woodland, not by massive invasion and expulsion, but rather by acculturation and internal development. He suggests the following chronology for the introduction of Mississippian traits into Alabama.

900 AD - Woodland peoples in Black Warrior drainage area influenced by early Mississippian settlements to the north. Introduces West Jefferson phase.

1000-1200 AD - Bessemer phase: rectangular buildings, earthen temple mounds and elaborate burial rituals appear on Black Warrior River.

1200-1500 AD - Moundville phase: Mature Mississippian Period. Influence spreads down Tombigbee River system south to Mobile Bay.

Protohistoric - (1500-1700 AD) Burial urn culture along Coastal Plain decline and abandonment of Moundville.

The coastal manifestation of Middle Mississippian is identified as Pensacola, characterized by plain, incised and engraved shell tempered pottery. Pensacola ceramics seem to represent a complete break with earlier cultural tradition and, instead, mimic Moundville to the north with additional influence from Mississippian and Plaquemine cultures of the lower Mississippi Valley (Knight 1976:147).

The florescence of Mississippian culture was manifested in the Mobile area at the Bottle Creek site, a large ceremonial center with subsidiary mound centers. Curiously enough, the mound complex is located in the very center of the delta and is subject to annual flooding (Curren 1976:79).

The Bottle Creek site has been dated to A.D. 1250 to 1450 while a later manifestation of the Pensacola culture, identified at the Bear Point complex, occurred between A.D. 1450-1600 (Mistovich and Knight 1983a:11).

Like most of the other phases of aboriginal culture in Mobile, the protohistoric period is also poorly documented, although some controlled collections of contact period ceramics do exist at Fort Conde and on Dauphin Island (Harris and Nielsen 1972; and Knight 1975) as well as at the D'Olive site (DeJarnette 1976). Contact period ceramics also include a number of non-indigenous forms with western affiliations, explained as the product of Indian women who, as wives or slaves of French and Canadian backwoodsmen and soldiers, brought them to the area (Knight 1976:145).

Ten thousand years of aboriginal development came to an abrupt end during the eighteenth century as a result of rapid acculturation by European interlopers, incessant warfare, political intrigue and disease. French colonization at Mobile eventually ended in the total subjugation of indigenous societies which led, finally, to the forced movement of entire communities to Oklahoma (Walthall 1980:275).

The prehistory of Mobile is, admittedly, poorly understood even by those most closely identified with its study (Knight 1977). The general paucity of cultural interpretation and synthesis rests in part on the lack of large, systematic surveys in and around the Mobile Bay area and, in part, on the very limited number of controlled excavations.

Historic Background

The Spanish Entrada

Soon after Columbus landed at Hispaniola and claimed the Indies for Castile, Spanish ships began probing into the New World. The very early period of exploration is, however, characterized by a paucity of information. The scarcity of records from this era is due, in part, to the poor survivability of documents from a time when the Spanish royal court persisted in the medieval pattern of constant physical mobility between the strongholds of their realm. It

was not until Spain developed an effective bureaucracy under Charles V, in the form of a series of councils, that the need for a central repository of documents was recognized. A national archives was finally established at the fortress of Simancas in 1543.

The lack of documentation for this period goes beyond the mere survivability of records to touch on a basic factor affecting the European perception of New World. The failure to describe and communicate the physical characteristics of the New World may reflect a lack of interest among sixteenth century Europeans in landscape and in nature. It may reflect, too, the strong traditional literary conventions which resulted in the view of the New World obscured by contemporary chroniclers in the haze of popular chivalric romances lampooned by Cervantes in Don Quixote. The lack of interest in the New World as anything other than a potential source of wealth largely accounts for the scarcity of documentation from this period and makes an account of early exploration in the northern Gulf especially dependent upon speculation.

Haiti and Cuba were the first conquests for Spain in the Caribbean and these islands served as springboards for the exploratory expeditions into Darien (Panama), Mexico, and the northern Gulf. Even before Cortez had led his band of conquistadors into Tenochtitlan, Ponce de Leon, in 1513, had explored and named Florida. The northern Gulf of Mexico proved to be a disappointment to the Spaniards' desire for easy wealth. At least four expeditions had coasted between Florida and Texas before 1529: Ponce de Leon, Diego Miruelo, Alonso Alvarez de Pineda and Panfilo de Narvaez. The appearance of a large body of water, indicated on the Gulf coast on the Waldseemuller map (1507), has led to some speculation that the area was actually known as early as 1497 (Summersell 1949: frontispiece, Hamilton 1976:10). No modern historians have attempted a restudy of the original materials relating to early exploration of the northern Gulf.

The Pineda/Garay expedition of 1519 can lay claim to having named Mobile Bay after the Holy Spirit (Espiritu Santo), which continued to appear on maps throughout the sixteenth century. Speculation that Mobile was the "river of very great volume" at which he revictualed for forty days is, as yet, unproved.

The rag-tag survivors of Panfilo de Narvaez' expedition of 1528 are believed to have watered at Mobile Bay on their retreat to Mexico in crudely built boats. A tradition among the French later held that bones found bleaching on Massacre (Dauphin) Island were those of Narvaez' men (Hamilton 1976:13).

De Soto's admiral, Francisco Maldanado, searched the Gulf coast west of Florida for a suitable harbor to rendezvous with the overland expedition. The inhabitants of Mobile Bay may have been contacted during Maldanado's reconnaissance.

The fate of De Soto, the realization that no easily accessible precious metals were to be found in the Gulf states, and the spectacular riches to be won in Mexico and Peru contributed to the deterrence of Spanish exploration into the northern Gulf until 1558. On September 3 of that year, Guido de las Bazares was dispatched from Mexico to examine the northern coastline for purposes of colonization. Bazares "rediscovered" Mobile Bay and renamed it Bahia Filipina in honor of Philip II.

The Bazares expedition had the definite object of selecting the site for a colony which was actually settled in the summer of 1559 by Tristan de Luna y Arellano and 1500 followers. After a disastrous year in which most of the colony's supplies were lost in a hurricane, Luna's men mutinied and by 1561 the settlement was practically abandoned.

Following the disastrous defeat of the Spanish Armada in 1588, the optimism generated by the fantastic achievements of the previous 100 years seems to have vanished overnight. One result of the stinging naval defeat was an increased challenge to Spain's thalassocracy in the New World by the English. Philip II's power was based on his Indies possessions and the English realized that the way to destroy Spain was through her American possessions. The increased presence of northern interlopers in American seas, combined with decreased silver production and fewer opportunities for emigrants, resulted in the New World closing in on itself. After a century of discovery and expansion, exploration all but ceased and only nominal control was maintained over areas which were not of vital interest to Spain's sagging economy. Mobile Bay, which had been visited only sporadically during the exploration period, was all but forgotten by Europeans for the next hundred years.

The Colonial Period, 1701-1813

French Mobile

European interest in the northern Gulf of Mexico was renewed following La Salle's exploration of the Mississippi Basin. His proposal to secure Louis XIV's claim over the vast territory of Louisiana with a settlement on the Gulf ended disastrously. Missing the mouth of the Mississippi River altogether, La Salle and his colonists landed on the shores of Matagorda Bay in present-day Texas. Abandoned by the commander of his transport ships, La Salle was murdered by his own men during an attempt to reach the Mississippi overland.

The rumor of a French colony on the Gulf terrified the Spanish in Mexico and Florida. With the threat of the disruption of American treasure fleets, the Spanish launched one of the largest manhunts in history. The result of renewed Spanish interest in the Gulf coast was a re-exploration of bays at Mobile and Pensacola and the establishment of a base at the latter.

Although La Salle had failed to secure a Gulf colony at the cost of his life, the French recognized the necessity of protecting the southern shores of their American claim. Pierra Le Moyne, Sieur d'Iberville, was selected to carry on La Salle's work and sailed in 1698 with instructions to discover the mouth of the Mississippi and colonize the country. On January 31, 1699, his ships dropped anchor at Mobile Point and explored the bay after finding that the Spaniards had established themselves in Pensacola just a few weeks before (Delaney 1981:15). He then continued westward to Biloxi and established his base there.

It fell to Iberville's young brother, Jean Baptiste Le Moyne, Sieur de Bienville, to move the colony from the low, marshy banks of the Mississippi to a high bluff on Mobile River, now known as 27-mile Bluff. A stockade was built on the river bank and given the name Fort Louis de la Louisiane in honor of King Louis XIV. From the beginning, the new colony was more often called Fort Louis de la Mobile or simply Mobile after the indigenous tribe who had already given their name to the river flowing beside it.

Due to the shallowness of Mobile Bay and the treacherous ascent up the river, ocean-going French merchant ships were prevented from sailing directly to the new colony. As a result, a deep water port was established in Pelican Bay, just south of Dauphin Island, so that goods could be off-loaded there and lightered 60 miles (97 km) to Fort Louis. The raw products of the New World, principally pelts and tobacco and other natural products such as rice, indigo, pitch, tar, lumber, masts, sassafras and quinine, were carried down to Pelican Bay for transshipment (Surrey 1916:164).

In 1711 the Mobile settlement was moved to its present location near Choctaw Point because of flooding at the 27-mile Bluff site. While the new site was considerably closer to the base at Dauphin Island, this advantage was negated when the hurricane of 1717 ended its usefulness as a harbor. This natural disaster, combined with harassment by English freebooters during the war which broke out in Europe in 1711 (Queen Anne's War, 1711 to 1722), resulted in the abandonment of the Dauphin Island settlement in 1719.

The war in Europe was disastrous to the fledgling economy of Mobile. With the French navy in shambles, the colony had difficulty both in receiving much-needed supplies from home and in transporting the raw materials which were rotting in the warehouses in Mobile's humid climate. Antoine Crozat, an enterprising French merchant, attempted to turn the situation to his advantage by his offer in 1712 to take over operation of the colony for 15 years. The new governor selected by Crozat, Antoine de la Mothe Cadillac, proved to be a poor choice, however, and the venture was a complete failure (Delaney 1981:27).

After Crozat's failure to make the colony yield a profit, the contract was turned over to John Law, a Scotch gambler and financier. Law shifted the capital of the colony to Biloxi in 1720 after the closing of the port at Dauphin Island. Two years later it was moved again to New Orleans. Mobile lost much of her political and commercial influence as a result.

Mobile continued as a French settlement although she was no longer the capital. Trade in raw materials continued to be active but sporadic. Law's Company of the West gave way to the Company of the Indies in 1719. This corporation continued in control until 1731 when the colony reverted to the Crown. Trade was seriously crippled during the French and Indian War (Seven Years War) between 1756 and 1763. The cessation of hostilities brought about by The Treaty of Paris (1763) resulted in the transfer of all of Louisiana east of the Mississippi, including Mobile, to the British.

Although the French had remained in control of Mobile for a scant 62 years, they left their mark indelibly on its culture and economy. Commerce continued to rely heavily on the Indian trade in the interior of the continent. Ships were loaded with hides, indigo, furs, cattle, corn, tallow, bear's oil, tar and pitch, rice, tobacco, myrtle wax, salted beef and fish, sassafras, and oranges and vegetables which were raised in great abundance in Mobile (Hamilton 1976:290).

It was under the French that boat traffic on Mobile Bay first became a regular occurrence. Most of the vessels involved in this trade were, of necessity, small and of shallow draft. The vessels mentioned in contemporary records carried less than 100 tons of cargo and of these, most carried less than 50. The sailing vessels are referred to as "barques" and "brigantins" and were employed in coastal trade and overseas routes to Tampico, Havana and Vera

Cruz (Surrey 1916:70). One was reported to have passed some distance above Fort St. Louis de la Mobile (Surrey 1916:70).

River commerce depended upon vessels which could be rowed, towed or punted. Vessels of this type were variously described as flat boats (bateau plat) or "pirogues", which were open boats, or "galere" which were decked over and considered to represent a definite improvement over the former.

French vessels coming to Mobile sailed from the ports of La Rochelle, Rochefort, Bordeaux, St. Malo, Marseilles, Nantes, Havre, Bayonne and Dunkerque. Crown vessels were primarily dispatched from Rochefort, with merchant vessels sailing mostly from La Rochelle and Bordeaux.

The tonnages of merchant ships, particularly in the early eighteenth century, were surprisingly small, ranging from 35 to 60 tons burden. After 1720, tonnages increased to between 110 and 500 and it is not until 1736 that a vessel of as much as 250 tons is recorded (Surrey 1916:78). By the third quarter of the century and the latter years of French domination, ship tonnages reached as high as 700, although the smaller ships remained the more frequent visitor to southern shores.

Surrey (1916:78f.) points out that French vessels sailing to the Alabama coast were no smaller than those sailing to other colonies or, in fact, smaller than vessels dispatched by the English and Spanish across the Atlantic. If anything, the French vessels were generally larger than those of other nations in the Gulf.

Little is known about the hull forms of these vessels. The various names by which they are known refer more often to purpose or sail pattern. A "barque" or "brigantin" may have similar hulls, for example, but differing sail plans; a merchant frigate could carry schooner rig and still be called a frigate (Landstrom 1961:173). Because of these confusing (to the modern scholar) references in the contemporary record, there is no clear idea of the exact appearance of ships which were known to visit Mobile during the French regime.

The British Colony of West Florida

With the Treaty of Paris of 1763, Mobile, along with the rest of the Louisiana territory east of the Mississippi River, was ceded to Great Britain. The British believed the area to be too large to govern effectively as a unit with the result that smaller administrative districts were formed. Mobile fell within the district of West Florida. The land north of the arbitrary border of West Florida was reserved for the Indians and closed to white settlement.

The mainstay of commerce under British rule continued to be trade with the Indians for raw materials from the interior. Trade was under the control of merchants and trading houses rather than the government. Cotton, which was to become so important in Mobile's future, began to be recognized as a potential export (Hamilton 1976:290). Timber and naval stores also became major commodities.

The politics of the age did not leave Mobile unaffected. With the outbreak of revolution in the Atlantic colonies, loyalist Tories fled to West Florida. Strong Tory influence contributed to the steadfast loyalty of Florida to

the king. With France and Spain now allies against the English, Washington convinced the Spanish in New Orleans to launch an attack against the British in Mobile. The Spanish governor of Louisiana, Don Bernardo Galvez, landed at Choctaw Point with 2,000 men in February, 1780, and took the city after a 14-day siege. A year later Galvez captured Pensacola and paroled the British officers and men on the condition that they not take arms against Spain again. Galvez' clemency did not find favor with the fledgling United States since the paroled British arrived on the Atlantic coast in time to take part in the battle of Yorktown (Delaney 1981:46).

The Spanish Return

With the Spanish takeover, the government of Mobile returned to much the way it had been under the French. One of the Spanish government's initial measures was to re-grant the land around Mobile, which, for the most part, had been abandoned or improperly registered. Modern property ownership is still based on the Spanish land grants (Delaney 1981:48).

As always, commerce was strongly dependent on the Indian trade and one of the most important mercantile firms of the period specialized in it. Panton, Leslie and Co., which later evolved into Forbes and Co., prospered in the fur and hide trade and, at one time, maintained 15 schooners to carry their goods. One of the first actions of the company had been to fill the shallow, stagnant lagoon along the river in front of their Royal Street offices.

Although Mobile was not included in the Louisiana Purchase of 1803, Jefferson disputed its exclusion since the Perdido River had been the earliest boundary of colonial Louisiana. Spain, although under the control of Napoleon III of France, remained steadfast in her insistence that Mobile had been part of Florida, which was still Spanish, since 1763.

Despite the Spanish retention of Mobile, she was the center of commerce for American settlers in the "Bigbee District" of the new Mississippi Territory. The "Bigbee" settlers had to ship their products and receive supplies through Mobile despite the heavy import duties levied by Spanish officials. A hearty resentment of the Spanish presence in Mobile by American settlers and the fact that the U.S. retained a claim on the area under the Louisiana Purchase, made her annexation inevitable under the doctrine of territorial imperative.

The opportunity for annexation came as the result of another European conflict. When England undertook to overthrow Napoleon III, Spain joined to aid in the emperor's defeat. With the declaration of war between the U.S. and England, Congress annexed the District of Mobile on May 11, 1812 on the excuse that Spain was an ally of the declared enemy. The city was not actually occupied by American troops, however, until April 13, 1813, bringing to an end a hundred years of European rule.

The American Era

American hegemony over Mobile was introduced under less than peaceful circumstances. A new theater of the War of 1812 had been opened in the south with General Wilkinson's invasion from New Orleans. In response, the English and Spanish offered encouragement in the form of arms and supplies to a Creek Indian campaign of extermination against the settlers of the Alabama-

Tombigbee area. The Creeks were eventually defeated by American troops under General Andrew Jackson.

After the British defeat at New Orleans, their fleet attacked Dauphin Island and Mobile Point. During the course of this attack, the British warship Hermes was destroyed. The first attack was repulsed from Fort Bowyer on Mobile Point, but a second engagement in February 1815 overcame the American defenses with 38 warships and 5,000 troops. A few days later, the war was over and Fort Bowyer was returned to American control.

Alabama achieved statehood in 1819, with the capital finally settling in Montgomery. Mobile, of course, was the chief port of the Alabama-Tombigbee Basin and a constant stream of produce and supplies passed through the city. With the arrival of the first steamboats in 1818, river commerce was greatly facilitated and Mobile flourished.

Between 1830 and 1860, cotton became the staple crop of the south and nearly all that was raised in Alabama was shipped through Mobile. Deep draft, sea-going ships could still not reach the city because of the shoals at Dog River Bar and there had been no safe deep water anchorage at the mouth of the bay since the port at Dauphin Island was closed in 1717. As a result, cargoes had to be lightered down to the Lower Bay and transferred to ships riding at anchor, a potentially dangerous and risky procedure.

Wishing to avoid the risk of damage to their cargoes, many planters began shipping their cotton at greater cost to other ports (Delaney 1981:87). Because of the increasing loss of business, Mobile made plans to construct a railroad through the cotton country of Mississippi to the corn and wheat regions of the upper Mississippi Valley. Work on the Mobile and Ohio Railroad began in 1851 and had reached Columbus, Kentucky when the Civil War interrupted its construction.

While the railroad made it cheaper to ship goods to Mobile, the problem of getting to blue water remained. To help alleviate this problem, a 10-foot deep channel was dredged through Choctaw Point Spit and Dog River Bar between 1826 and 1857 (Delaney 1981:89). A 5-foot deep channel was dredged through what is now Grants Pass beginning in 1839. This facilitated coastal traffic between Mobile and New Orleans by allowing vessels to pass through sheltered waters to the Mississippi Sound.

Plans begun in 1860 to further improve the channel were interrupted by the Civil War. With the secession of Alabama from the Union on January 11, 1861, Mobile became a Confederate port. Mobile's strategic location on the Gulf made her of paramount importance to the survival of the Confederacy, particularly after the fall of New Orleans and Pensacola in 1862 left Mobile as the only port through which supplies and medicines could be brought from Cuba, where they were delivered from Europe.

Due to Mobile's seemingly impenetrable defenses (see Chapter VI, "The Confederate Defenses of Mobile"), Federalist armies were dissuaded from an assault on Mobile until the very end of the war. Early on, however, Union ships established a blockade to try to prevent the flow of goods and materials in and out of Mobile.

The Confederacy's vital sea-link to the outside world was severed by a daring naval assault led by Admiral David Farragut. Farragut's fleet of 17 ships sailed under the roaring guns of Fort Morgan on Mobile Point on August 5, 1864. The assault resulted in the total loss of three ships, including the ironclad Tecumseh, which sank in 30 seconds after striking a Confederate mine (referred to as torpedoes in that era). The loss of this vessel and 121 officers and crew caused a momentary hesitation in the fleet's progress, prompting Farragut's famous order "Damn the torpedoes, full speed ahead!"

Two other vessels were lost as a consequence of the Battle of Mobile Bay. One of these, the C.S.S. Gaines, was run aground on the north side of Mobile Point and burned by her crew after sustaining heavy damage from Union guns. The second vessel was the U.S.S. Philippi which, despite orders to the contrary, attempted to follow the fleet into the bay (Seaver 1864). After being struck by a shot from Fort Morgan, her captain put his helm aport and ran her on the bank. He abandoned the vessel and the Confederates later burned it. The Philippi's boilers could be seen on navigation charts for several decades.

Another interesting relic of this battle which should still exist is the iron ram from the U.S.S. Monongehela, lost when she struck the Confederate ram Tennessee.

With Farragut's Union fleet in control of the pass into the bay, Fort Gaines on Dauphin Island and Fort Morgan on Mobile Point fell to a combined naval and land assault soon afterward. Mobile was now effectively sealed, although her strong Upper Bay defenses prevented an immediate frontal assault on the city. Mobile did not, in fact, surrender until April 12, 1865, four days after Lee's surrender at Appomattox. Her defeat, then, was more the result of a total collapse of the Confederacy rather than a failure of her complex and ingenious defenses (Nichols 1959:192).

These defenses, consisting in part of pilings and sunken hulks obstructing the channel, proved a formidable obstacle to the reopening of the channel. Much of the work of opening a channel through the obstructions was initiated by the State Board of Harbors Commissioners under the direction of General Braxton Bragg. Part of Bragg's plan called for the channelization of the Mobile River by means of a series of jetties. Jetties were constructed across Pinto Pass, at the southern end of Pinto Island, and at Garrows Bend (Simpson 1872:582).

Col. J. H. Simpson of the U.S. Army Corps of Engineers at Mobile vehemently opposed Bragg's plan, arguing that the jetties would create shoaling in the Upper Bay. The jetties were destroyed in 1873 and an alternate plan of dredging commenced at Dog River Bar. Mistovich and Knight (1981:21) provide a useful table illustrating the chronology of harbor improvements from 1826 to 1943, of which one additional event is significant. In 1914, the Upper Bay channel was straightened to its modern configuration, eliminating a tortuous and dangerous bend which had run through the obstructions (Mistovich and Knight 1983a:21).

As a result of improvements to the harbor, ocean-going vessels could steam directly to the city wharves for the first time in 1877. This success was, however, considerably offset, at least initially, by the increasing reliance on rail to transport goods. Nevertheless, the opening of the Panama Canal in 1914 and

the rise of Birmingham's iron and coal industries contributed to Mobile's continued importance as a Gulf port. The opening of the Alabama State Docks in 1923 provided modern harbor facilities which, combined with good railroad and highway connections, attracted industry to Mobile.

With the decline of the cotton trade at the turn of the century, other local industries took its place in Mobile's economy. Of these industries, shrimping and oystering are important mainstays of the modern economy.

Increasing local use of the bay has also created a demand which stimulated the growth of the shipbuilding industry. The urgent need for ships during World War I resulted in the formation of five major shipyards by 1917 (Mistovich and Knight 1981:22). Shipbuilding still figures prominently in the modern economy.

IV. INVESTIGATIVE PROCEDURES AND TECHNIQUES

The EH&A investigators employed a variety of methods to locate and identify magnetic anomalies in the proposed Turning Basin and Transshipment Facility areas. Techniques changed to meet the challenges of two radically different environments, as conditions varied considerably between the northern and southern extremities of the bay.

The northern project area is characterized by extremely shallow (3-15 ft, 0.9-4.5 m), murky water. The amount of suspended particulate matter discharged by the Mobile River usually reduced visibility to near zero. Visibility improved to between 3 and 20 ft (1-6 m) in the southern project area, but divers often had to contend with a strong 2- to 3-knot current. EH&A adapted its testing program to techniques most suitable to the prevailing conditions of each area.

Positioning and Survey

Turning Basin

All positioning in Mobile Bay was performed with a Motorola Mini-Ranger III radar positioning unit. This system consists of land-station transponders which transmit to a mobile receiver mounted on board the survey vessel. The system provides a continuous readout of the distance from two of the transponders, and may be switched to a third as a check. The Mini-Ranger provides a distance measurement accurate to within ± 1 meter.

In an attempt to duplicate the original survey data, EH&A used the monumentation employed by ITEC, subcontractor to OSM Archaeological Consultants, Inc., who performed the original survey. Two U.S. Army Corps of Engineers (USCE) benchmarks were identified by Mistovich (personal communication 1983) as having been utilized for survey control: Pinto 18 and Pinto 14 Alpha 1. Transponders were set on these two stations and the receiver and console were mounted in a 21 ft (6.4 m) MonArk work boat. The precise point was located by first finding the correct distance from one of the transponder stations and then steering along that arc until the second point was reached. This intersection was marked with a PVC buoy held on position with a non-magnetic concrete anchor. After initial deployment of the buoy, its coordinates were checked and its position gradually refined to the published coordinates. These positions were later checked using a third monument on the southern end of MacDuffie Island.

Transshipment Facility

The Motorola Mini-Ranger system was again deployed for the positioning of anomalies in the southern Transshipment Facility. Three Corps monuments were selected to ensure the accuracy of the buoy placement. The three points were: Ft. Gaines on Dauphin Island, "Mack" near Pt. Clear, and Mon Louis Cemetery.

The Mini-Ranger console was initially mounted aboard a 20 ft (6 m) open vessel with the receiver fastened at the top of a 20 ft (6 m) steel pole. The

distance range of the system is strictly a function of line-of-sight beam, necessitating the elevation of the transmitters and receivers to project over the curvature of the earth. To overcome this phenomenon, both transmitters and receiver were also elevated on aluminum towers to a height of approximately 20 ft (6 m).

New Positions of Transshipment Facility Anomalies

Buoys were set on the coordinates provided for anomalies C17-5, E28-1, E29-2, E29-3, and E39-1, and a Geometric 866 magnetometer was deployed around each buoy beginning with the northernmost position E28-1. No anomalies were encountered within 75 ft (23 m) of any of the buoys. After testing and fine tuning the magnetometer, a magnetic resurvey of the area was commenced following east-west compass headings on tracks spaced approximately 30 ft (9 m) apart. Buoys were placed on five anomalies encountered during the resurvey and their positions were tentatively recorded with Loran C. UTM and latitude/longitude positions were later provided for these anomalies by a separate Corps contractor, the latter contractor using a laser distance meter mounted at Fort Gaines for survey measurement. The new positions were assigned letter designations "A" through "F" in the field in order to separate them from the original OSM identified positions (Mistovich and Knight 1983b). The new positions of anomalies "B" through "F", as they relate to the previously recorded positions, are shown in Fig. 5. As described in Chapter V, an anomaly tentatively labeled "A" was later discounted as an instrument error. The approximate gamma strengths of the five anomalies are as follows:

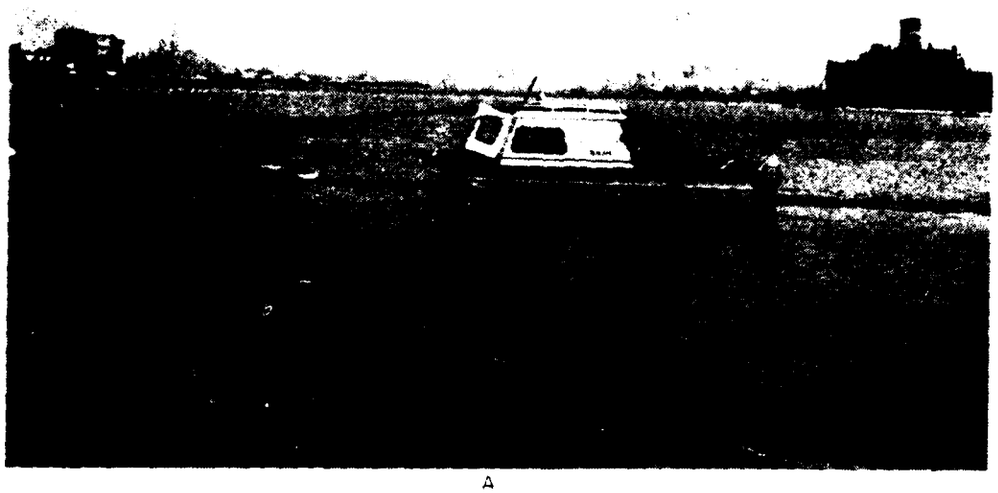
"B"	-	130 gammas
"C"	-	400 gammas
"D"	-	100 gammas
"E"	-	200 gammas
"F"	-	700 gammas

Testing procedures for the new anomaly coordinates remained unchanged from the original EH&A proposal.

Remote Sensing

All remote sensing was performed with a Geometrics 866 proton precession magnetometer. The "866" offers high-precision measurement within 0.1 gamma resolution. The unit has a built-in dual trace recorder which produces a permanent record annotated with exact readings, time, date and scale factors. A continuous LED readout was found useful when refining buoy positions, and a strip chart was not required. Experimentation showed that the machine performed best for this type of archaeological interpretation when set on the 10/100 gamma sensitivity scale with a sample interval of two seconds.

The remote sensing survey in the Turning Basin area was carried out from EH&A's 21 ft (6.4 m) MonArk aluminum work boat. A 25 ft (7.6 m) wooden spar was rigged to project some 10 ft (3 m) beyond the bow of the boat (Fig. 6A). This spar then towed the magnetometer sensor or "fish" which was floated inside a plastic inflatable raft. As the fish was only a few feet beyond the bow of the boat, this system greatly facilitated the placement of buoys. After the general location of the anomaly was buoyed, its position was refined by towing the magnetometer fish by hand until the general shape of the magnetic signature was



A

B

Figure 6
UTILIZED TECHNIQUES AND SUPPORT VESSELS

identified and areas of varying gamma intensity were located. Generally, the area of highest gamma intensity was marked as a starting point for the underwater search.

The deeper water of the Transshipment Facility area necessitated a change in strategy. In this more exposed area, it was found that the magnetometer performed more effectively when towed by EH&A's leased 36 ft (11 m) vessel Sea Duster. Floats were attached to the cable to enable the fish to be towed about 5 ft (1.5 m) beneath the surface. This system permitted the sensor to be towed 15 to 20 ft (4.6 to 6 m) above the ocean floor at low vessel speeds.

Due to the wood and fiberglass construction of the Sea Duster, the fish could be towed quite close to the vessel. When an anomaly was encountered, a buoy was immediately thrown out, and additional passes, on different compass headings, were made in the vicinity of the buoy to assess strength and shape of the signature. Additionally, the point of highest gamma intensity was visually estimated in relation to the first buoy and another buoy was set in the new position. This process was continued until a buoy lay directly over what was presumed to be the anomaly. The other buoys were then raised. After diving on the buoy positions, it was found that the anchor had consistently fallen within two feet (0.6 m) of the actual anomaly source. In one instance in which the anomaly source was a coil of cable, the buoy anchor was found to have fallen in the coil.

Excavation

Due to different conditions of the marine environment in the northern and southern study areas, EH&A approached the problem of undersea excavation in a flexible manner which utilized techniques specifically effective in those conditions. Three primary excavation techniques were employed. These consisted of hydraulic and steel probes, hydraulic dredges and prop wash deflection. The magnetometer was used in an attempt to specify the precise location of the anomaly prior to excavation.

Four vessels were employed during the project at different times depending upon the conditions under which they were required to function. In the Upper Bay, diving operations were conducted from a 16 x 12 ft (4.8 x 3.6 m) pontoon barge equipped with lifting tackle (Fig. 6B). A 21 ft (6.4 m) MonArk aluminum work boat and a 16 ft (4.9 m) Zodiac inflatable served as support vessels. In the Lower Bay, a 36 ft (11 m) wooden hulled work boat functioned as the primary research vessel.

An underwater circle search was conducted immediately after a buoy was positioned on the area of greatest magnetic intensity. A line, 45 feet (13.7 m) in length and knotted at 5 ft (1.5 m) intervals, was attached to a concrete or lead anchor. Two divers then visually inspected the area of the circle, using the line to control their distance from the center. The beginning of each revolution was marked by a stake so that the divers would know when the circle was completed. At the completion of each circle, the divers moved down the rope 10 feet (3 m) and began the next revolution. The almost total lack of visibility in the Upper Bay area made the use of the line mandatory for the divers to hold their relative positons. Although the visibility improved in the

south, the search line was still found to be extremely useful in search control. Any material located during the survey was buoyed for subsequent examination.

If the circle search failed to produce the anomaly source, the area around the anomaly buoy was extensively probed in a grid pattern 25 feet (7.6 m) to 30 feet (9.1 m) square, with the probe sunk at 2 ft (0.6 m) intervals. The probes consisted of 1-inch (2.5 cm) diameter PVC pipe attached by a "U" joint to a Briggs & Stratton powered 2-inch (5.1 cm) centrifugal water pump. Two lengths of probe were employed: one 10 feet (3 m) and one 20 feet (6.1 m) in length. The 10 ft (3 m) length was employed first due to its less cumbersome length. In the event the first probe failed to locate the anomaly, another 10 ft (3 m) section was attached to it and the grid repeated. Due to the nature of the anomalies, the probe was only found to be effective in delineating the area of one anomaly (TB-4-3).

The next step involved excavation of bottom sediments to uncover the source of magnetic disturbance. This was generally initiated by redeployment of the magnetometer in order to reassess the shape of the magnetic signature and to pinpoint the area of greatest disturbance. In the shallowest areas of the north bay, this was accomplished by simply walking the magnetometer fish over the area until the greatest deviation was registered. The point was then buoyed with a non-ferrous anchor and styrofoam float. In deeper areas of the Upper Bay, the magnetometer fish was floated with kapoc-filled life vests and boomed out from the bow of EH&A's MonArk work boat. The fish was essentially towed from the end of the boom at a distance of about 10 ft (3 m) off the bow. The fish could then be maneuvered with the vessel or held in any location desired. The proximity of the fish to the non-magnetic boat also allowed the buoy to be set with considerable precision.

Excavation began at the buoy anchor and a variety of tools were employed in sediment removal. A hydraulic dredge proved to be the most effective excavation device for both study areas. The dredge consisted of a 2-inch (5.1 cm) Venturi nozzle attached via a 50 ft (15.2 m) hose to a 3-inch (7.6 cm) Honda WA30 water pump. The dredge operates by forcing water under pressure through a port feeding into a 4-inch (10.2 cm) steel pipe. The pipe is bent at a 30° angle and it is crucial that the water feed into the bend in such a way that the flow is directed toward the exhaust end. A powerful suction is created at the opposite, or intake, end of the pipe. A nylon mesh bag was attached to a 4-inch (10.1 cm) 20 ft (6.1 m) hose at the exhaust end of the dredge head to collect any artifacts which might be inadvertently fed into the dredge. The material collected in the bag was water screened on the surface through 0.25-inch (6.4 mm) hardware cloth and carefully examined for the presence of historic or prehistoric artifacts.

A water jet attached to a Honda WA-30 water pump was occasionally employed in the Turning Basin to remove sediment, primarily as a means of cutting into banks or expanding trenches excavated by the dredge. While this device proved to be an effective means of sediment removal, it had the distinct disadvantage of reducing the already poor underwater visibility to zero, despite attempts to alleviate this situation by playing the nozzle towards the surface to dispel the suspended sediment. The disadvantage of having to work in total darkness outweighed any advantages and the dredge continued to be the preferred means of excavation under all conditions.

A prop wash deflector, attached to one of the MonArk's 75 horsepower outboard engines, was used to clear sediment from an east-west trench 47.5 ft (14.4 m) long, 10 ft (3 m) wide and as much as 7 ft (2.1 m) deep across the area representing anomaly TB-4-3. The site had already been found to consist of a concentration of hand-made brick. Probing had defined the site's limits and a small area was excavated with the dredge near the center of the mound. The probe, however, had revealed that the edge of the site lay entombed under 7 ft (2.1 m) of clayey ooze. Due to the depth and nature of the sediment, the prop wash was deployed in order to examine the edge of the brick accumulation and to determine if it was contained within some type of structure.

V. INVESTIGATED ANOMALIES

Turning Basin - Upper Mobile Bay

Eight magnetic anomalies were investigated in the Turning Basin area. The following discussions, organized by anomaly number, describe the investigative procedures and findings at each of the anomaly positions.

M-99-1

Anomaly M-99-1 was located in 7 ft (2.1 m) of water on the edge of an old channel 15 ft (4.5 m) in depth. Work commenced on August 24, 1983 on this site and continued for three days. Due to the shallow water depth at this site, the magnetometer sensor was rigged off a boom projecting from the bow of EH&A's MonArk work boat. In accordance with the standard operating procedure, the general shape of the signature was determined and a buoy was dropped at the point of greatest magnetic deviation (73 gammas).

No anomaly source was located during the initial circle search, and with the anomaly buoy as the central point, a 15 x 15 ft (4.5 x 4.5 m) grid was established. This 225 ft^2 (68.5 m^2) area was probed at 1 ft (0.3 m) intervals to a depth of 20 ft (6 m). The probe failed to encounter any solid object. Bottom sediments were noted to have been more firm and sandy in the vicinity of this buoy near the channel edge and considerably softer, gummier and more clayey 30 ft (9.1 m) to the north. This is believed to be the result of a dredge spoil bank.

Since the probe failed to locate any anomalous material, a trench 12 ft (3.7 m) wide and 9 ft (2.7 m) deep was cut ino the channel bank using two water jet nozzles. A large coil of braided steel wire cable was found approximately 3 ft (0.9 m) under the silt. The cable, 1.25-inches (3.18 cm) in diameter, was estimated to be 100 ft (30.5 m) in length. The coil of cable was then towed from the site and the area was reexamined with the magnetometer. The resurvey of the area failed to produce an anomalous reading, thereby isolating the cable as the source of magnetic deviation.

TB-2-2

The investigation of TB-2-2 commenced on August 19, 1983 and continued for four days. The work time was divided between a magnetometer resurvey of the area, excavation and recording.

Working from the position buoy which marked the recorded coordinates for the anomaly, the general area was resurveyed using the Geometrics 866 magnetometer. North-south and east-west transects were run beginning from the position buoy and proceeding outward at 10 ft (3.04 m) intervals. A very strong, broad-based anomaly was encountered approximately 40 ft (12.2 m) southeast of the buoy. High readings fluctuated between 1600 and 2300 gammas. The field was surveyed to determine the point of highest magnetic concentration and a buoy was placed on that spot.

Following the placement of the anomaly buoy, a bottom search was conducted using a 45 ft (13.7 m) line knotted in 5 ft (1.5 m) intervals. A circular search pattern was initiated by two divers beginning from the anomaly buoy and using the line to set their intervals. The source of the anomaly was visually located on the second pass in eight feet of water.

An iron pipe 2 ft (0.6 m) in diameter, was found protruding at a slight angle from the sandy silt bottom. An 11 ft (3.6 m) section of the pipe was exposed and displayed a fitting at one end. The fitting consisted of a flange encircling the pipe 10 inches (25 cm) from its termination. The flange consisted of 18 lobate tabs attached to an iron collar. The tabs were alternately drilled and slotted.

A 25 ft by 25 ft (7.6 m x 7.6 m) area north and east of the pipe end was tested with a 10 ft (3 m) hydraulic probe. The probe was then employed to determine the length of the pipe buried beneath the surface. In this manner it was found that the pipe measured 112 ft (34 m) long and was on a generally north-south alignment with a magnetic bearing of approximately 170° and 350°. Probing failed to reveal any additional objects in the vicinity.

With the two terminals of the pipe located and marked by buoys, the magnetometer was redeployed and transects were run between the buoys. It was found, not unexpectedly, that the pipe generated a large magnetic field which produced a significant reading on the magnetometer (Fig. 7) from as far as 50 ft (15.2 m) away.

The pipe has been identified by parallel example as a dredge spoil discharge pipe. The exact date of its loss is not known but may be assumed to be in the recent past. It is unassociated with any other cultural feature.

TB-4-2

Anomaly TB-4-2 was located in 10 ft of water (3 m) and was found to be generated by another coil of wire cable. The cable was located almost immediately during the circle search despite the near zero visibility of the water. The cable was raised and photographed, then it was removed from the area. The cable was 7-strand, ordinary lay, with 21 wires to the strand, and is 1-inch (2.5 cm) in diameter. No magnetic deviation was detected in the area following the cable removal (Fig. 8).

A trench was excavated, using the hydraulic dredge, to search for possible subsurface material. All excavated material was screened through 0.25-inch (6 mm) hardware cloth and carefully examined for signs of cultural material. Nothing beyond a natural accumulation of rangia shell and organic debris consisting of bark and wood fragments was collected with the exception of one brown glass "long-neck" style beverage bottle of modern vintage.

TB-4-3

Chronologically, TB-4-3 was the last anomaly to be investigated in the Upper Bay and, coincidentally, the most significant. The anomaly was reported by OSM to have a gamma intensity of 40 expressed in a negative spike (Mistovich and Knight 1983a:162). The resurvey of TB-4-3 found the anomaly to be large in area, and producing a general field of low amplitude (about

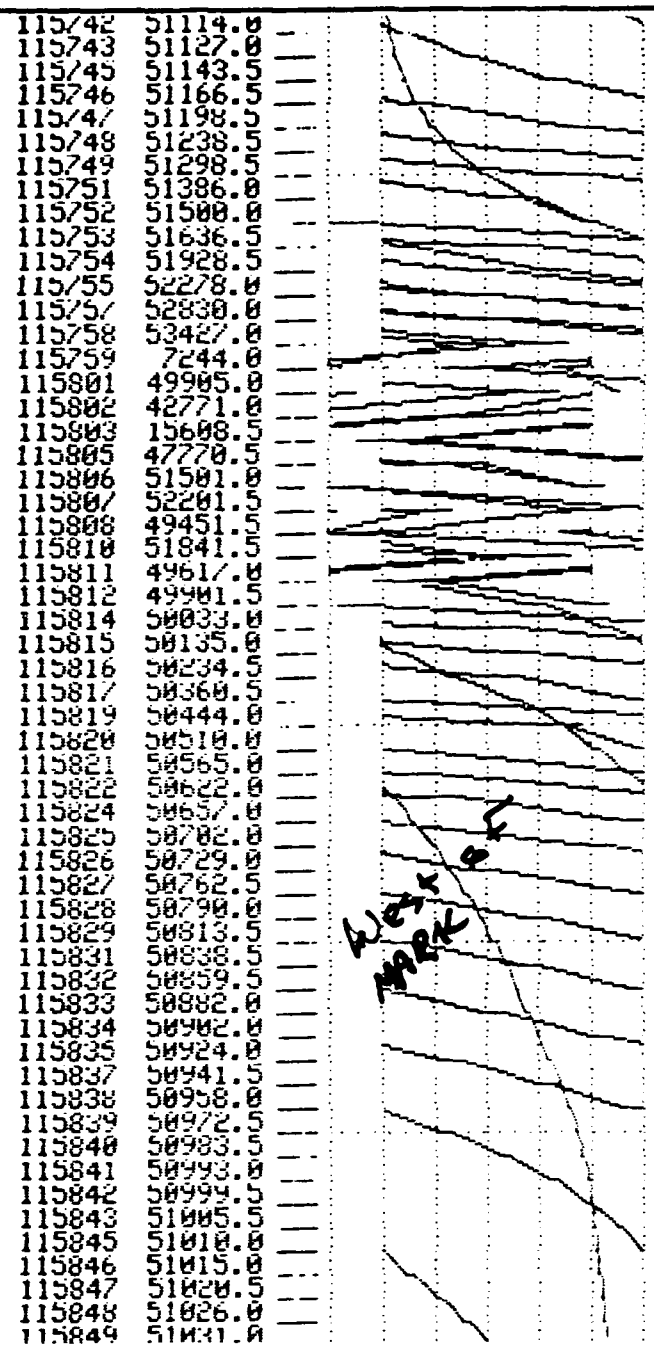
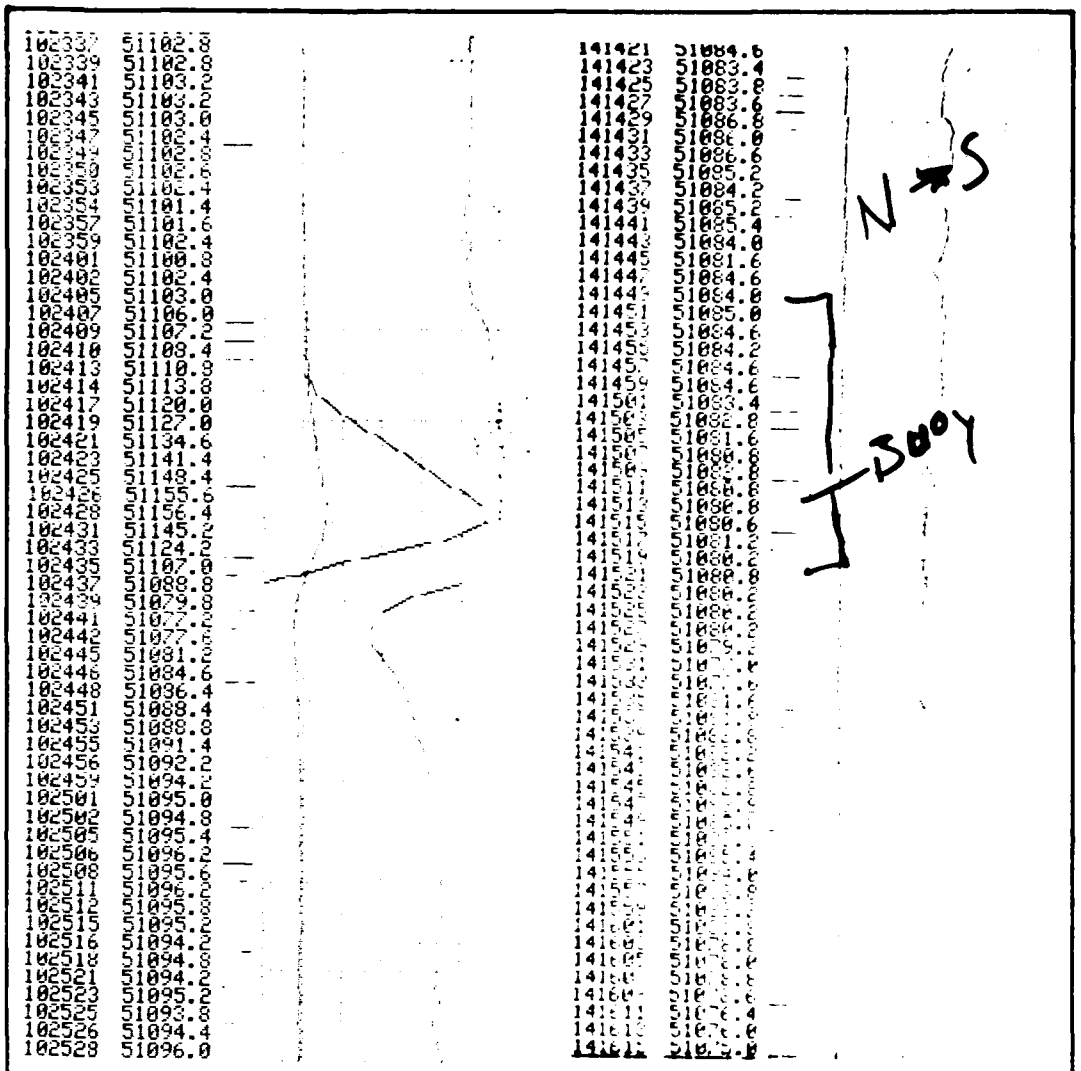


Figure 7
MAGNETOMETER CHART ANOMALY TB-2-2
Vessel Direction East to West
Estimated Vessel Speed 2.5-3 Kts. Sample Rate 1.0 sec.



Prior to Removal of Cable

After Removal of Cable

Figure 8
MAGNETOMETER CHARTS
ANOMALY TB-4-2

30 gammas) with multiple peaks sometimes exceeding 100 gammas scattered throughout the area (Fig. 9). A buoy was dropped on a 110 gamma strike which was located 15 ft (4.6 m) northwest of the buoy marking the recorded UTM position for this site.

EH&A's 16 x 20 ft (4.8 x 6 m) dive barge was anchored slightly up current of the anomaly in 4 ft (1.2 m) of water. A circle search in the immediate area failed to locate any above-bottom protrusions in the area, so the hydraulic probe was deployed. An apparently large solid object was struck with the first thrust of the probe at a depth of 3 to 4 ft (0.9 to 1.2 m) beneath a fine silty sediment.

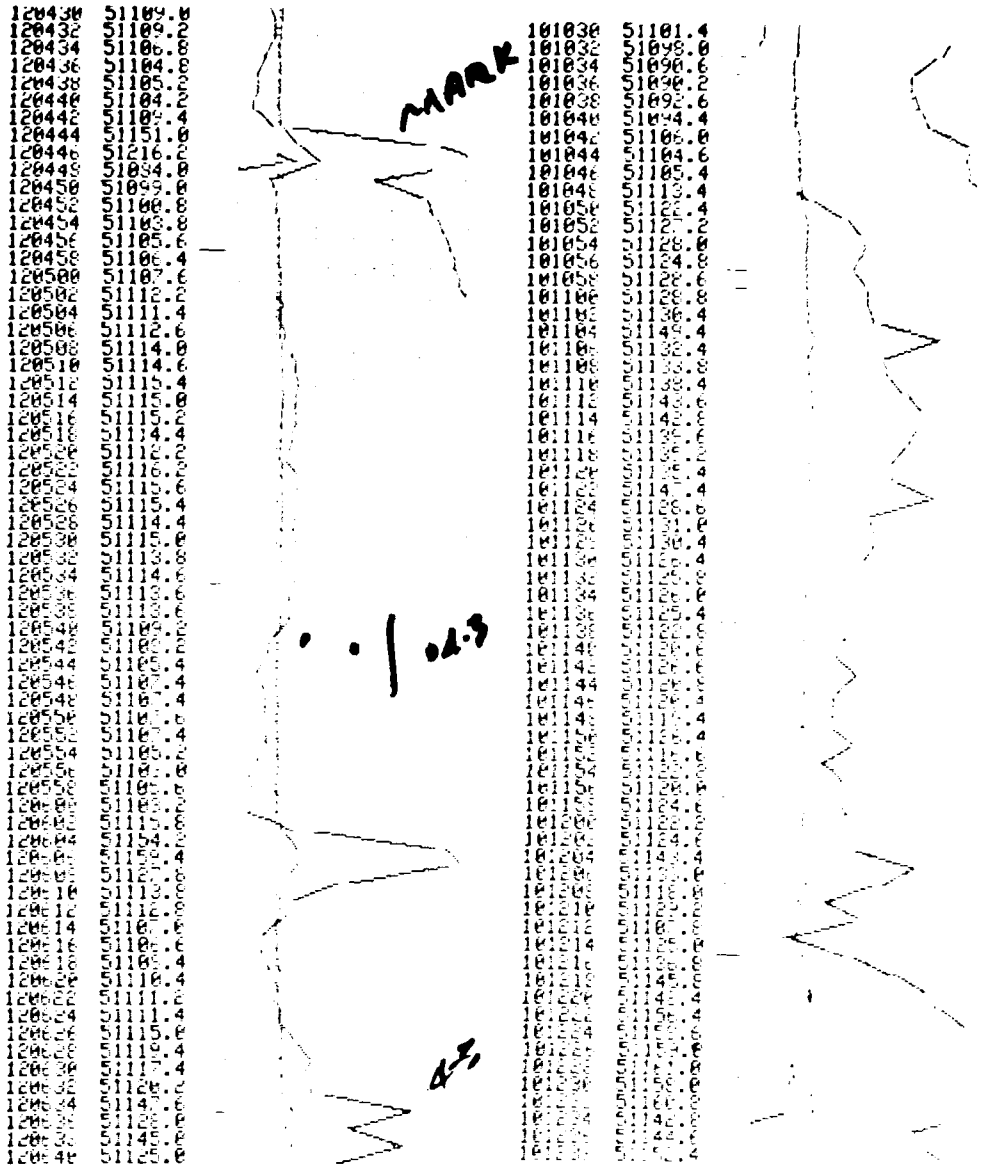
Subsequent testing with both the hydraulic probe and steel re-bar probes showed that this solid object or somewhat irregular subbottom floor extended over an area approximately 30 ft (9.1 m) wide and 200 ft (61 m) long. The area was defined as a low ridge or mound buried under 2 ft (0.6 m) of sediment in the center and as much as 8 ft (2.4 m) along the sides. The long axis of the object appeared to be aligned from south-southeast to north-northwest.

A small test trench, placed approximately at the center of the ridge, was excavated with the hydraulic dredge to determine its nature. The excavation resulted in the discovery that the approximately 5,000 ft^2 (457.5 m^2) area was a solid mass of apparently randomly placed hand-made brick. Many of the bricks recovered during the excavation were broken, some had mortar attached to them, indicating previous use, and others showed evidence of burning. Still others appeared to be whole and unused. As an average, the whole bricks were found to measure 4 x 8.5 x 2.3 inches (21 x 42 x 11.5 cm), weigh 5.1 lbs (2.3 kg), and were tan or reddish in color. No stamps or markings of any kind were present on any of the bricks examined during the excavation.

All excavated material was screened through 0.25-inch (6 mm) hardware cloth. In addition to sizeable quantities of bark, twigs, and rangia shell, 13 sherds (7 clear, 2 brown, 2 green, and 2 aqua) of modern bottle glass were recovered.

A single small fragment of a flat copper sheet was also recovered during the excavation. The specimen, approximately 0.06-inch (1.5 mm) thick, 5.5-inches (14 cm) long, and 1.7-inches (4.3 cm) wide, has one evenly-rounded convex edge and one straight edge. The straight edge has a slightly rolled lip and gives the object the appearance of having been broken from a larger, round copper sheet. One side of the sheet has been marked with a series of purposefully placed punctates applied with a pointed punch. The punctates created a double-arch design which forms the letters "W" or "M", or the number "3", depending on the orientation of the object. No identification has yet been assigned to this object.

Following the preliminary identification of the composition of the "brick feature", steps were taken to explain its presence in Mobile Bay. The decision was made to enlarge the initial excavated trench by cross-sectioning the mound in order to determine if the bricks were contained within some structure or vessel. Because the bricks represented a relatively consolidated mass, a prop wash deflector attached to a 75 hp outboard motor was used to clear sediment from a trench perpendicular to the long axis of the mound. The trench was excavated to a length of 48 ft (14.6 m), a width of 15 ft (4.6 m), and a depth of



Vessel Track West to East

Vessel Track Southeast to Northwest

Figure 9

MAGNETOMETER CHARTS

ANOMALY TB-4-3

up to 8 ft (2.4 m). The brick mass was found to be contained between two rows of pilings (Fig. 10) oriented on its long axis from south-southeast to north-northwest. Five vertical pilings, 0.8 ft (0.24 m) in diameter and apparently hewn to a point at the upper end, are located in or adjacent to the excavated trench. The limited excavations indicated that the pilings ranged from 7.5 ft (2.3 m) to 15.4 ft (4.7 m) apart in each row and the two rows are 21.4 ft (6.5 m) to 24.7 ft (7.5 m) apart.

A heavy beam measuring 1.25 ft x 2.3 ft (0.38 x 0.7 m) abuts against the inside of the row of pilings on the west-southwest side and appears to be held in place only by the weight of the bricks piled against it. Another timber was found lying parallel to the east-northeast side but it is on the outside of the row of pilings. This timber, which was hewn to a point on the exposed end, measured 0.8 ft (0.24 m) in diameter.

An attempt was made to excavate into the bricks to determine what, if anything, lay underneath them. It was soon found, however, that they had settled into a cohesive mass which made excavation extremely difficult without heavier equipment than was available under the existing contract. Nevertheless, approximately 1.65 ft^3 (0.5 m^3) of the bricks, weighing 280 lbs (126.5 kg), was removed from a trench 3 ft (1 m) in depth. Although attempts to penetrate into the brick feature were unsuccessful without heavy lifting equipment, sufficient information was obtained, however, to determine the function and significance of the site and to predict the internal structure of the brick feature.

TB-4-3 has been positively identified as representing a small section of a complex network of harbor obstructions and defenses erected by the Confederate Corps of Engineers in Mobile Bay between 1861 and 1865 (see Chapter VI. Confederate Harbor Defenses).

The obstructions at TB-4-3 were part of the works designed specifically to prevent entrance into the City of Mobile through Choctaw Pass and up the Mobile River. The defenses consisted of three main batteries covering obstructions of pilings and sunken hulks. The batteries formed the inner line of defense from Choctaw Point Spit to Spanish River. Choctaw Point Spit Battery mounted four guns; Gladden Battery, 0.75 mile (1.2 km) to the east on Pinto Island Spit, mounted between four and seven guns (10 inch columbiads). The strongest battery in this line was MacIntosh, also known as Spanish River Battery, which mounted six guns in a casemate plated with railroad iron and two guns in barbette. Battery MacIntosh was 0.75 mile (1.2 km) farther east of Battery Gladden and formed the northeast corner of the obstructions. Eight rows of piles, 5 to 10 ft (1.5 to 3 m) apart, were driven between Choctaw Point Spit and Spanish River shoal 0.23 mile (0.4 km) outside the batteries. From Battery MacIntosh, the obstructions run south-southwest 1.35 miles (2.17 km), turn to the west at Dog River Bar across the old ship channel for about 0.6 miles (1 km), then turn again to run north-northwest to Choctaw Point Spit, a distance of about 0.8 mile (1.2 km). TB-4-3 is part of this last leg from Dog River Bar to Choctaw Point Spit.

These "lower obstructions" consisted of pilings and sunken ships filled with brick. There is no lack of contemporary sources for the composition of this line. J. W. Porter, a refugee from Alabama who surrendered to Federal forces on September 13, 1862 reported:

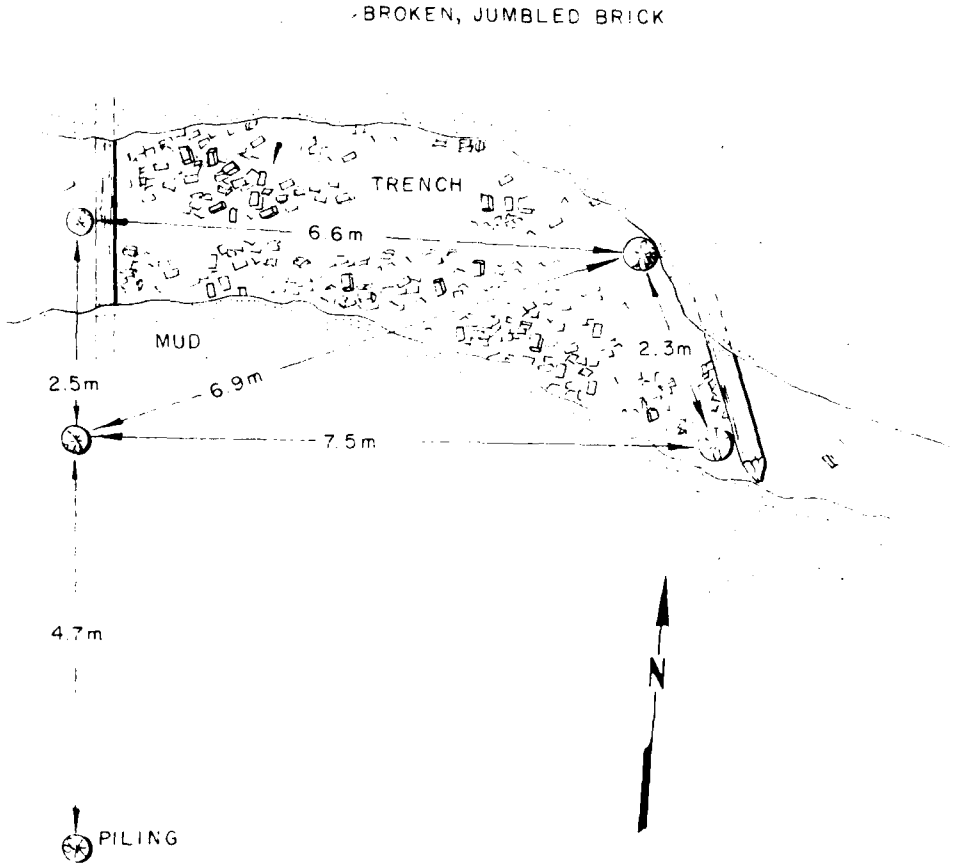


Figure 10

PLAN VIEW SKETCH,

PROP WASH TRENCH

TB-4-3

DRAWING NOT TO SCALE

> "From this battery (MacIntosh), with a wide sweep to the south and west, was a line of obstructions across the channel to the west shore. This line is formed of spiles (sic) and sunken vessels filled with brick. Millions of new brick were sunk here" (Porter 1862).

Admiral Daniel G. Farragut who had boldly led the Union fleet into Mobile Bay under the guns of Fort Morgan on August 5, 1864, wrote eight days later to Gideon Welles, Secretary of the Navy:

> "The rebels have so obstructed the channel by piles and by sinking vessels loaded with bricks that in that shoal water it will be difficult to do anything about them" (Farragut 1864b).

Farragut's entrance into Mobile Bay naturally caused consternation among her Confederate defenders. Soon afterward, Lt. Col. Viktor Sheliha, the engineer in charge of Mobile defenses since fall of 1863, ordered that all gaps in the line of obstructions be closed. The gaps or gates had been left open to permit ship traffic, and particularly the desperately needed supplies from the blockade runners, to enter through the obstructions to Mobile. With Farragut in command of the bay, Mobile's tie to the outside world was severed and the gaps were closed. How this was accomplished is seen in an order preserved in the National Archives (Sheliha 1864k):

> Engineer Office
> Mobile, Aug. 11, 1864
>
> Mr. Johnson will go to Govt. St. wharf and relieve Mr. Easlturm. He will take charge of one of the Engineer steamers (or any other, on an order from Hed Qrs, Distr. Gulf) and will tow flats loaded with brick to the gate of the lower obstructions, place the gate carefully in position to close the gap and sink the gate to the bottom with the brick.
>
> By order of Col. Sheliha
> W.P. Gazzam, A.A.E.

With the Union fleet in the bay and forts Morgan and Gaines in enemy hands, the engineers in Mobile feverishly set out to block the water approach to the city. Maj. Gen. Gordon Granger reported on September 29, 1864 from the Union Army Headquarters at Mobile Bay that:

> "From refugees who left Mobile last night I learn that Frank Gardner is in command and has a force of 3,000 to 5,000 negroes laboring incessantly night and day upon their fortifications, sinking flats, scows and every species of craft to be obtained across the various channels. The courthouse in Mobile has been demolished to obtain brick of this purpose" (Granger 1864).

The New York Sun had, in fact, reported on February 23, 1864, that the courthouse at Mobile, valued at $200,000, had been destroyed by fire.

Other buildings also fell prey to the engineers' urgent need for ballast with which to hold the ships in place. In a report dated February 6, 1866, Brevet Colonel W. E. Merrill, U.S. Corps of Engineers, noted his observations on the

condition of the harbor immediately after the war. In this report he noted that: "The wrecks, without exception, were filled with bricks and debris of old buildings" (Merrill 1866). He also notes that "these substances have gradually settled into a species of concrete very difficult to remove." Merrill recommended the use of 10,000 lbs of black powder to open a 200 yd (183 m) gap in the southern-most line of obstructions.

Certain sections of the Upper Bay defenses were removed after the war to open the channel again to ship traffic. Merrill recommended that:

> "a passage for vessels be opened from the northwestern end of the present gap, where the steamer Carondolet is lying, to a point on the southern line 200 yards east of the wreck stake." (Merrill 1866:53).

He also recommended that the "piles and wrecks northwest of the Carondolet" (the line in which TB-4-3 lies) be left in place, thinking that they would act advantageously in directing the current toward the main channel (Merrill 1866).

In the upper line of obstructions, Merrill reported that the entire line should be removed, except for a small section on the eastern end. He further notes that a one-gun ironclad battery sunk in Choctaw Pass could be easily removed to open that channel.

TB-4-4

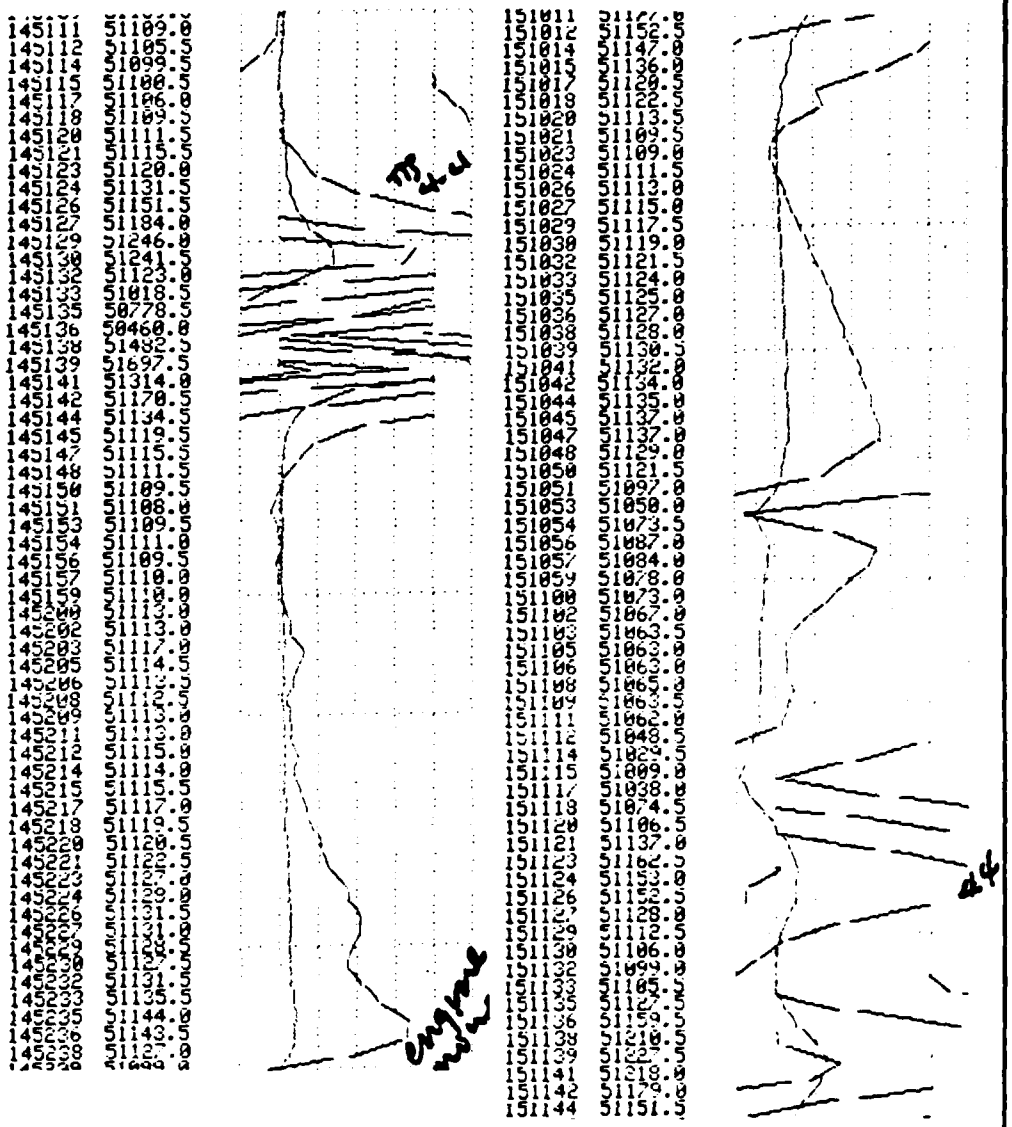
Anomaly TB-4-4 was located in 12 ft of water (3.6 m) on a sandy silt bottom. Its magnetic signature was found to be strong (780 gammas) and bipolar but of short duration on a north-south track. On an east-west track, the greatest magnetic deviation was only 117 gammas, but the signature was expressed in complex multiple peaks over a considerably longer distance (Fig. 11).

A buoy was placed at the point of greatest magnetic deviation. Divers were sent over the side to conduct a tethered circle search and reported within minutes that the buoy anchor had fallen amidst tangled coils of heavy gauge steel cable. The cable measured 1.25 inch (3.2 cm) in diameter and approximately 200 ft (61 m) in length. The coils looped tightly along an east-west line, which accounted for the longer signal duration in that track. Strands of yellow polypropylene rope were also wrapped around part of the cable. The bulk of the cable proved to cause too much drag for total removal with the vessel at hand. However, the removal of portions of the cable resulted in a significant reduction of the signal. The cable is composed of six strands with 12 wires to the strand and seven hemp centers. It is of a type generally employed as mooring lines (American Cable Company 1932:26).

A trench was excavated at TB-4-4 to test for potential subsurface material. This yielded no material other than naturally occuring rangia shell and other organic debris.

TB-6-3

A gamma strength of 14 was registered for this site by the 1982 survey (Mistovich and Knight 1983a:162). Refinement of the survey area produced a somewhat broad and poorly defined anomalous reading of 35 gammas. Since the bay is only 3 ft (0.9 m) deep at TB-6-3, the magnetometer sensor was



Vessel Track South to North

Vessel Track East to West

Figure 11
MAGNETOMETER CHARTS
ANOMALY TB-4-4

walked over the area to pinpoint the epicenter of greatest magnetic deviation. A buoy was placed to mark the site. Other buoys were positioned to form a grid 30 ft (9.1 m) square with the anomaly in the central position.

Seven pilings were located during the circle search which were protruding just above the bottom in the area formed by the grid square, which was also probed at 2 ft (.6 m) intervals to a depth of 20 ft (6 m). An eighth piling was struck by the probe under 2 ft (0.6 m) of mud. The pilings were in rough alignment in three rows. Each piling was approximately 10 inches (2.5 cm) in diameter and some appeared to retain portions of intact bark.

A central zone measuring 5 ft (1.5 m^2) was probed more extensively, at intervals of 1 ft (0.3 m) to a depth of 20 ft (6 m). The 1-inch (2.5 cm) diameter probe was inserted into a 4-inch (10.16 cm) diameter pipe which was "washed" down into the sediment. During the washing-down process, the effluvium was examined for artifactual material with negative results.

A 4-inch (10.1 cm) hydraulic dredge was employed to excavate a test pit 5 ft (1.5 m) in diameter and 3 ft (0.9 m) deep directly over the suspected anomaly source. An additional buried piling was located during this process. Wood chips, coal chunks and a coconut were retrieved and/or were found in the dredge screen. No evidence of an artifact capable of producing a magnetic disturbance was located.

This site may have some significance due to the presence of pilings which possibly associates it with the line of Confederate harbor obstructions. Its location off the supposed main line (slightly to the east) suggests that it could represent the remains of the unfinished Choctaw Point Spit Battery. (See discussion of Confederate harbor defenses in Chapter VI.)

Construction of a battery was ordered by the Commanding General in January, 1863 to be in 6 ft of water at Choctaw Point Spit. It was intended that four 10-inch guns in barbette be mounted in order to command the outer obstructions at Dog River Bar. Brigadier General Danville Leadbetter wrote in his report to the Engineer Bureau on operations for the defense of Mobile for the month of January, 1863, that work had begun on the battery (Leadbetter 1863a). In the report for the following month, Leadbetter writes that:

> "Three fourths of the crib-work inclosing the arm of this battery has been sunk and filled above high tide with earth. I shall recommend the suspension of this work, as it is doubtful whether guns can be had for it" (Leadbetter 1863b).

Choctaw Point Spit Battery was, evidently, never completed; it is never mentioned again in the reports and fails to appear on any map. The lack of a battery in this zone left the lower obstructions at Dog River Bar exposed to attack since batteries Gladden and MacIntosh were too far away to effectively cover it. This weakness in the defense was acutely felt after Farragut forced an entrance into Mobile Bay on August 5, 1864. As a stopgap measure, Br. General E. Higgins ordered that an ironclad floating battery, the Phoenix, be sunk across the channel. Lt. Col. Viktor Sheliha, the Confederate chief engineer at Mobile, protested the action in a letter dated August 7, 1864 to Maj. Gen. J. F. Gilmer, Chief of Engineer Bureau, Richmond, Virginia:

"Have been ordered to place iron-clad floating battery, which was being changed into a very strong two-gun battery, in its present unfinished condition, at lower obstructions near Choctaw Spit. Position is very isolated. Completion of the battery is rendered difficult, and even if completed it cannot hold out long by itself against an attack by the whole of the enemy's fleet" (Sheliha 1864g).

Sheliha's assertion that the site was too exposed later proved to be correct. On September 7, 1864 he wrote:

"I hereby certify that the steamer "Phoenix" was taken possession of by this Dept. by order of the commanding general of the District Br. Genl. E. Higgins on or about August 7, 1864 and that the said vessel was sunk across the channel leading through the obstructions on the water front of Mobile. A few nights later a section of her deck was blown off by the enemy. Her upper works were therefore ordered to be burned to the waterline which was done under the direction of the Comdg General" (Sheliha 1864h).

Choctaw Point Spit is a narrow inundated landform extending southeast from Choctaw Point which forms the western bank of the natural channel. Its position is clearly shown on several contemporary maps. TB-6-3 , located on what was, in 1863, Choctaw Point Spit, is believed to be this unfinished battery. The lack of depth in the area today may be largely accounted for by the reduction of flow velocity of suspended silt caused by the damming effect produced by the obstructions. As the battery was never completed, armed and occupied, it is highly doubtful that anomaly TB-6-3 is associated with its use. It is possible that it is part of the fill used to build up the battery, in which case it is buried under as much as 10 ft (3 m) of silt. Since the site was never occupied, it is important primarily for its association with the network of Confederate defenses.

TB-6-4

Following routine procedure, the area around the position buoy was examined with the magnetometer, again employing the boom arrangement to position the sensor. A strong reading (1900 gammas) of short duration was recorded at a distance of 15 ft (4.6 m) from the original position buoy. The former spot was marked and a circle search was conducted. Water depth at TB-6-4 was approximately 6 ft (1.8 m) and the bottom was soft and silty. Visibility was extremely poor during the investigation of the anomaly, no doubt aggravated by a 3-kt current which was experienced in the area for several days.

The visual search, conducted over a circular area 90 ft (27.4 m) in diameter, was fruitless. Extensive probing in the area also failed to identify a possible source for the anomalous reading.

Two hydraulic dredges were employed to excavate a pit 10 ft (3 m) in diameter and 6 ft (1.8 m) deep. After six days of excavation on this site, the source was finally discovered to be a core drill casing driven vertically into the bottom. The pipe is 4.8 inches (12.2 cm) in diameter with a 0.2-inch (5.1 mm) thick wall. The upper end terminates in a collar which is interiorally threaded. An 8-inch (20.3 cm) long section of the pipe was removed with a metal saw for identification. An abortive attempt was made to extract the pipe with water

jets and a four-part purchase block and tackle, but this was found to be impossible using the equipment at hand.

TB-7-3

TB-7-3 was the second anomaly to be investigated during the EH&A testing program, beginning on August 17, 1983, with the magnetometer repositioning of the anomaly. The anomaly was located in 4 to 5 ft (1.2 to 1.5 m) of water in a black-gray, clayey silt bottom.

A buoy was placed over the area of highest magnetic intensity (99 gammas) by walking the sensor over the bottom. A circle search was conducted around the buoy anchor to a distance of 45 ft (13.7 m) without result. A hydraulic probe was then utilized which located a solid object buried under 4 ft (1.2 m) of mud.

An hydraulic induction dredge was employed to excavate down to the object located by the probe. A pit 7 ft (2.1 m) in diameter and 4 ft (1.2 m) deep was excavated. The source of the anomaly was encountered at the bottom of the pit and was revealed to be a 5-horsepower, 2-cylinder Elgin outboard motor of the type manufactured ca. 1950-1953 for Sears, Roebuck and Co. (1950). Several small friable fragments of sawn planking were associated with the motor. Additionally recovered during the excavation, but not necessarily associated with the motor, were four to five fragments of oxidized and friable steel beverage cans, chunks of coal, and several glass fragments from modern bottles.

The engine was removed from the site and the magnetometer redeployed. After removal of the engine, the magnetometer recorded no anomalous readings, thereby isolating the engine as the anomaly source.

The engine and plank fragments may be indicative of the wreck of a small fishing skiff, perhaps deposited in the area during a storm or hurricane. It is noted that the engine was missing its lower unit and propeller. The engine was found lying on its side and while several small, 2 x 2 x 4-inch (5 x 5 x 10 cm) lumber fragments were found with the motor, which might represent a portion of the transom, no positively identified direct evidence of a hull could be found.

As this material was deposited, at most, only 33 years ago, it is not considered to have significance as a cultural resource. Like so many of the other anomalies investigated during the project, this anomaly site is indicative only of modern use of the harbor in industrial and recreational capacities.

Transshipment Facility - Lower Mobile Bay

During the EH&A resurvey of the Transshipment Facility, five anomalies were recorded in the survey area. Because they did not correspond exactly with positions recommended for testing by OSM (Mistovich and Knight 1983a, 1983b), the EH&A anomalies were assigned letter designations. Letters A through F were initially assigned but anomaly A was never refound and is now thought to have been an erratic reading caused by a pitch or roll of the sensor, engine noise, electrostatic interference, or any of the other myriad phenomena which seem to occasionally affect magnetometer records. Anomaly A was stricken from the record and will not be further described.

Three of the EH&A anomalies correspond very roughly to the positions reported by OSM and may be assumed to be their anomalies by virtue of the fact that the rest of the area is magnetically clean. Following this assumption, EH&A's anomaly "F" corresponds to OSM's E-28-1, D corresponds to E-39-1, E corresponds to E-29-2, and C corresponds to E-29-3. No anomaly was recorded by EH&A anywhere in the vicinity of OSM's C-17-5, nor did OSM report an anomaly near our anomaly B.

Although five anomalies were recorded in the Transshipment Facility, B and C were found to be sections of the same object. This was also found to be the case with anomalies D and E. As a result, these latter four anomalies will be considered and described as two clusters--B/C and D/E.

B/C

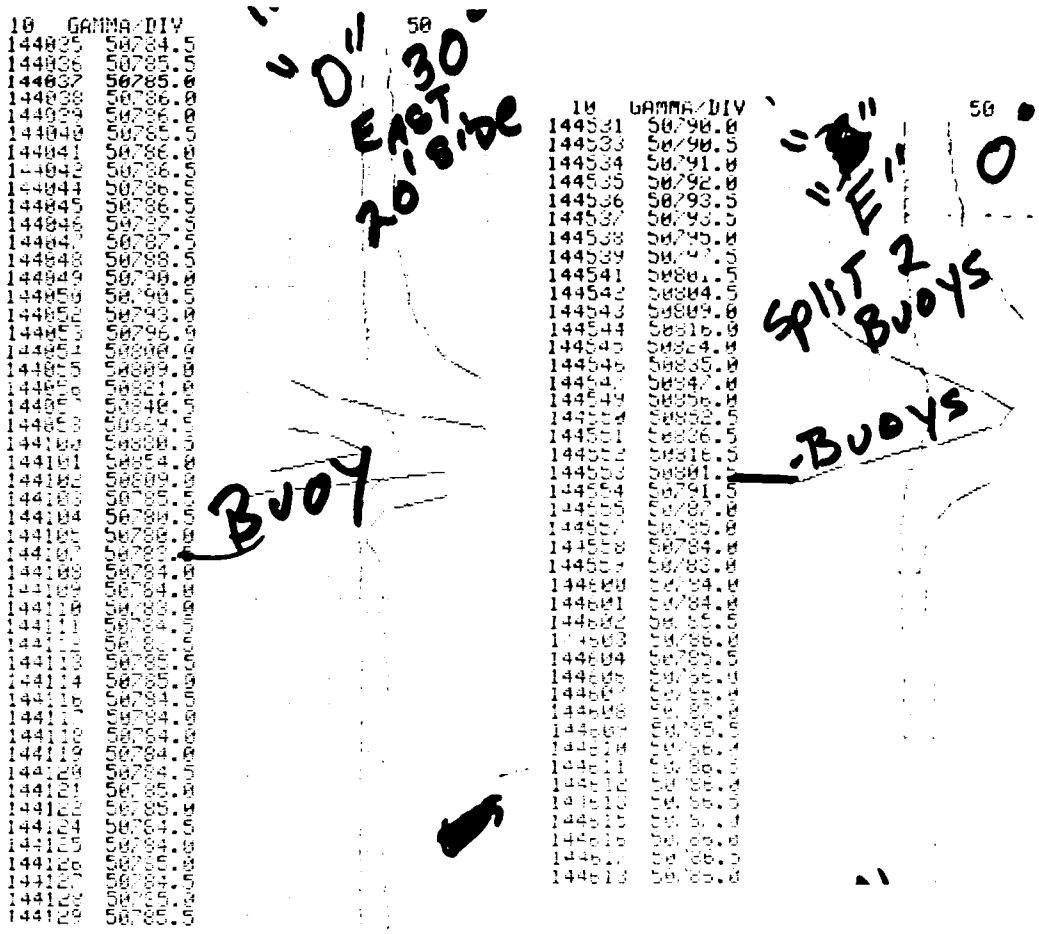
Anomaly B/C consists of loops of a seven-strand wire cable 1 inch (2.5 cm) in diameter. The cable is estimated to be over 200 ft (61 m) long, generally oriented in an east-west direction. It was originally designated as two separate anomalies because it crossed two of our survey tracks. Visual inspection revealed that the two anomalies were, in fact, a single object. Part of the increased gamma reading recorded at C (333 gammas as opposed to 92 for B) was primarily caused by the fact that several loops of the cable were coiled at C; additionally, the increase was partly due to the presence of a refrigerator door which, oddly enough, still had a Wishbone salad dressing bottle in the tray. The door was raised, photographed and removed. Several days later a line was attached to the cable at B and the Sea Duster was employed to drag it off the site. The area was again surveyed with the magnetometer. It was found that no magnetic deviation was recorded at B while a 40 gamma deviation still existed at C. Divers were sent over the side to investigate and reported that another cable stretched off in the direction of the ship channel to the west. It was not deemed necessary to remove it as the cable could easily be traced with the magnetometer.

Bottom sediments at B/C consisted of a light tan sand and water depth was 23 ft (7 m). Diving was generally impeded in this area by a stiff ebb current up to 3-kt. Weather conditions in mid to late September, characterized by strong north winds and 5 to 7 ft (1.5 to 2.1 m) swells in the bay, were a major cause of delay to the diving operation.

D/E

Anomaly D/E proved, again by visual inspection, to be produced by a copious quantity of cable. Anomaly "D" produced a magnetic deviation of 84 gammas expressed in a positive spike. Anomaly E also produced a positive spike, but of only 66 gammas (Fig. 12), perhaps due to the fact that the cable was slightly buried and the water was slightly deeper at this point.

A visual search was conducted by tethered divers on SCUBA equipment. D and E were found to represent a single cable snaking over the sea bed in a generally east-west direction. It was not coiled as had been anomalies B and C, so the mass at the individual points of detection was considerably less although cable D/E was far heavier and longer than B/C.



ANOMALY D

ANOMALY E

Figure 12
MAGNETOMETER CHARTS
ANOMALY D-E

Cable D/E consisted of seven strands of heavy gauge steel wire. The cable measured 1.25 inches (3.18 cm) in diameter and was estimated to be 300 ft (91 m) long. An attempt was made to drag the cable from the area with the Sea Duster as had been successfully done with B/C. The increased weight of cable D/E and the fact that it was partially buried made it immovable. The magnetometer signature, however, left no room for doubt that the anomalous reading was due to a single length of heavy cable and that the area is clear of other cultural material.

F

Anomaly F, producing a magnetic reading of 683 gammas (Fig. 13), was the strongest anomaly in the Transshipment Facility and the first to be tested in the Lower Bay. The anomaly was located on a sandy bottom in 24 ft (7.3 m) of water. Visibility varied from 15 ft (4.6 m) to 3 ft (0.9 m), depending upon wind and tide. The current in this area could, at maximum ebb, reach a velocity of 3-kt.

After isolating the point of greatest magnetic deviation and marking it with a buoy, divers were sent over the side to conduct a visual search within a 45 ft (13.7 m) radius of the buoy. The anomaly was quickly found to be generated by a jumble of steel wreckage in the form of pipes, I-beams, rods and cable protruding from the sand bottom (Fig. 14). Numerous fishing weights and hooks, shrimp nets and a short-handled spade were tangled up in the wreckage.

The use of our hydraulic equipment was rendered extremely difficult due to the strong drag effected on the hoses by the rapid current. Nevertheless, a test trench was excavated in the center of the wreckage to determine if it was associated with any underlying structure. The results of this test were negative. The debris extended approximately 2 ft (0.6 m) into the sand but was unconnected to any vessel or platform.

Mr. Jerry Walker (personal communication 1984), captain of the Sea Duster, identified the wreckage from the archaeologists' sketches as being that of a stiff arm crane off a type of dredge barge with which he was familiar, which was in use in Mobile Bay in the 1940s and 50s. This type of dredge, known as a grab dredge, utilized a grab bucket dropped from a crane which rotated on a turntable. The remains uncovered in the 1983 investigation were only those of the stiff arm.

It is unclear how this wreckage came to be in the area. Personal communication (1984) with the Investigation Division of the U.S. Coast Guard in Mobile failed to turn up any record of a vessel lost in this vicinity. Mistovich and Knight (1983b:12) note that a barge, D.B. 364, was reported stranded in 1954 in the vicinity of the intersection of the Gulf Intracoastal Waterway and the Mobile Bay ship channel, about a mile north of the anomaly position. No description of this vessel has yet been located.

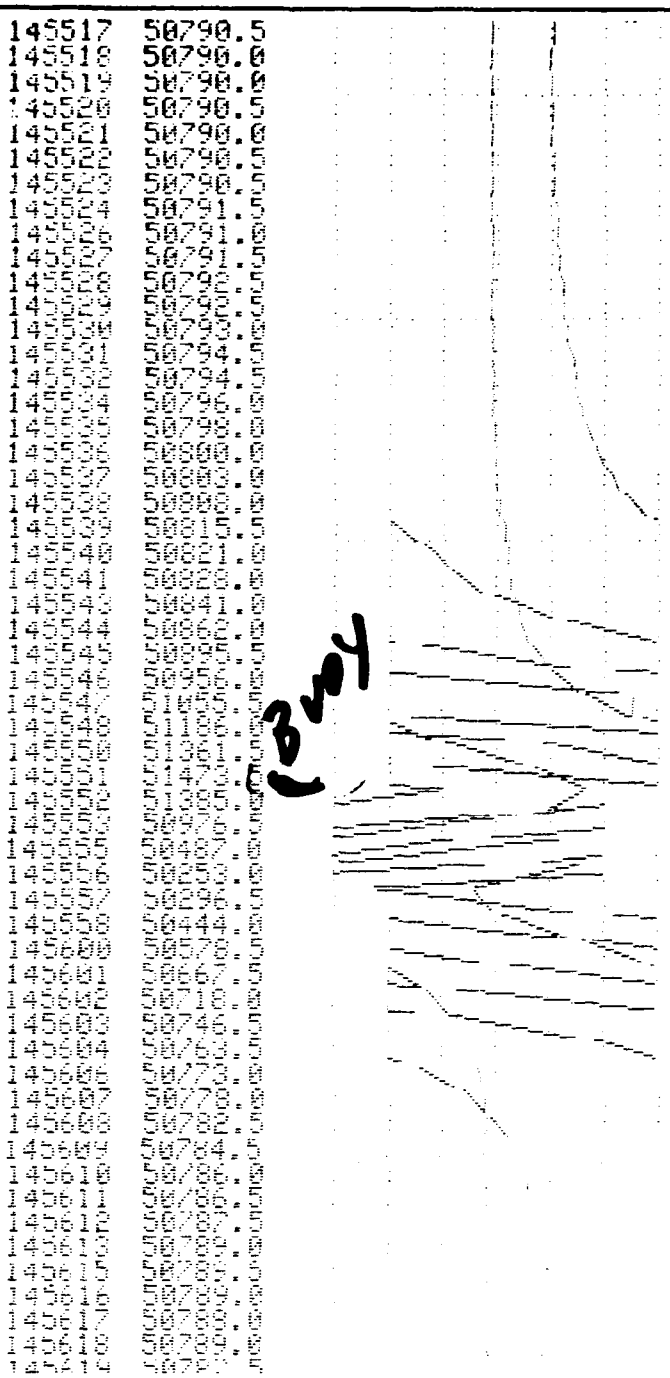


Figure 13
MAGNETOMETER CHART
ANOMALY F

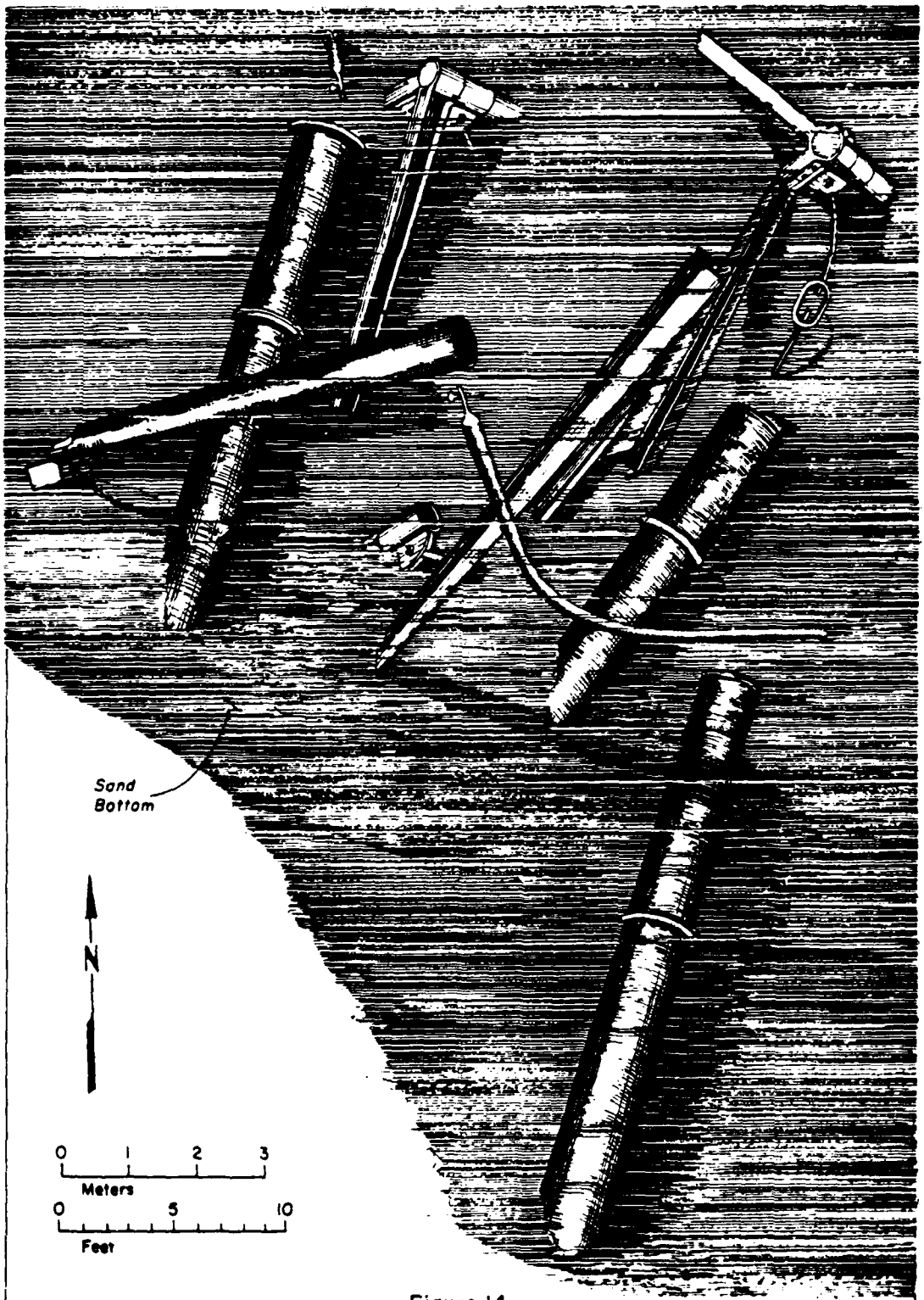


Figure 14

SKETCH OF STEEL WRECKAGE FOUND AT ANOMALY F

VI. CONFEDERATE DEFENSE OF MOBILE

Introduction

The need for a thorough study of the Confederate defenses of Mobile arose as the result of the discovery of a section of the bay emplacements known to their contemporaries simply as "the obstructions". This discovery was made during the course of testing seven anomalies in Upper Mobile Bay, when one of the test sites, identified as TB-4-3, was found to consist of an elongated mound, 200 ft (61 m) long by 30 ft (9.1 m) wide, of broken, jumbled, hand-made brick (see Chapter V). It was soon recognized that the "brick obstruction" was part of a complex network of pilings, sunken hulks, batteries and "mine fields" erected between 1861 and 1865 by the Confederate Corps of Engineers to barricade the channel entrances into the Mobile River. The obstructions were, in fact, only a small part of the overall Confederate plan of defense which made Mobile the most formidably fortified port in the south.

Very little has been written on the Mobile obstructions, although at least two studies on various aspects of Civil War coastal defense are underway (Jack Friend, personal communication 1984; Dale Floyd, personal communication 1984). The most important discussion on this subject is Viktor E. K. R. von Sheliha's A Treatise on Coast Defense (1868). Sheliha, a Prussian mercenary, was the engineer in charge of Mobile's fortifications in 1864 and described his personal work and experience in his book. The works are described, however, only in general terms without providing details essential to the identification of TB-4-3. It should also be noted that Sheliha's name appears in the record with two different spellings. As the author of the Treatise, the German spelling "Scheliha" is used. His signed reports in America, however, drop the "c" and that is the version employed here.

Several books and articles deal with the activities of the Confederate Corps of Engineers. Two interesting studies by James L. Nichols, Confederate Engineers (1957) and Confederate Engineers in the Defense of Mobile (1959), provide excellent summaries of the composition, chain of command, and duties of the Confederate Corps. The latter article, as is obvious from its title, deals specifically with Mobile and provides a useful synopsis of the overall development of the fortification plan. William R. Robinson's article, The Confederate Engineers (1930), is concerned more specifically with the organization of the Corps and contains short biographies of some of its more prominent leaders.

The important Confederate innovation of the use of torpedoes to mine harbors is discussed at some length in Milton F. Perry's fascinating book, Infernal Machines: The Story of Confederate Submarine and Mine Warfare (1965). Due to Sheliha's liberal use of torpedoes in his development of Mobile's defenses, Perry makes extensive mention of the bay.

Due to the paucity of published information on the construction of the Upper Bay defenses, extensive use of original sources has been made for this study. The principal repositories of documents relating to Mobile are the National Archives in Washington, D.C. (Record Group 109, Confederate Records) and the Mobile City History Museum (Maury Papers). Inquiries have also been directed to the Confederate Naval Museum in Columbus, Georgia, and the

Southern Historical Society at the University of North Carolina. The New Albany, Indiana, Public Library was consulted for details on the Cremona, a river steamboat sunk as an obstruction.

Two series of publications are basic to any study of the Civil War; these are The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies (1880-1901) and Official Records of the Union and Confederate Navies in the War of the Rebellion (1921). Both publications are indexed transcriptions of selected documents, letters and reports. The original documents, for the most part housed in the National Archives, are stamped if they appear in either of the Official Records. The basis for the selection of documents for publication in the Official Records varied according to the researchers' whims, and by no means do they all appear in published form. Many of the documents basic to this study had to be consulted in the original. Due to the extensive citation of documents from these works, they are abbreviated in the bibliography as ORA for the Army records and ORN for the Navy records. This is generally followed by a Roman numeral to indicate the series and arabic numbers to indicate the volume and page.

The fortunate preservation of the letter copy books of the Confederate Corps of Engineers at Mobile (Letters and Telegrams Sent, Engineer Office, Mobile, in seven volumes) provides a wealth of information on their day-to-day operation, including details on supply, labor, activities, current events and personalities. These volumes, now housed in the National Archives, were exceptionally valuable to this study, as were the Civil War era maps preserved in the Cartographic and Architectural Branch.

The single most important document to this study was a report by Col. W. E. Merrill, On the Present Conditions of the Harbor of Mobile (1866), to the U.S. Corps of Engineers office. This report, written less than a year after the surrender of Mobile, details the construction of the obstructions and offers suggestions on reopening the channel to ship traffic. The report benefits not only from Merrill's direct observation, but also from interviews with many of the ex-Confederates involved in their design and construction, including Lt. Col. Sheliha, who had remained in Mobile until 1866 or early 1867. The maps which accompany the report provide information on the number and placement of pilings and the location and names of vessels sunk as obstructions across the channel (Figs. 15, 16 and 17). The discovery of these maps provided the final major piece in the puzzle and permitted, at last, a tentative identification of the brick obstruction at TB-4-3.

A subsequent U.S. Corps of Engineers report by Col. J. H. Simpson, entitled Improvement of Harbor and Bay of Mobile, Alabama (1872), discusses the removal of a portion of the obstructions to reopen the channel to ship traffic. The report also discusses, to a limited extent, the impact of the obstructions on bay sedimentology after ten years. The efforts of the State Board of Harbor Commissions to channelize the Mobile River with a series of jetties are also discussed.

With the names of the sunken vessels provided by the Merrill report, additional information on the ships was sought in two important resources; the first of these is a National Archives microfilm publication entitled Papers Pertaining to Vessels of or Involved With the Confederate States of America, in which the purchase vouchers for two of the ships were located. The second

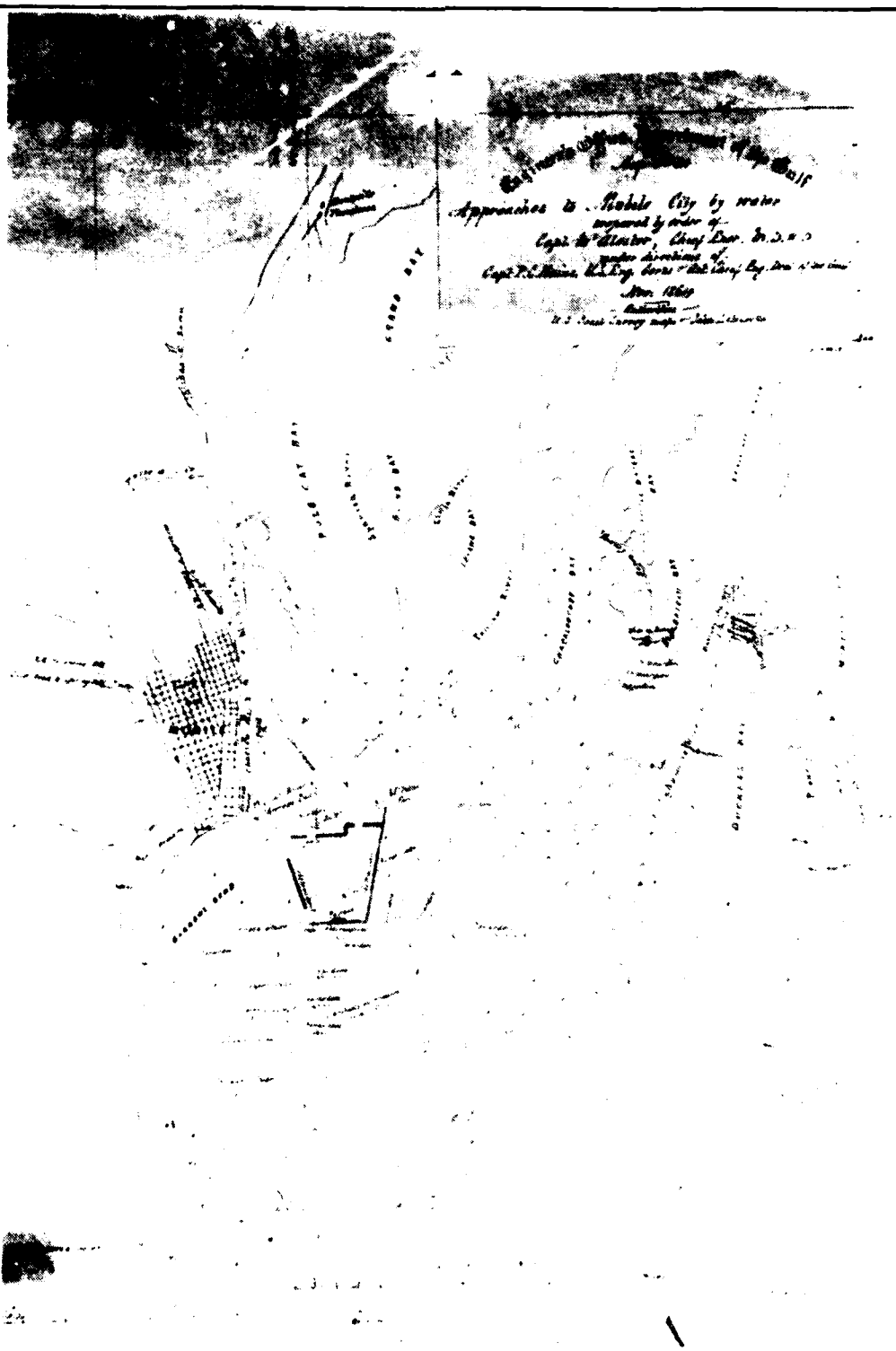


Figure 15
APPROACHES TO MOBILE CITY BY WATER (*MERRILL 1866*)

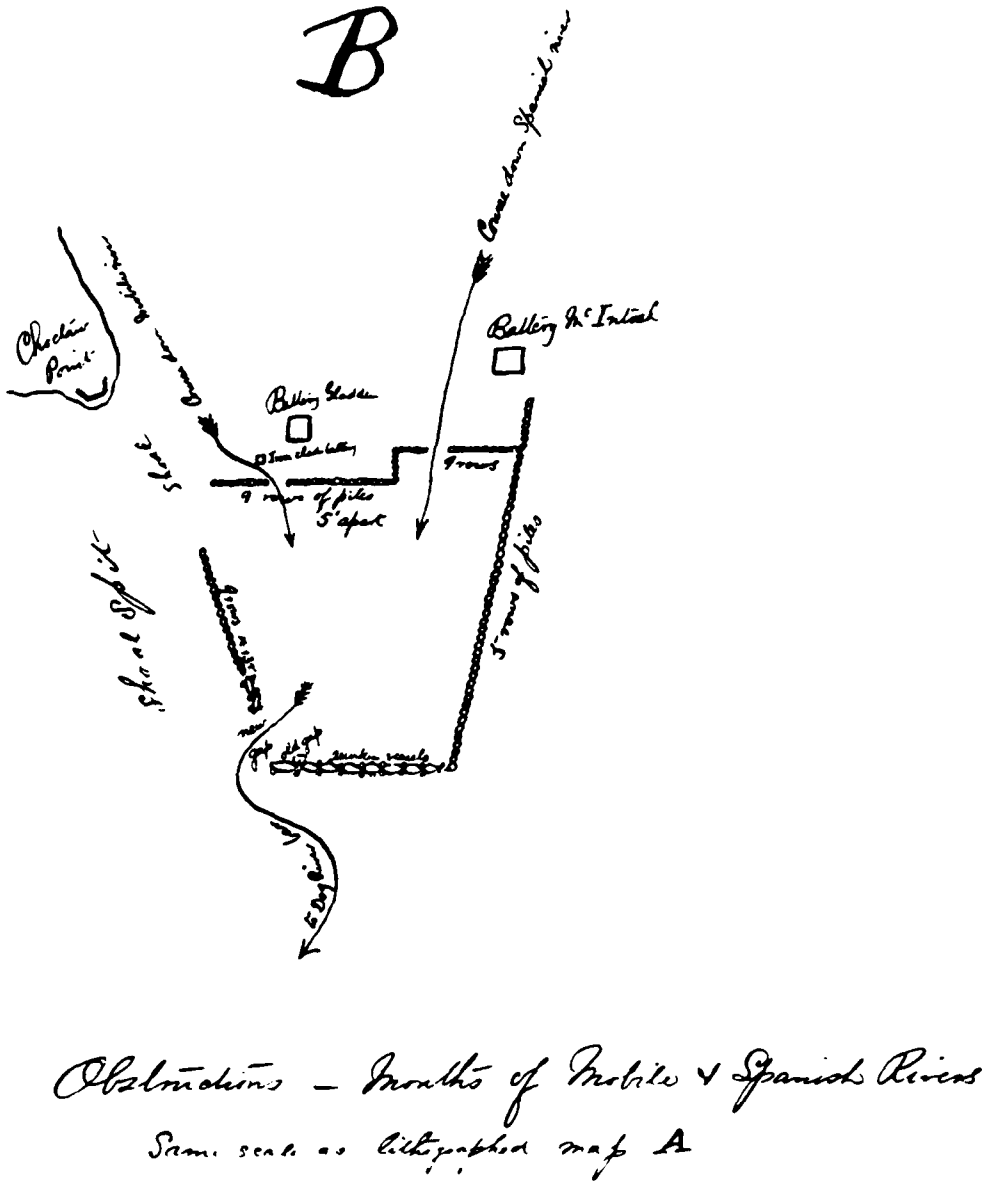


Figure 16

OBSTRUCTIONS, MOUTHS OF MOBILE AND SPANISH RIVERS

SOURCE: Merrill 1866

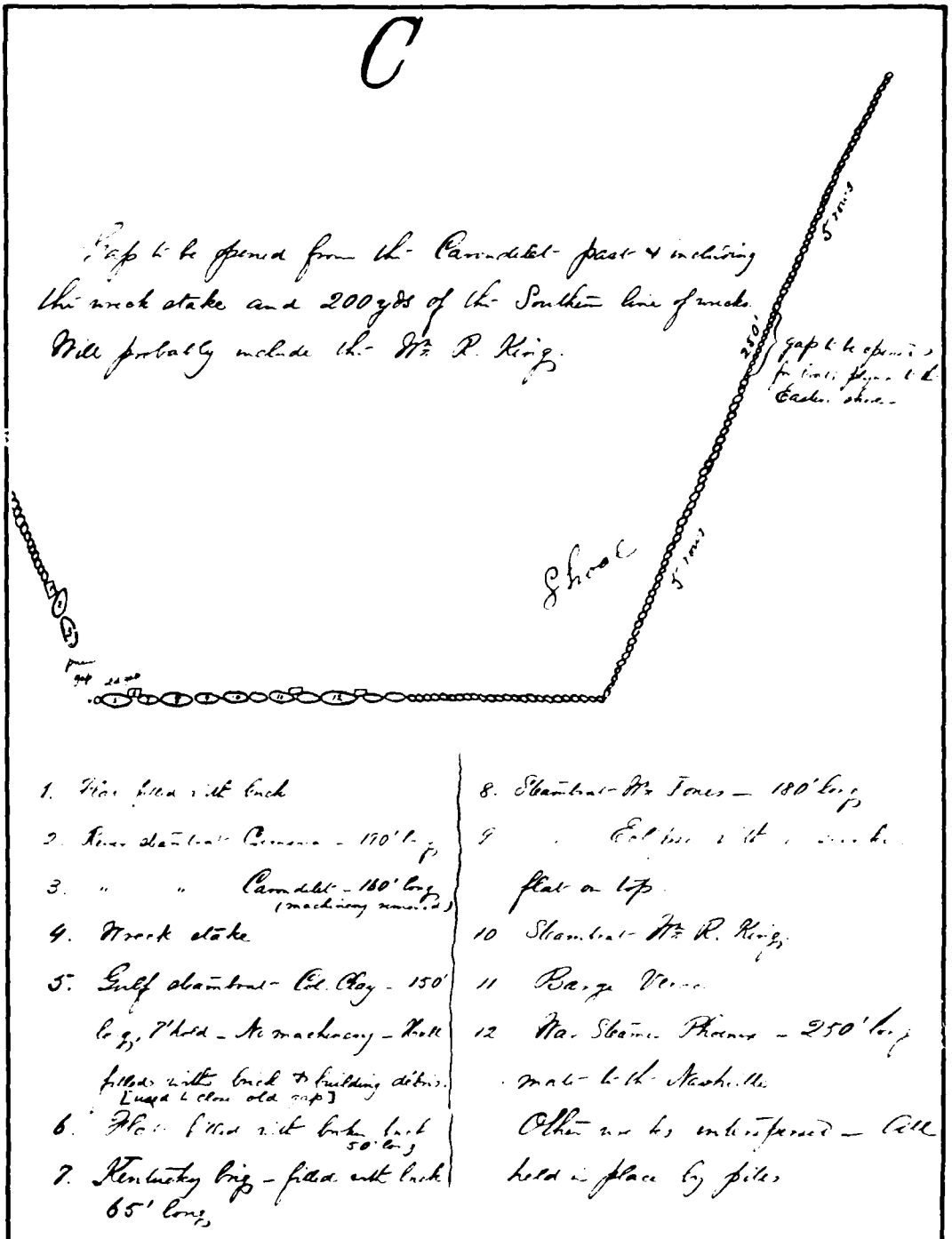


Figure 17

VESSELS SUNK, DOG RIVER BAR OBSTRUCTION

SOURCE Merrill 1866

major source consulted for information on the vessels is the "Lytle-Holdcamper List" (1975). In two particular instances, the information contained in this publication varied considerably from what was known from other sources. This is discussed in further detail later in this chapter.

The fortunate survival of hundreds of documents relating to the Confederate Corps of Engineers operations in Mobile has made possible an understanding of how and in what order the defenses were built. There is also a certain amount of human drama which comes through in the documents that is not possible to communicate in this report: cowardice and courage, arrogance, frustration, hope, humor and death. The strutting Prussian bravado of Lt. Col. von Sheliha, secretly called "Little Wings" by General Gilmer in a letter to his wife (Nichols 1959:185), becomes particularly vivid.

The records also provide insights into the conditions of the slaves who labored on the defenses, often at the cost of their lives. A weekly report concerning slaves engaged in work on the obstructions mentions that 13 had died in one week and that "the number of deaths shows a decrease for this week" (Confederate Corps of Engineers 1863). One of the reasons for the shocking number of deaths is revealed in a surgeon's report: "their rations . . . consist of corn meal, rice, molassas (sic) and fresh beef, the latter article often falls short and according to evidence of overseers, for as many as five and six days in succession the negroes have lived upon bread and molassas (sic)" (Ross 1863).

For all that the documents have told us, there are lines of investigation yet to be followed. A thorough investigation of the Archives of the City of Mobile may yet reveal more about the vessels sunk as obstructions. Additional field work may also uncover constructional details of these vessels which are totally unavailable from documentary sources. The Cremona, for example, which we believe to be located at TB-4-3, is a very early example of a stern-wheel paddle boat and could provide important evidence on the constructional evolution of these vessels which were so important to the opening of the American west.

The Strategic Importance of Mobile

With Alabama's secession from the Union on January 11, 1861, Mobile's importance to the survival of the Confederacy was immediately recognized. Mobile was an essential point of supply; her port received the waters of the huge Alabama-Tombigbee system, while the recently begun Mobile and Ohio Railroad connected her to the cotton-rich lands along the Mississippi River.

An essential point for communication and resupply, the port of Mobile was recovered from the Federal government by the state during the secession convention. The collector of the port was continued in office as a state official and was ordered to retain all funds belonging to the United States (Fleming 1911:51). He was also authorized to take possession of all government custom-houses and lighthouses and reappoint the officers in charge if they would accept office from the state. After the Confederacy was formed, the convention ordered that the custom-houses, marine hospital, lighthouses, buoys and the revenue cutter Lewis Cass, be transferred to Confederate authority.

For several months after the secession of the state, its one important seaport, Mobile, remained open and trade continued as usual. Mobile was not to remain in a condition of unrestricted trade for long; Lincoln's proclamation of April 19, 1861, declared a blockade of all Confederate ports. Subsequent proclamations of April 27 and August 16, 1861 made the blockade more stringent and by the end of the year, Mobile was sealed to all but professional blockade runners.

At first, the Confederate government believed the blockade would assist the war effort by creating shortages of cotton in Europe and thereby prompting foreign governments to recognize the Confederacy and relieve the blockade. However, it was soon recognized that Europe was slow to become embroiled in an American conflict and shortages of manufactured goods necessitated getting supplies through the blockade and sending cotton out in exchange.

Agents were sent abroad by the Treasury and War Department to enlist vessels to run the blockade. The agents were also responsible for seeing that certain kinds of goods were shipped in order of their importance: first, arms and ammunition; second, clothing, boots, shoes and hats; third, drugs and chemicals, especially quinine, chloroform, ether, opium, morphine and rhubarb (Fleming, 1911:185). In spite of these regulations, the blockade runners brought in more luxuries than necessities. Cotton, instead of being exchanged for British gold, was exchanged for trinkets, silks, satins, laces, broadcloths, brandy, rum, whiskey, fancy slippers and ladies goods (Fleming 1911:188).

For the first two years of the war, military and naval supplies were the most important materials brought into Mobile. Shipments of arms from Europe generally went to Cuba and then were smuggled into Mobile at night. Nevertheless, a large portion of the vessels making for the bay were captured by the Federal navy.

Despite the dangers, blockade-running was an enormously lucrative profession. The expenses of one blockade runner for one trip amounted to $80,265, while the gross profits were $172,000, leaving a net gain of $91,735 on the trip (Sharf 1887:481, 485). High returns made the dangers more palatable for many bold skippers.

The Confederate government depended heavily on the revenues of the cotton trade; the export business was in the hands of the Produce Loan Office. All stores for shipment were turned over to the Treasury Department, transported by the War Department, and consigned to Treasury agents in the West Indies or Europe. In 1864, there were 115,450 bales of government cotton in Alabama, of which some was exported and some sold through the lines to the north (Fleming 1911:187).

After the fall of New Orleans and Pensacola to Federal troops, Mobile was the last major port on the eastern Gulf still under Confederate control. As a result, her importance to the survival of the Confederacy was paramount; she was the closest port for the trade with Cuba in much needed European munitions and medicines. Her defense then became a prime concern of the Confederate government and was pursued with the best resources that could be mustered. As a result of their efforts, Mobile remained open to blockade runners for three years and it has been estimated that this important source of resupply delayed the end of the war by a year or more (Fleming 1911:188).

"Preparation for a Great Struggle", 1861-1862
(Headline on article in New York Herald, June 4, 1863)

Following the formation of the Confederate States of America, the new government began hurriedly building and repairing defensive works against the impending attack. This task was put under the charge of a Corps of Engineers authorized by Congress on March 7, 1861, consisting of four majors, five captains, and non-commissioned officers and enlisted men sufficient to make up a company of 100 "sappers, miners and pontoniers" (Nichols, 1957:9).

Of the officers nominated by Jefferson Davis, two were from Alabama and would later figure prominently in Mobile's defense. Danville Leadbetter, commissioned as a major, and Samuel H. Lockett, a captain, had both held commissions in the United States Army, and were both West Pointers. Leadbetter, who had begun his Confederate service at Mobile, was placed in charge of the Engineer Bureau in Richmond on August 3, 1861.

Leadbetter's first activities in Mobile were devoted to strengthening the two forts guarding the entrance to the bay: Fort Morgan on Mobile Point and Fort Gaines on Dauphin Island. Both forts had been well maintained by the U.S. Government and were considered to be strong enough to prevent the entrance of any ship into the bay.

After Leadbetter's promotion to Chief Engineer in August, he continued to interest himself in Mobile's defense. He directed the new engineer, Samuel Lockett, to rifle the 32 pounders at the forts, to build field works across the peninsula on the west side of Fort Morgan, and to block the channel near Fort Gaines with a chain and cypress raft and crib-work filled with stone (Leadbetter 1861). He also planned field works around the city and the construction of water batteries in the network of streams to cover all channels deeper than 4 ft (Nichols, 1959:183).

Leadbetter eventually gave up the idea of constructing a log boom across the channel at Fort Gaines due to the improved range of his rifled guns. The rifled gun, however, also rendered obsolete the solid brick walls of the forts. Later efforts centered around banking earth against the walls to absorb the force of an exploding rifled projectile (Nichols 1959:186).

Events of April, 1862 caused a serious reevaluation of coastal defense tactics among Confederate engineers. The attack at Savannah was particularly distressing. Savannah's harbor was guarded by Fort Pulaski, a pentagonal masonry work with brick walls seven to eleven feet thick, which was similar in design and construction to Mobile's Fort Morgan. The forts were capable of withstanding smoothbore artillery, all that was available in the 1830s when they were built; but, as the siege of Fort Pulaski proved, the development of rifled cannon in the 1850s rendered these brick forts obsolete.

Forts Jackson and St. Phillip, on the lower Mississippi, were similarly out of date. An elaborate raft placed across the river had snapped in a spring flood and a makeshift obstruction of old hulks and chains gave way to two Federal tugs. On April 16, 1862, Admiral Farragut led 17 warships and 19 mortar boats through the fire from the two forts and captured both them and New Orleans, sixty miles upstream.

The fall of Fort Pulaski and New Orleans demonstrated the folly of relying on cannon fire from a masonry fort to prevent a forced entrance by a determined Federal commander. It also left Mobile as the only port in the eastern Gulf still in Confederate control. Without the vital flow of European munitions from Cuba, the southern war effort would be seriously diminished if not totally destroyed. The defense of Mobile therefore became of prime concern to Confederate strategists.

The forts having been proved insufficient, and chain, log or raft booms being impractical in the stiff current, a program of harbor defense based on solid obstructions and the liberal use of floating mines, called torpedoes in that era, was adopted. The obstructions were to be guarded by heavy batteries to prevent their removal.

The work was begun under the direction of Captain Charles Liernur in the spring of 1862. One of Liernur's first actions was to sink vessels loaded with brick across the channel at Dog River Bar in the Upper Bay (Fig. 18). The vessels were purchased in mid-May and were in place by June. In a letter dated June 7, 1862, Gideon Welles, a Union loyalist who had left Mobile for Connecticut, wrote:

> "Sometime before I left Mobile, Beauregard had issued orders to defend Mobile at all hazards, and the cost of millions if necessary. In consequence of these instructions, stone vessels, flatboats and steamers were sunk 4 or 5 miles below the lighthouse in the shallowest part of the channel, intrenchments dug for several miles, and heavy batteries planted all along the bay road skirting Mobile Bay." (Kessler 1862).

Kessler's report was confirmed by the commander of the USS Susquehanna in the blockading fleet off Mobile. In a dispatch dated June 26, 1862 he wrote: "Obstructions have been placed three miles from Mobile by sinking boats and piling, leaving a small entrance with a steamer ready to sink in it. This work is protected by batteries" (Hitchcock 1862). The steamer held in readiness was probably the Col. Clay, a 150 ft (45.7 m) Gulf steamship (Merrill 1866:Map "C").

Liernur was later faulted by a successor, Lt. Col. Viktor von Sheliha, for sinking vessels at a time when they were desperately needed for transport. In his work on coastal defense he wrote: "The engineers at Charleston, Savannah, and Mobile found themselves often seriously embarrassed for want of suitable crafts in which to send building material, sandbags, etc., to detached points with which communication was only possible by water" (Sheliha 1868:189).

Sheliha also notes that this method of obstruction should only be used in an emergency because of the high cost (Sheliha 1868:189). Of the ten vessels recorded by Merrill (1866:Map "C") which were sunk, three totaled $10,250 (see Appendix A). While Sheliha faults Liernur for sinking the vessels, it should be said in his defense that an attack on Mobile appeared imminent after the fall of New Orleans and Pensacola. It was, in fact, the hastily placed obstructions and batteries which forestalled Farragut's attack on the bay. The Admiral later wrote: "The rebels have so obstructed the channel by piles and by sinking vessels loaded with brick that in that shoal water it will be difficult to do anything with

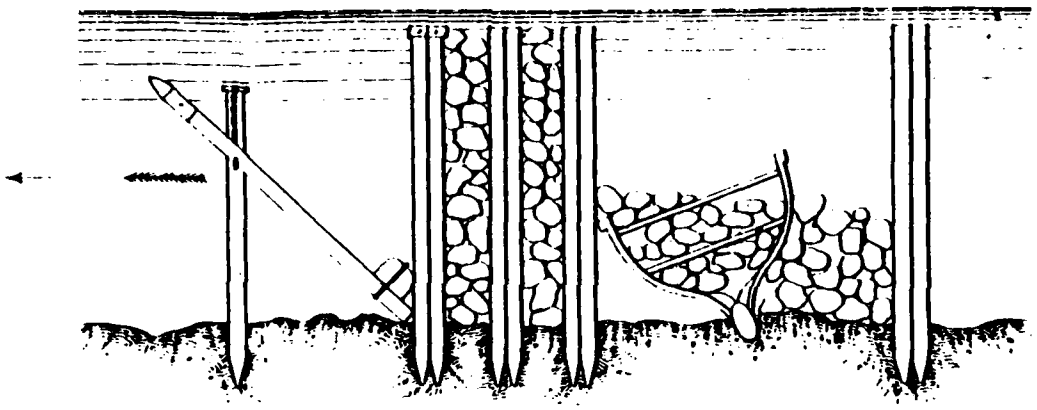


Figure 18
CROSS-SECTION OF CHANNEL DEFENSE WORKS
SOURCE: Sheliha 1868

them" (Farragut 1864b). The defenses under Liernur were estimated to be strong enough that a garrison of 10,000 troops could hold the city for 90 days against a besieging army of 40,000 (Andrews 1889:11). Farragut judged that not only would Mobile be difficult to take, but nearly impossible to hold, and the city remained unconquered for another three years.

The condition of the defenses of Mobile was well known to the enemy from information gained from refugees, spies and prisoners. Admiral Farragut received a detailed report on September 29, 1862, based on the statement of a "refugee" who had been in charge of 500 slaves building fortifications at Choctaw Bluff, 110 miles (177 km) above Mobile on the Alabama River. He reported the defenses at that time as consisting of the following:

> "First. A battery at the lighthouse, no guns mounted."
> "Second. An earthwork below the lighthouse, mounting three guns and possibly four, open."
> "Third. Southeast of the lighthouse, perhaps distant a mile, on a shoal, an open battery of three guns."
> "Fourth. East of this distance perhaps three-quarters of a mile, a very strong ironclad battery. The main channel runs between this and the last mentioned. This work is built by driving spiles (sic) in the shoal, filling up with earth, brick, etc., brought down in scows. Upon this a heavy timber foundation and wall of large timbers, with casemates for the guns; the whole is strongly cased by railroad iron. There are 6 guns mounted, and one casemate besides. The guns are of the largest calibre."
> "From this battery, with a wide sweep from south to west, was a line of obstructions across the channel and to the west shore, with only one outlet in mid-channel. This line is formed of spiles (sic) and sunken vessels filled with brick. Millions of new brick were sunk here. It strikes the shore about 4 miles below the city. The narrow entrance can be seen, as the spiles (sic) rise above the surface, but is commanded by batteries nos. 3 and 4."
> "One year ago Porter was told by his cousin, a soldier in Fort Morgan, that Fort Morgan had 115 guns and Fort Gaines 15. On the 8th instant, when at Mobile, was told by a friend that Morgan mounts 125 and Gaines 25; that an ironclad battery like the one above is being built in the lower bay, and that land fortifications enclose Mobile from the bay round to the river." (Porter 1862)

In the fall of 1862, Col. Jeremy F. Gilmer, final Chief of Confederate Corps of Engineers, made plans for the defense of major rivers throughout the Confederacy and Liernur's authority was extended to the Alabama River defenses. He soon ran afoul of the District Commander, General Forney, who had placed a naval officer in charge of battery construction at Owen's Bluff and had made Liernur's assistant subordinate to him (Nichols 1959:184). Gilmer supported Liernur's protest of "putting someone ignorant of the profession (of engineering)" in charge in a letter to the Secretary of War (Gilmer 1862). The controversy was ended by the return of Danville Leadbetter to Mobile.

"A Stronghold of Rebellion", 1863-1864
(Sheliha, 1868:156)

An attack on Mobile was still considered imminent with the continued buildup of the blockade fleet, and the Alabama Congress budgeted large sums of money to improve the defenses. In a letter dated October 31, 1862, W. B. Martin, a Representative to the Alabama legislature wrote to General Forney: "We have put into the hands of the Governor one million dollars and the power to impress slaves to any number to aid you in your defense of the Bay of Mobile and of the Alabama and other rivers." (Martin 1862). He added: "We of the upcountry cannot expect from you to protect our seaport or the tributary streams flowing to it, without men and money, the 'sinews of war'."

Several proposals were sent to Leadbetter suggesting various schemes for obstructing the bay and rivers in the Mobile District. One plan suggested rafts chained together and anchored with stone blocks at Fort Morgan (Riesen 1862). Other proposals came from H. L. Hunley (1862) a pioneer in the construction of submarines, and General Gabriel Rains (1863), inventor and advocate of the use of submerged torpedoes.

Leadbetter quickly abandoned the idea of raft obstructions across the main channel at the bay entrance, "owing to the depth of water at this point, the difficulty of procuring chains and anchors, the great specific gravity of the timber available, and the heavy swell and strong tide prevalent at the place" (Leadbetter, 1863a). Instead, he favored a floating battery, sheathed in railroad iron, anchored between the two forts.

The channel adjacent Dauphin Island was obstructed with pilings, planted in four rows, 10 ft (3 m) apart, 18- to 30-inches (45.7 to 76.2 cm) in diameter, and 10 to 15 ft (3 to 4.6 m) deep in the sand (Leadbetter 1863a) (Fig. 19). The steamboat Natchez was engaged in the work and the pilings were set, using a steam engine to "wash" them in, at the rate of about 50 per day (Glenn 1863).

A great deal of effort was spent in preparing the batteries in the Upper Bay, which were in various stages of completion at the beginning of 1863. The battery at Choctaw Point Spit was completed and mounted four guns, the battery at Pinto Island Spit (now the southern end of Pinto Island) was undergoing enlargement, and the armored Spanish River Battery was strengthened on the interior.

Work was begun on a line of obstructions linking the three batteries. These were planned to consist of eight rows of piles, 5 to 10 ft (1.5 to 3 m) apart, with openings at Choctaw Pass and Spanish River channels. After the end of the war, the "upper line of obstructions" was, in fact, found to consist of nine rows of pilings 5 ft (1.5 m) apart which were driven 11 to 16 ft (3.4 to 4.9 m) into the bottom (Merrill 1866).

Another floating battery, armored with railroad iron, was under construction for the upper line. It is presumed that this is the small, one-gun battery which Merrill (1866) reported in Choctaw Pass Channel.

The line of sunken ships blocking the channel on the north side of Dog River Bar had been connected by rows of pilings on the east and west sides so

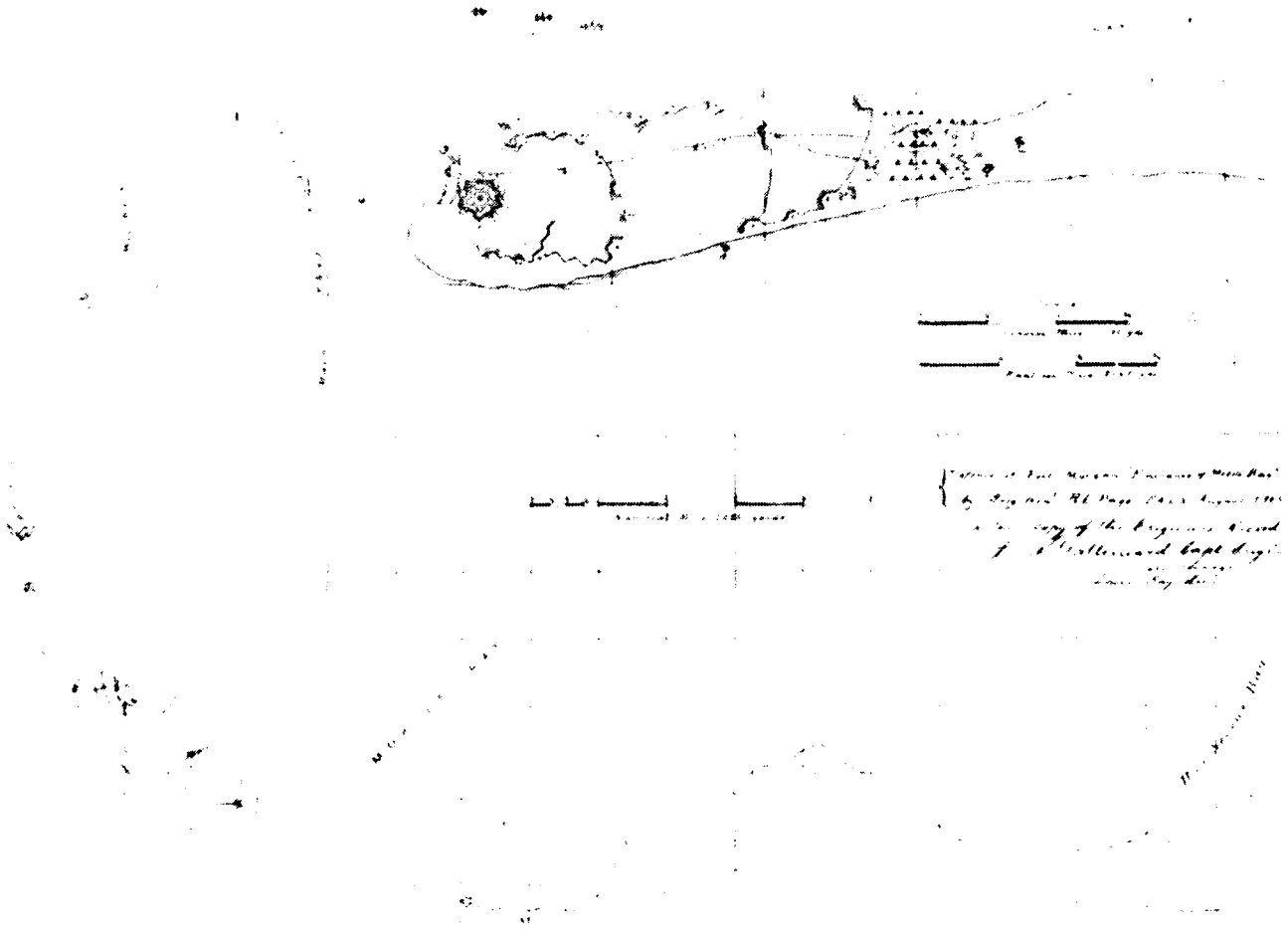


Figure 19
DEFENSE OF THE BAY ENTRANCE

that the obstructions now had a "keystone" shape in plain view. The lower line of obstructions, put in place by Liernur in May, 1862, blocked the main channel as it came across Dog River Bar. Choctaw Pass and Spanish River channels were blocked by rows of pilings and guarded by two batteries built up on the shoals. The approaches from the eastern shore or from Garrows Bend on the west were also obstructed by pilings, leaving only three narrow gaps through which the bay boats, offloading supplies from the blockade runners, could pass. Flats or barges loaded with brick or debris were stationed beside each gap so that the city could be sealed against any approach from the water (The World 1864).

An earthen battery had been planned by Leadbetter to be placed on Choctaw Point Spit in order to guard the southern-most gap in the obstructions, near the location of the sunken hulks. Work on the battery got as far as constructing log cribs and filling them with earth above the high tide line when it was suspended for lack of guns to arm it (Leadbetter 1863b).

Leadbetter also exercised considerable energy in expanding the trenches and gun emplacements on the land side of the city. Liernur had directed construction of a work "at about the 2¼ mile curve from the Courthouse" (Nichols, 1959:183). General Leadbetter's line was considerably inside Liernur's at about the 1¼ mile curve, beginning at the lighthouse on Choctaw Point and curving around to One Mile Creek (now an industrial canal). The approach to the city from the north, through the swamp around Three Mile Creek, was now cut off. The intrenchments were guarded by 16 redoubts at about 600 yds (548.6 m) apart and flanked by musketry from retired fleches. Leadbetter noted that "the line is too near the city to save it from bombardment, but such an attack would prove a lesser evil than the capture of the place. It is hoped the lines can be held until the place shall be relieved" (Leadbetter 1863a). He was more confident of his water defenses, stating that "the city could not be taken by any maritime force which could be brought against it" although "it is obvious that the enemy may pass the lower forts and occupy the bay" (Leadbetter 1863b).

The problem of keeping Federal ships out of Mobile Pass would continue to vex Leadbetter's successor, Viktor von Sheliha. Sheliha, a Prussian "scientific" officer, merited first mention among a distinguished group of Germans in the Engineering Corps (Lonn 1940:243). He was a graduate of Prussian military schools, had served as a Lieutenant in the Sixth Infantry Regiment of the Prussian Army, and was living in New Orleans in 1861. He joined the Confederate Army as an engineer in F. K. Zollicoffer's command and was captured in May, 1862 and imprisoned in Fort Warren, Massachusetts. He was exchanged on August 13, 1863 and was ordered to Mobile on October 10 as Leadbetter's assistant (Perry 1965:183). From January, 1864 until the end of the war he appears in the records as Lt. Colonel and Chief Engineer, Department of the Gulf.

Sheliha realized that if the enemy were able to pass Fort Morgan and enter the bay, it would be impossible to dislodge them. The key to his defensive strategy then was to find a method of obstructing the Mobile Pass.

One of his first actions as Chief Engineer was to place floating rope obstructions between Fort Morgan and the west bank of the channel, commencing from the west bank and extending 2,200 ft (670.6 m) east of it (Sheliha 1864a). These consisted of:

> "24 strings of solid wooden buoys, moored with three or four pieces of railroad iron banded together at 25 feet apart, across the channel. Each string had 8 hard-wood buoys 2 feet long and a foot square, 25 feet apart. Each string being moored by itself had the buoys secured between three tarred manila ropes of an inch each in diameter between which ropes the buoys forming a string were seized. Hence each string of buoys is 200 feet long and trend with the tide. The object of the buoys is not only to break the paddles of sidewheel steamers being entangled in the blocks catching in the wheels, but that propellors may also catch the ropes, by which all will be detained under the heaviest guns in the fort and a five-gun battery by the lighthouse (Marchand 1864)."

Sheliha had also planned to establish batteries on the west bank of the Main Ship Channel. These were to consist of two square-built, iron structures, towed to the site and sunk in 3.5 ft (1.1 m) of water. Major General Gilmer, Chief of the Engineer Bureau in Savannah, objected to the plan although he wrote that he would not object to a trial (Gilmer 1864). No more is heard of the battery after Gilmer's letter objecting to the plan.

The next scheme to obstruct the channel was undertaken in May of 1864 when Sheliha reported to General Gilmer "the first tiers of the timber obstructions have been successfully placed and the work promises well" (Sheliha 1864b). These obstructions were to be of a type known as chevaux-de-frise (Fig. 20). Sheliha describes them in some detail in his A Treatise on Coast Defense (1868:194):

> "Two logs, 40, 45 or 50 feet long, were, by braces, joined to a frame 6 feet wide. The first brace was placed 4 feet from the upper end of the logs, which were capped with a strong iron cap, in place of which a torpedo was used every 20 feet. Two of these frames were, near their upper ends, joined by a strong iron pin, and a chain attached to the brace, which was at about the middle of the frame. Five of these double frames made one section, and were connected by a strong chain. The section was launched, and floated to the point at which it was intended to be placed; here heavy mushroom-anchors were attached to the middle of the chains connecting the middle braces of the frames; at a given signal, the anchors were simultaneously sunk, drawing with them the lower ends of the frames, which soon became embedded in the sand, whilst the upper ends opened like a pair of scissors" (Sheliha 1868:194).

Despite the ingenuity of the device, the chevaux-de-frise was a failure. Captain Fremaux, Sheliha's subordinate in charge of the Lower Bay defenses, reported: "the obstructions have proved a failure, as they have floated away; or if we succeeded in anchoring them solid to the bottom the currents of the ebb and flow tide have wrenched them asunder" (Fremaux 1864).

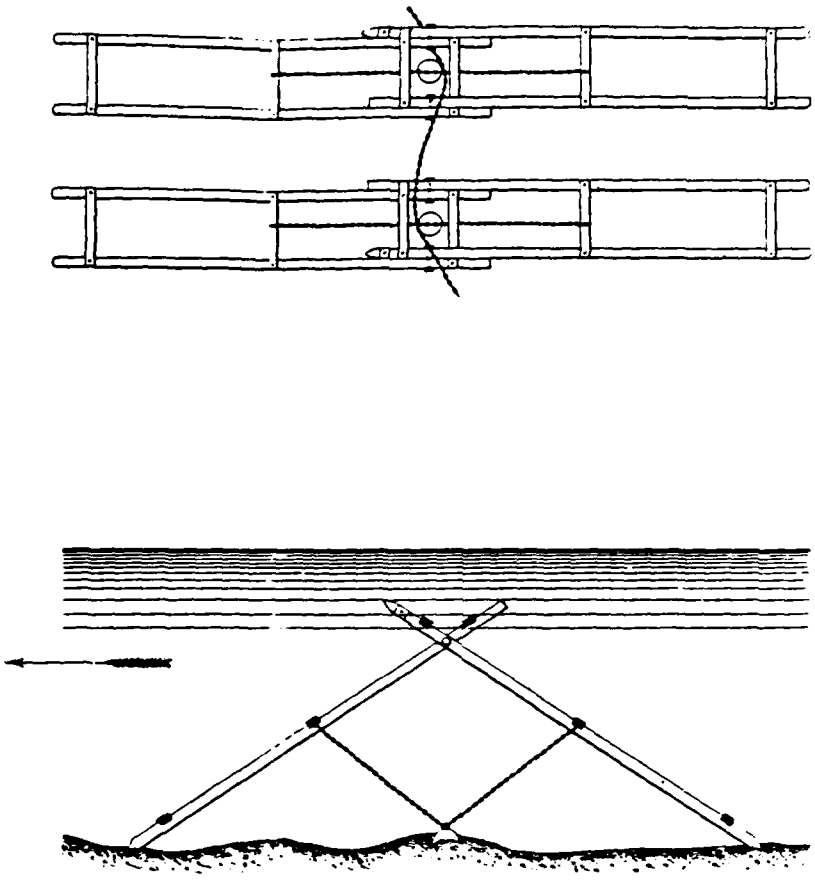


Figure 20

CHEVAUX-de FRISE

SOURCE: Sheliha (1868)

The engineers finally elected to rely on torpedoes, a relatively new development in naval warfare, to obstruct the pass; 86 of these were in place by June, 1864 (Fremaux 1864). By July, three lines of torpedoes, extending to within 0.5 mile (0.8 km) of Fort Morgan, were in place; the end of the line was marked by a small black buoy (Myer 1864).

Most of the torpedoes used in Mobile Bay were one of two types: the Singer (Fig. 21) or the Rains (Fig. 22). The Singer torpedo, invented by Texan E. C. Singer (relative of the sewing machine manufacturer), depended upon a strong spring driving a plunger into a percussion cap, while the mine itself consisted of a floating tin cone (Sheliha 1868:225). Gabriel J. Rains' torpedo, on the other hand, employed a friction fuse set into an oak barrel filled with gunpowder (Sheliha 1868:231). Rains' torpedo, due to the simplicity of its construction from readily available materials, was the most frequently used throughout the harbors of the south (Perry 1965:44).

Sheliha's attentions were also directed toward the Upper Bay where his engineering genius was displayed in the construction of batteries and forts which "proved models of strength and judicious arrangment" (Lonn 1940:243). Sheliha wrote in January of 1864 that "mere obstructions, however formidable in themselves, can never achieve the object desired unless protected by batteries" (Sheliha 1864c). Convinced of this truth, Sheliha directed the construction or improvement of batteries in the Upper Bay and rivers. Pinto Island and Spanish River batteries were expanded and renamed Battery Gladden and Battery McIntosh, respectively. The Tombigbee River was guarded by batteries at Choctaw and Oven (or Owen) Bluffs; the Apalachee and Blakely rivers by batteries Tracy and Huger.

A new line of trenches was also constructed between Liernur's and Leadbetter's lines. Fort Sidney Johnson was erected to cover Garrows Bend and the line of entrenchment extended from it on the west side of the city to the swamp, where it connected with Leadbetter's line at redoubt 13. Twelve redoubts, much admired later by U.S. engineers (Lonn 1940:243), were built along the line. The city was thought to be impregnable; Sheliha (1864d) wrote to A. L. Rives that when the work was complete, "Mobile will hold out as long as our provisions last."

Labor was Sheliha's chief problem. Most of the work was done by slaves hired into service from plantations in the Black Belt for $360 per year. The lack of an adequate labor force was a source of constant frustration to the Prussian engineer. He wrote to Rives: "My earnest appeals for laborers have met with no success whatever; we have had at no time a working force here adequate to the stupendous work to be done" (Sheliha 1864d). The previous month he had requested to be relieved from duty, stating: "His reasons for making this application are that he receives no assistance whatever and yet is expected to accomplish more than any engineer could possibly perform with the inadequate means at his disposal" (Sheliha 1864e). The request was refused.

In a letter to C. C. Clay, Sheliha described the condition of the laborers:

> "Negroes are generally impressed for 60 days, they arrive but seldom provided with the necessary clothes and shoes to last them for that period, much less to make the

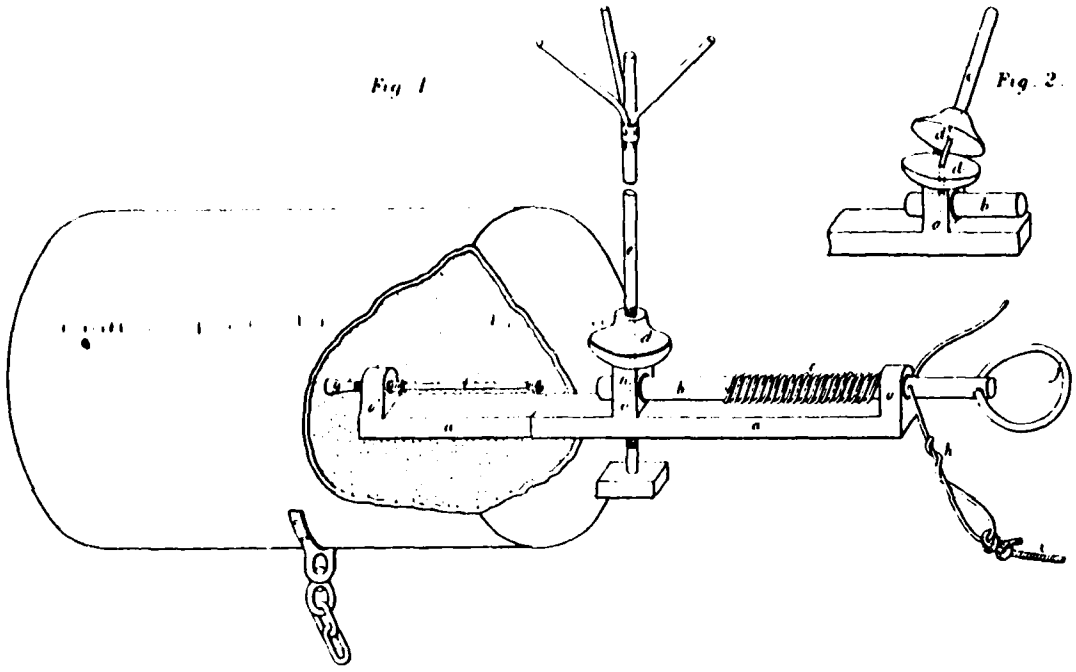


Figure 21

THE SINGER TORPEDO

SOURCE: Sheliha 1868

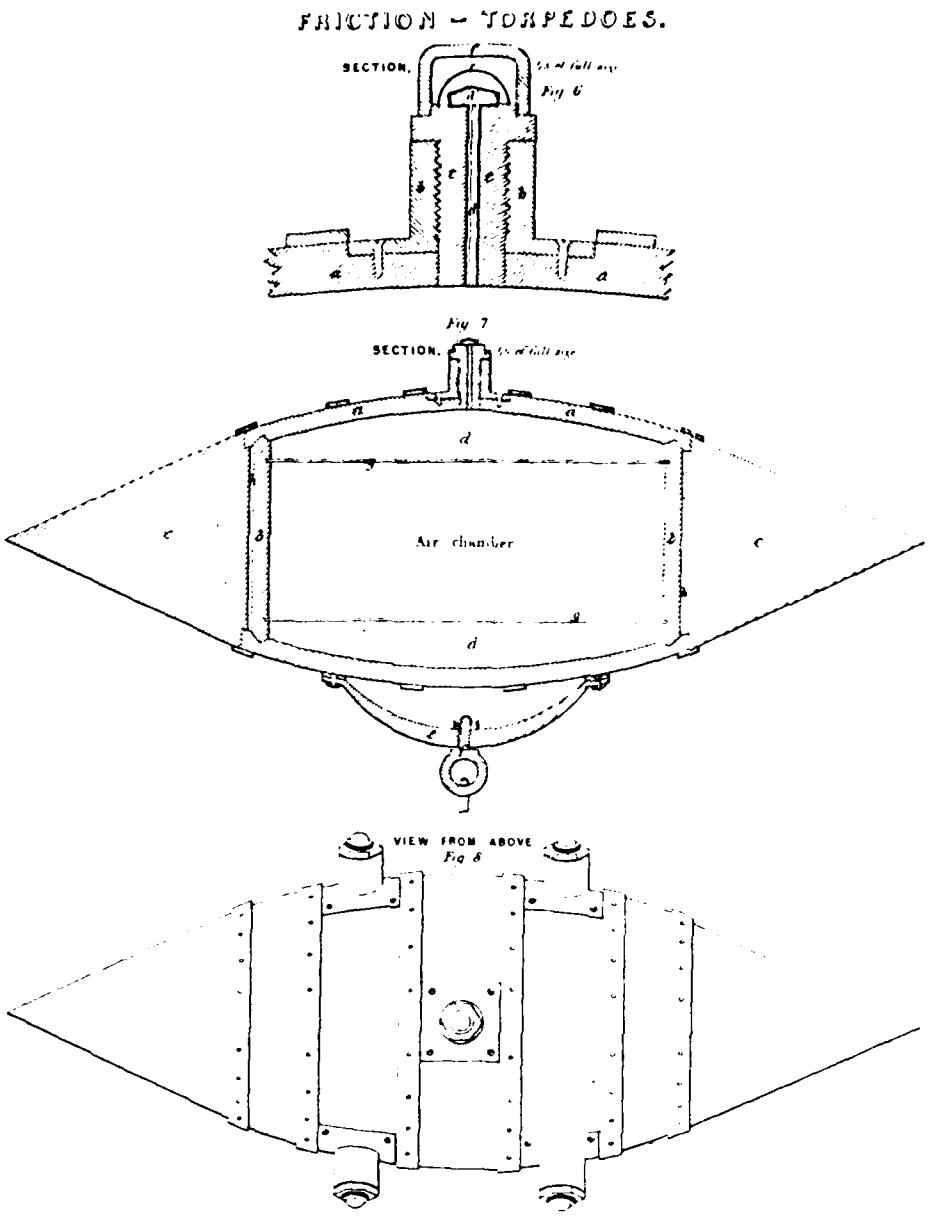


Figure 22

THE RAINS TORPEDO

SOURCE: Sheliha 1868

> changes required by cleanliness and hygienic laws; one out of ten is unfit for work and has to be discharged at once; others will be taken sick a few days after their arrival and have to be discharged because there is no prospect of their being able to resume work during the limited period for which they are impressed, all have to undergo the process of acclimatisation to which all persons are subject who change their place of domicile and their accustomed mood (sic) of living; they have to be taught the work to do, when hardly beginning to understand their work they are discharged and a new gang of unexperienced hands is taking their place requiring it to be taught again . . ." (Sheliha 1863).

The shortage of labor remained a chronic problem. Gilmer had approved projects requiring 6,000 hands but only 1,414 could be raised (Nichols 1959:188). Sheliha agitated for the forced impressment of plantation slaves, but with the war effort going badly and popular support dwindling, Governor Thomas Watts refused to act as a "high sheriff" to execute Confederate laws (Nichols 1959:189).

"Damn the Torpedoes!"
(Admiral D. G. Farragut, August 5, 1984)

The long awaited attack was launched on August 3, 1864, when General Gordon Granger landed with his division on the west end of Dauphin Island and prepared to besiege Fort Gaines. With Fort Gaines under siege, Farragut delayed the naval attack until the morning of the fifth, awaiting the arrival of the monitor Tecumseh.

The ships entered the bay two abreast and lashed together with their steam boilers protected by chains hung from the side. The ironclads Tecumseh, Manhattan, Winnebago, and Chickasaw were ordered to take positions on the starboard side of the wooden ships (Farragut 1864c) (Fig. 23).

The attack had hardly begun when the monitor, the Tecumseh, struck a torpedo and sank in 30 seconds. The lead vessel, the Brooklyn, trying to avoid the heeling monitor, arrested the advance of the fleet, allowing Fort Morgan's guns to rain shot on them. Without hesitation, Farragut's Hartford swung around the Brooklyn and Octorara and took the lead, steaming between the buoys marking the line of torpedoes. The torpedoes failed to explode and Farragut led his fleet past the fort, sustaining relatively little damage. The three Rebel gunboats Morgan, Gaines, and Selma, and the ram Tennessee (Fig. 24) were overcome and the Confederate Admiral Frank Buchanan was captured. The battle was won in a little over three hours. A few days later, forts Gaines and Morgan were invested by Federal troops and the entrance to the bay was firmly under Yankee control.

Recriminations ascribing responsibility for the fall of the Lower Bay defenses flew far and wide among the Confederate commanders. The commander of Fort Powell at Grant's Pass had blown the magazine and escaped after sustaining only a short bombardment and was under investigation; Col. Anderson surrendered Ft. Gaines against orders and was ordered arrested by Jefferson Davis.

CONFEDERATE DEFENCES OF THE LOWER BAY OF MOBILE.
Fig. 1.

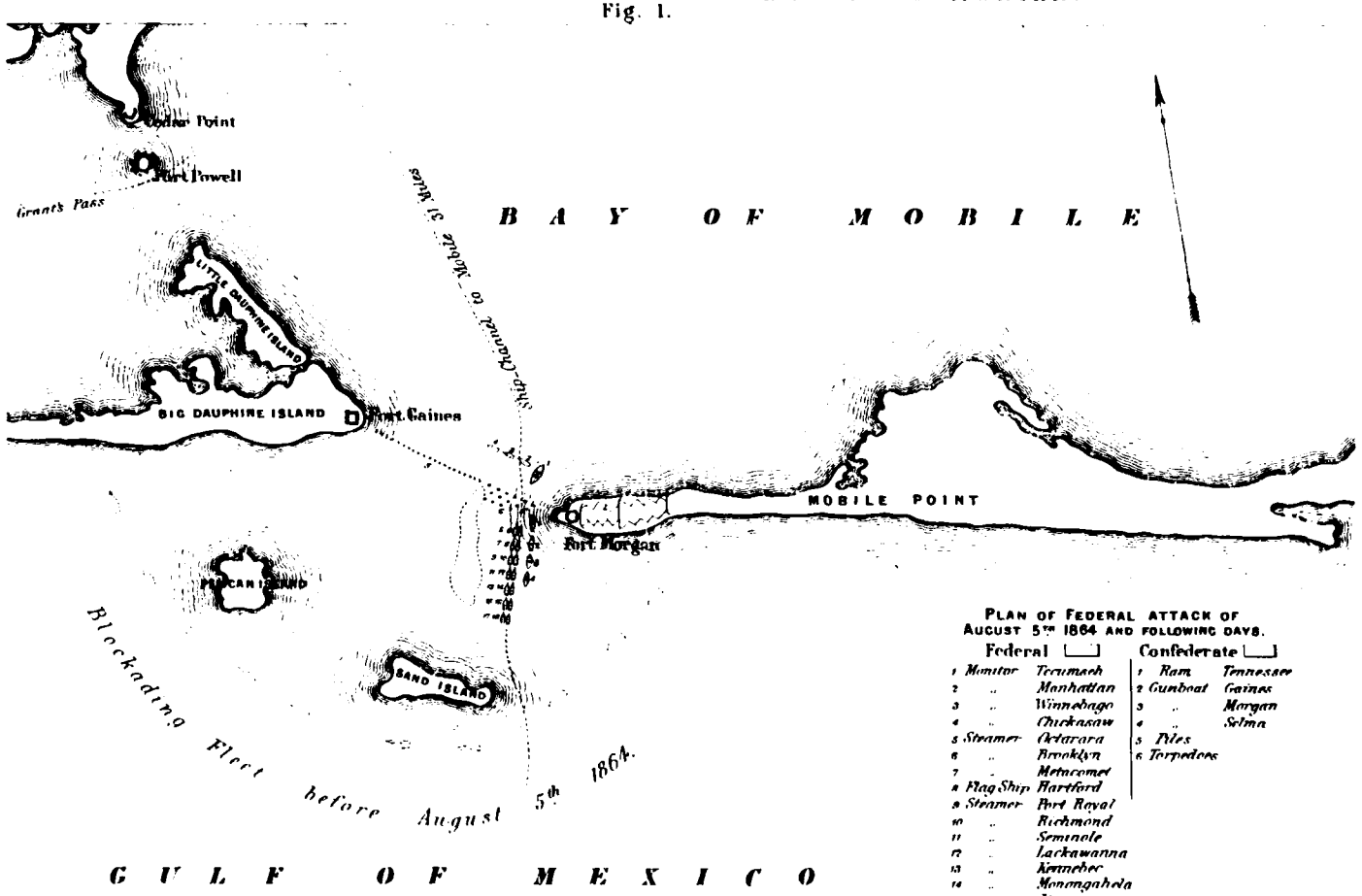


Figure 23
PLAN OF FEDERAL ATTACK

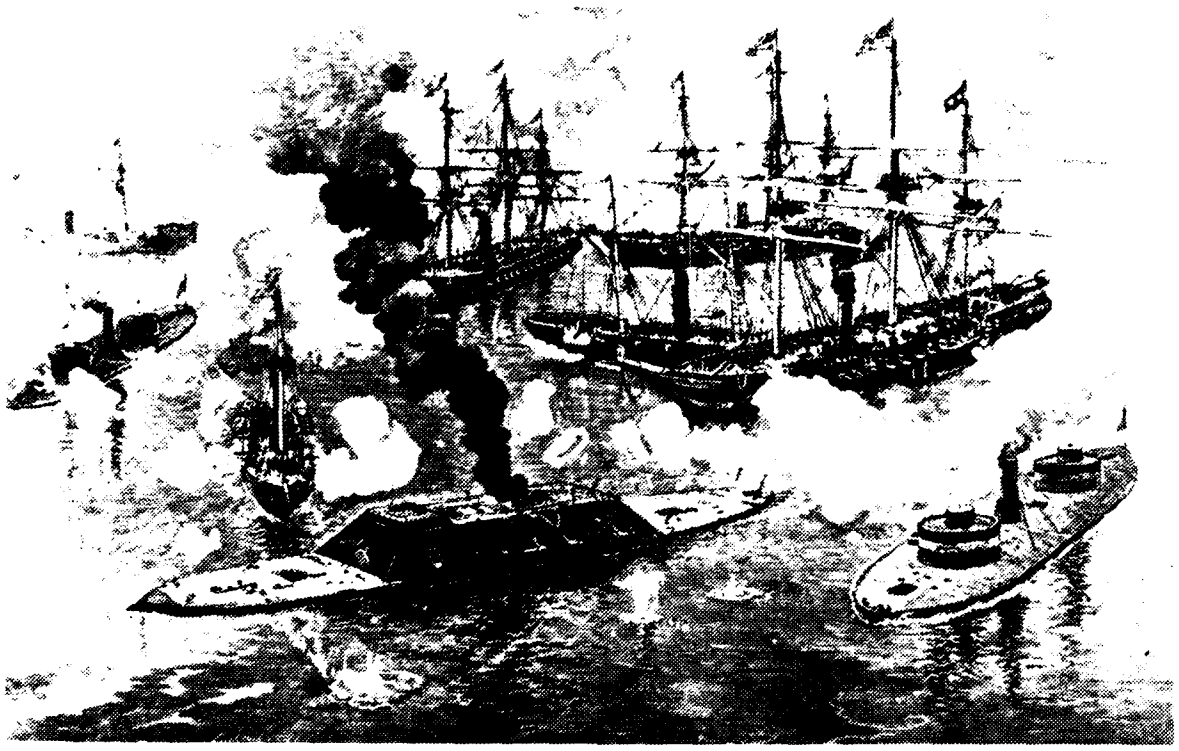


Figure 24

ARTIST'S RENDERING, DEFEAT OF THE TENNESSEE

Much of the blame wrongly fell on Lt. Col. Sheliha, who was relieved from duty a few days later. On August 20, he resigned his commission and requested a passport for him and his wife to return to Prussia but offered to "tender Col. Lockett any assistance it may be my honor to give, without rank or pay" (Sheliha 1864f). However, despite the assignment of Samuel Lockett, the engineer of Vicksburg's defenses, to the post of Chief Engineer, Department of Alabama, Mississippi and East Louisiana in order to oversee Mobile's defenses, Sheliha remained in his position as chief engineer of the District of the Gulf until the end of the war. He, in fact, remained in Mobile at least a year after the war when he and Captain Fremaux opened a civil engineering consulting firm on Water Street (Mobile Advertiser, Sept. 1, 1866).

Questions had been raised as to how the Federals had passed through the gap. The line of topedoes extended from the West Bank toward Fort Morgan to the east. The commanding general, Dabney H. Maury, had ordered a gap in the line of torpedoes be left open and marked by a buoy 160 yds (146.3 m) from Fort Morgan (Maury 1984). He further states that all of the ships passed over the torpedoes but only the one striking the Tecumseh exploded. This however, is in direct constrast to a statement by F. S. Barrett (1864), the lieutenant in charge of setting the torpedoes. He testified:

> "By the course they were running in it is evident that they were well informed as to the location of the torpedoes we had planted, as they kept well in on the east side of the channel where we had none, that part being left open by orders of the Chief of Engineer Department for our steamers to pass in and out. The monitor Tecumseh not keeping as far to the eastward as the other, struck one of our torpedoes and sunk almost instantly . . . The sinking of this monitor demonstrates that fact that if we had been allowed to plant torpedoes entirely across the channel, leaving no entrance for vessels to pass in and out, or even if we had extended our line 300 yards further eastward very few, if any, of their vessels would have got through . . . We had planted, by orders of Lieutenant Colonel Sheliha, Chief of the Engineer Department, twenty-three torpedoes in the Main Channel between the two buoys and thirteen between the west buoy and the line of spiling (sic) opposite the water battery at Fort Morgan. This left an open channel of about 500 yards between our east line and the shore" (Barrett 1864).

Barrett's testimony places the Tecumseh on the west or port side of the Federal fleet while Farragut states that the ironclads had been ordered to take their positions on the starboard side, placing themselves between the wooden ships and the fort. He further states:

> "I steamed between the buoys where the torpedoes were supposed to have been sunk . . . we had been assured . . . of their existence, but believing that from their having been some time in the water, they were probably innocuous, I determined to take the chance of their explosion" (Farragut 1864).

The ships' bottoms reportedly brushed across the mines and the sailors heard the steel rods of Singer torpedoes snapping against the primers (Perry, 1965:161). No one knows why they failed to explode but the fault evidently did not lie in their placement but rather through mechanical failure. Despite the staggering loss of the Tecumseh, Farraguts's courage won the day.

"Take Mobile and Hold It"
(Telegram from Ulysses S. Grant to Edward R. S. Canby)

With Union warships safely past the guns of the two Lower Bay forts, Mobile itself was, for the first time, seriously threatened by an invading force (Fig. 25). The Confederates reacted by sealing the city defenses against attack.

On August 7, the day after Farragut entered the bay, Sheliha was ordered by the district commander, Brigadier General E. Higgins to sink the unfinished ironclad Phoenix across the channel at the lower obstructions to serve as a battery. Sheliha protested the order to Gen. Gilmer writing: "Position is isolated . . . it cannot hold out long against an attack" (Sheliha 1864g). As predicted: "A few nights later a section of her deck was blown off by the enemy. The upper works were therefore ordered to be burned to the waterline . . ." (Sheliha 1864h).

Preparations were made to close the other gaps in the defenses; the Mobile Dry Dock Co. was ordered to prepare for the dry dock to be sunk at the obstructions (Sheliha 1864i); and the Danube was ordered to be held ready for scuttling at Spanish River channel gap (Sheliha 1864j). Two days later, on August 11, an order was issued to "take charge of one of the Engineer steamers . . . and (to) tow flats loaded with brick to the gate of the lower obstructions, place the gate carefully in position to close the gap and sink the gate to the bottom with the brick" (Sheliha 1864k).

Expecting the attack to come at any time, the engineers redoubled their efforts to obstruct the river channels leading to the Upper Bay. Pilings and torpedoes were placed in the Blakely and Apalachee rivers and the Danube was sunk in Conways Bayou to prevent a Federal attack on the city down the Tensas River. The Federal Navy, in the meantime, was engaged in the deadly task of removing torpedoes from the channel (Fig. 26 and 27).

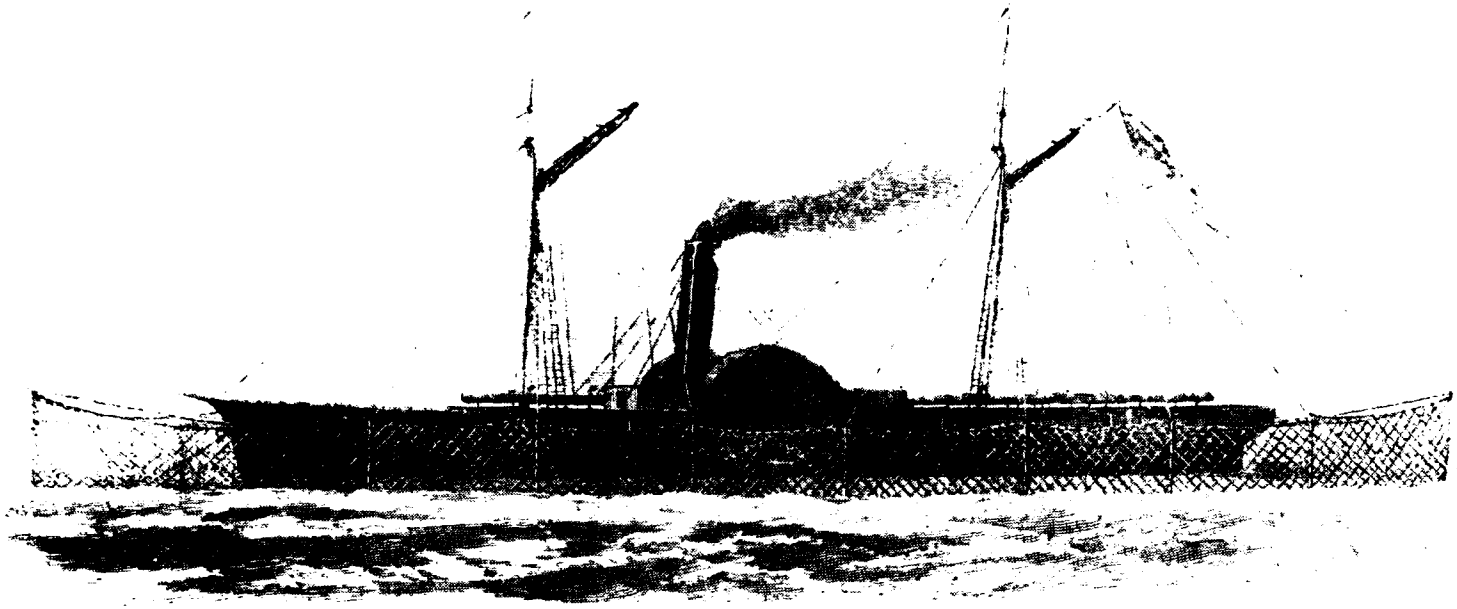
On September 29, Major General Granger reported:

> "Frank Gardner is in command and has a force of 3,000 to 5,000 negroes laboring incessantly night and day upon their fortifications, sinking flats, scows and every species of craft to be obtained, across the various channels. The court-house in Mobile has been demolished to obtain brick for this purpose" (Granger 1864).

The courthouse had, in fact, been destroyed by fire early in the year (New York Sun 1864).

The Confederate defenders gained a respite owing to the delay of the attack by General Canby. Despite an order from General Grant on January 18 to move on Mobile, Canby's 18,000-man army settled in for the winter at Dauphin Island and Fort Morgan (Huffstodt 1982:9).

Figure 25



THE GUN-BOAT "GENESEE" PROVIDED WITH A NET-WORK AGAINST TORPEDOES.—[SKETCHED BY GEORGE WATTERS.]

Figure 26

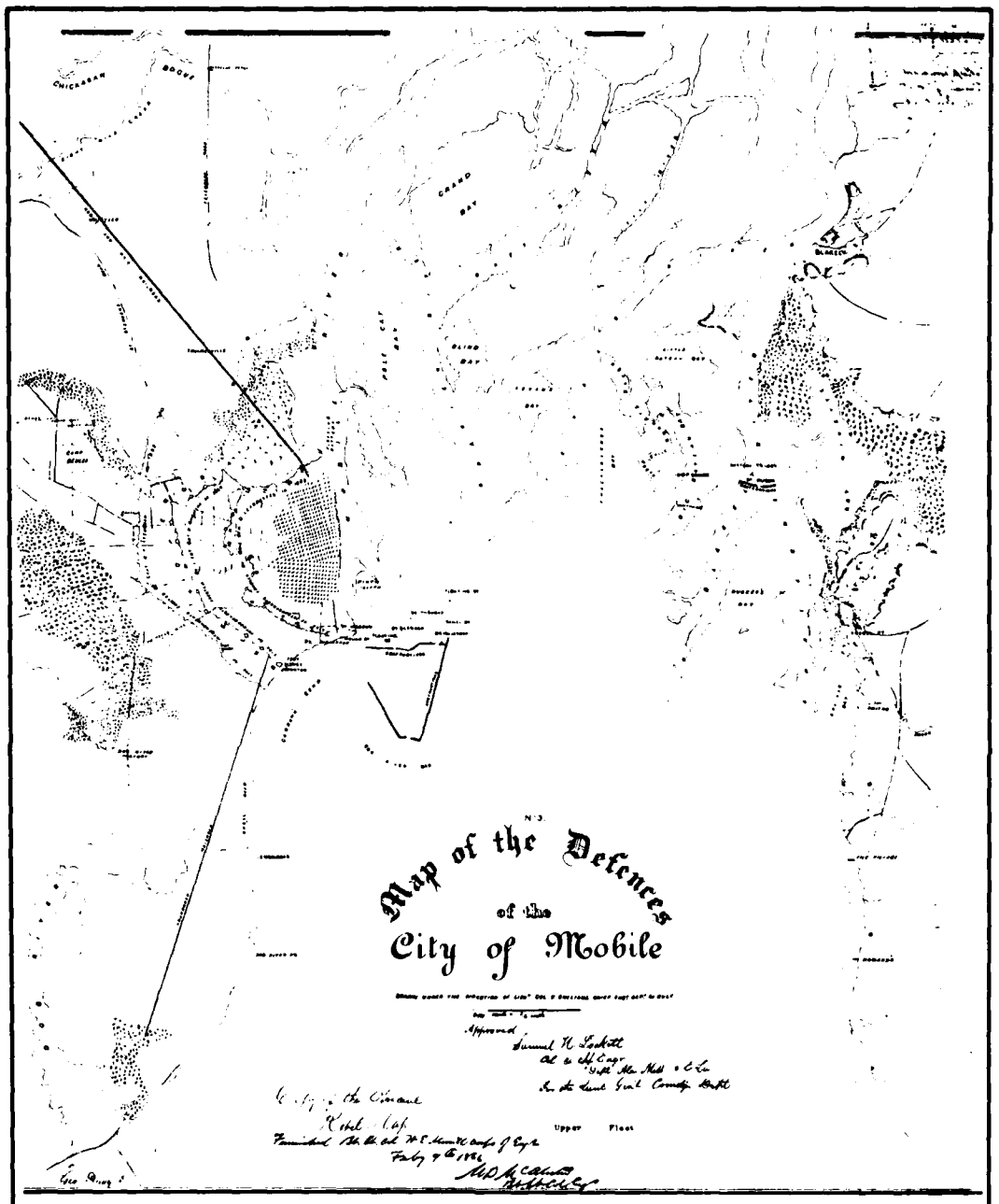


Figure 27

MAP OF THE DEFENSES OF THE CITY OF MOBILE

In the meantime, the Confederates funneled men and supplies into Mobile and every available man was put to work on the defenses. Sheliha was convinced that the Yankees would attack from the east and was particularly concerned about the two batteries, Huger and Tracy, that guarded the rivers. He wrote that "they are faulty in location, in conception and in construction" (Sheliha 1864l). Work began immediately to strengthen the batteries and mine the channels with Rains' kegs and a new invention, electric torpedoes detonated by a galvanic battery.

Two additional batteries were constructed in the Upper Bay to the north of the main obstructions. The location of the batteries are indicated on Sheliha's map of the defenses (Fig. 27) where they are designated "Camel battery" on the Spanish River channel and "Battery Tilghman" on Pinto Pass Channel. The constructional details of these two batteries are unclear, although it would appear that forms were towed to the sites, moored with pilings, filled with sand and then covered with sod. The "camel battery" may have been constructed of the sectional docks or "camels" similar to those used to lift the ironclad ram Tennessee over the Dog River Bar to meet Farragut's attack. Battery Tilghman, on the other hand, may be the "Round Battery" referred to in some reports. Sheliha noted in a report to the Engineer Bureau that after this battery had been put in position, the high tide shifted it before a sufficient quantity of sand could be put into it (Sheliha 1864m). This may suggest that the battery was capable of floating prior to the mooring and filling with sand.

Two principal forts guarded Mobile on the east: Spanish Fort at the mouth of the Apalachee and at the confluence of the Tensaw. Because the western defenses of the city were considered impregnable, it was decided by the Union commander to carry these eastern works and approach Mobile by the Tensas River (Andrews 1889:31).

After months of delay, Canby moved his 45,000-man army up from the Lower Bay on March 27, 1865 and began the attack on Spanish Fort. The initial artillery barrages accomplished little for either side; Canby ordered his ironclads up the Blakely River to bombard Tracy and Huger. Here the Confederate torpedo squads achieved spectacular results with the sinking of two Union ironclads, the Milwaukee (Fig. 28) and the Osage (Fig. 29) by electrically-detonated mines (Huffstodt 1982:13). Several days before, the gunboat Althea, engaged in sweeping the channel for mines, fell victim to one herself (Perry 1965:184).

When it became apparent that the issue could not be decided by naval artillery, the Union forces began trenching towards the Confederate lines. By April 9, 1865, a few hours after Lee had surrendered at Appomattox, both Spanish Fort and Blakely had fallen to the massive Union assault. The Federal troops crossed the bay by steamer early on April 12 and accepted the surrender of Mobile, four years to the day after Rebel cannon bombarded Fort Sumter and began the conflict.

The day before the surrender, General Dabney Maury succeeded in withdrawing the remnants of the Confederate defenders, 4,500 men, out of Mobile to Meridian. The garrisons at batteries Tracy and Huger, with only a little over 200 rounds of ammunition to each of their 16 guns, held off the Federal army to cover the evacuation of Mobile. Maury later wrote: "These

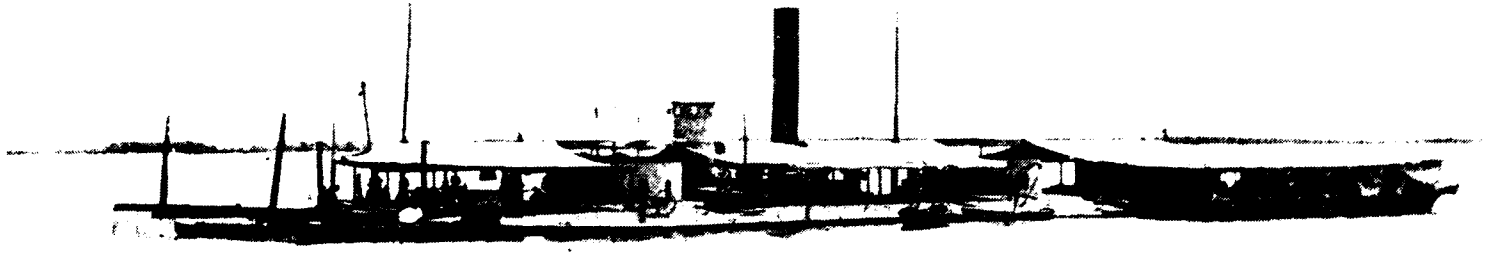


Figure 28

USS MILWAUKEE (1864-65)

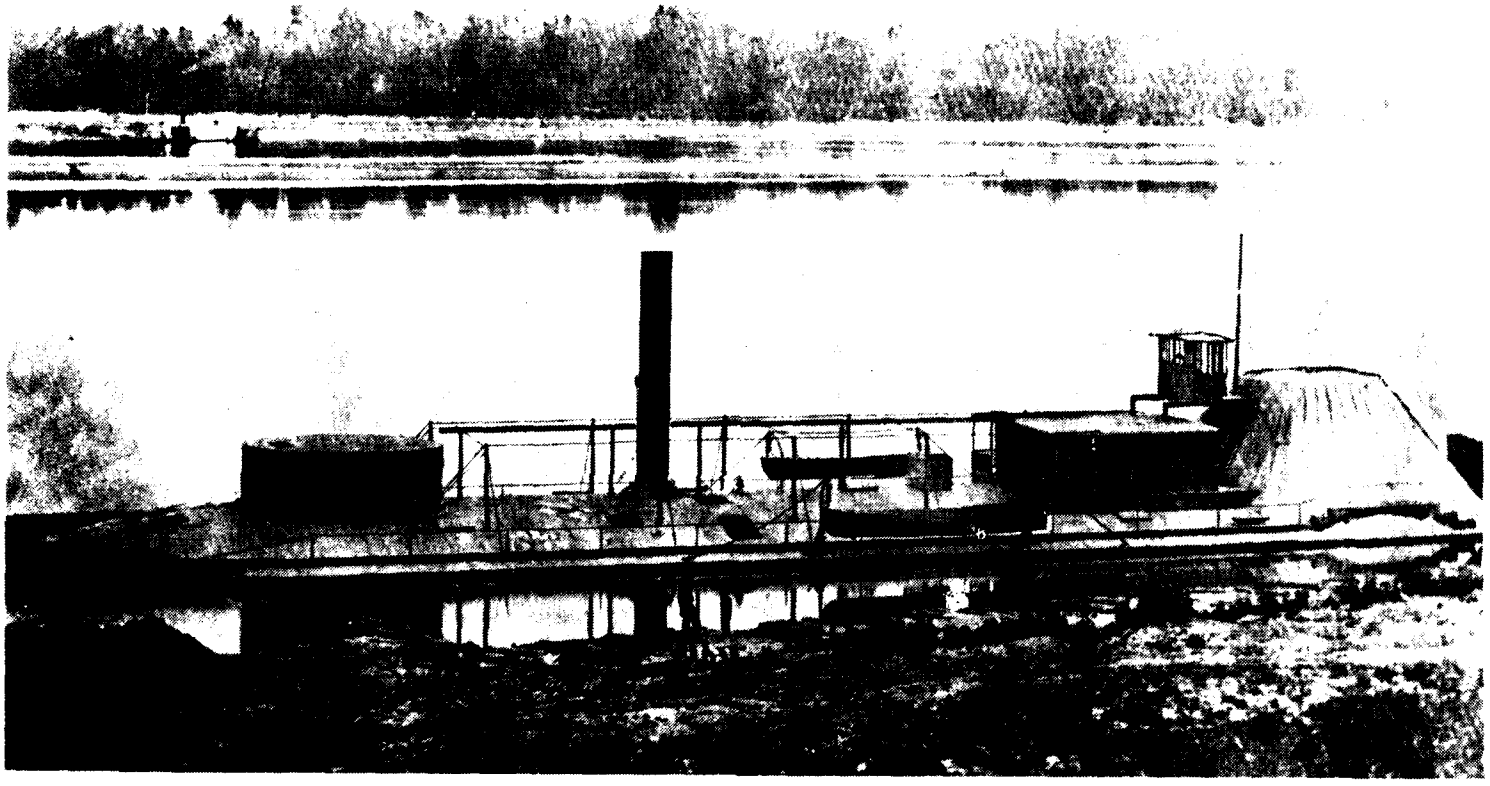


Figure 29

USS OSAGE (1863-65)

garrisons fired the last cannon in the last great battle of the war for the freedom of the Southern States" (Maury 1877:10).

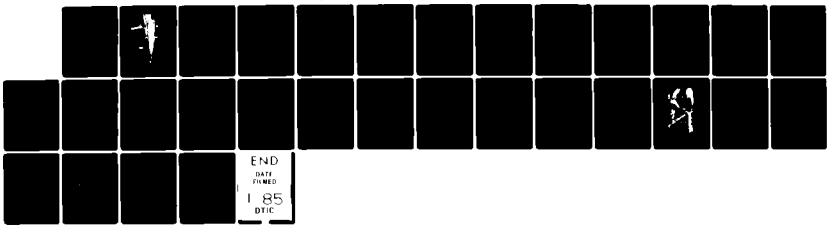
As a parting shot, the Confederates sank their last two remaining ironclads to the bottom of Spanish River to prevent their falling into enemy hands. The vessels, the Huntsville (Fig. 30) and Tuscaloosa were plated with 4-inch (10.1 cm) iron on the casemate, were 120 ft (36.6 m) long, drew 9 ft (27.5 m) of water and were armed with two Brooks rifled 32-pounders and two 42-pounders apiece (Merrill 1866). They are believed to still be in place.

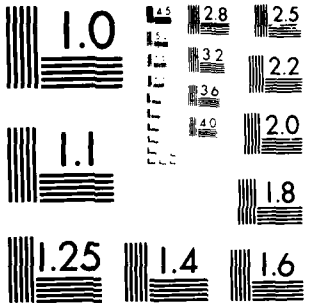
The construction of Mobile's defense system had, for four years, occupied the creative energies of the Confederate Corps of Engineers. Beginning only with two outdated forts, Liernur, Leadbetter, Sheliha and Lockett had achieved a model example of seacoast defense for a nation lacking an effective navy. As Sheliha (1868:104-105) wrote after his return to Europe: "Southern engineers were compelled . . . to recognise the inefficiency of existing modes of defense, and to draw on their scientific knowledge and ingenuity for new ones."

The fall of Mobile was largely the result of a de facto Confederate collapse (Nichols 1959:192). Without sufficient time, materials or labor, the engineers had, nevertheless, succeeded in delaying the inevitable, while their commanders continued to hope for a last minute European intervention.

AD-A148 542 IDENTIFICATION AND EVALUATION OF SUBMERGED ANOMALIES MOBILE HARBOR ALABAM..(U) ESPEY HOUSTON AND ASSOCIATES INC AUSTIN TX J B IRION ET AL. OCT 84 84066 2/2

UNCLASSIFIED COESAM/PDEC-84/004 DACW01-83-C-0124 F/G 13/10 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

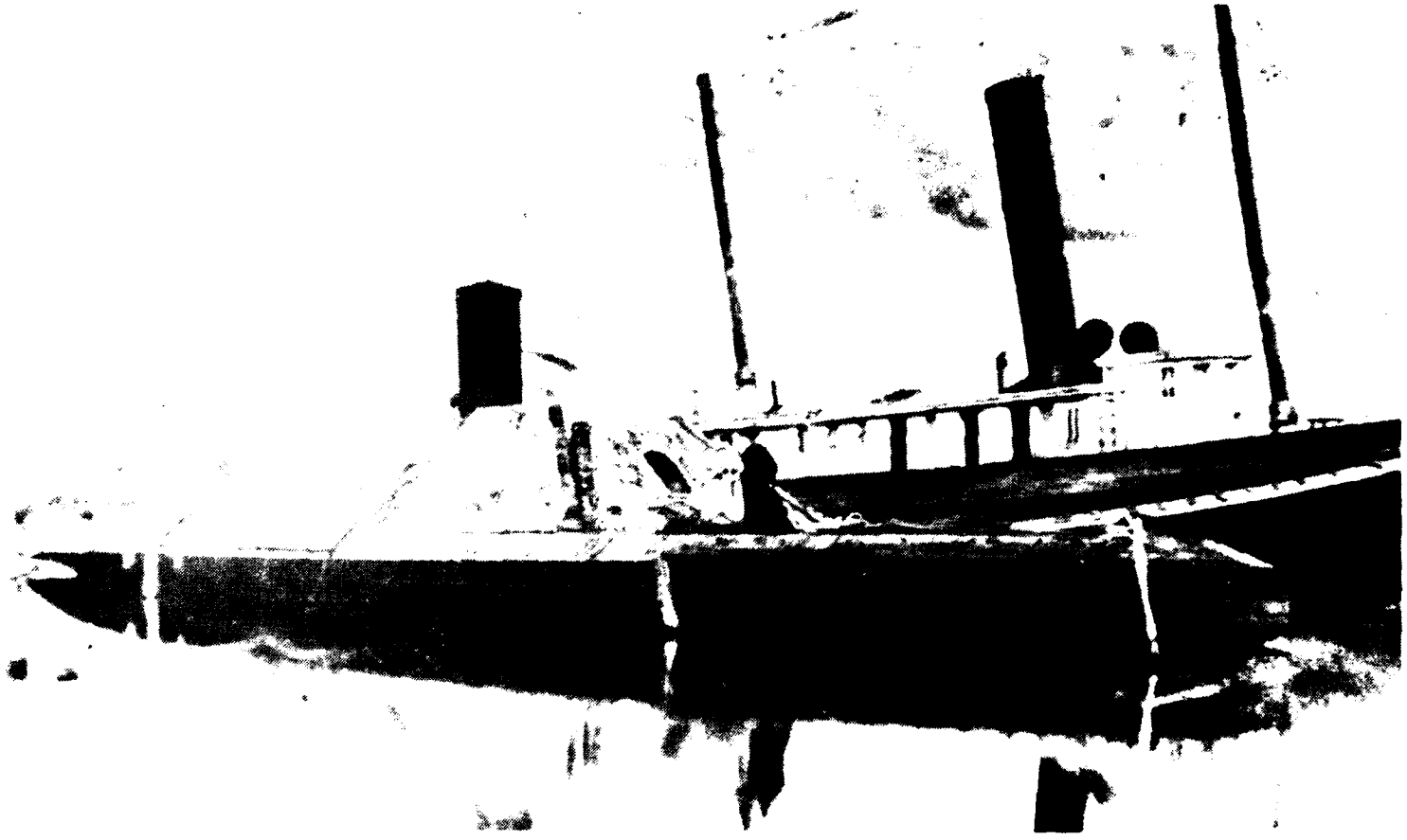


Figure 30

CSS ALBEMARLE, PROTOTYPE FOR THE HUNTSVILLE

VII. CONCLUSIONS AND RECOMMENDATIONS

Anomaly Summary

The testing of twelve anomalies was specified under Corps of Engineers contract DACW01-83-C-0124. One additional anomaly was tested as the result of a typographical error in the contract. Twelve of the thirteen anomalies consisted of modern debris requiring no further archaeological or historical research. One anomaly was found to be generated by an historic site believed to be potentially eligible for inclusion in the National Register of Historic Places. This anomaly, TB-4-3, is recommended for further investigation to determine what, if any, mitigation is required.

An identification of the source of the perturbations of the magnetic field was identified for every location tested except anomaly TB-6-3. A summary of these data follows.

Turning Basin

M-99-1 consists of approximately 100 ft (30.4 m) of 1.25-inch (3.18 cm) diameter steel cable. After removal of the cable from the area, the magnetometer detected no further anomalous readings.

TB-2-2 was produced by a large dredge disposal pipe 2.8 ft (0.85 m) in diameter and 112 ft (34 m) long. Mistovich and Knight (1983b) recorded a surprisingly small gamma reading for this site, apparently crossing only the outer edge of its generated field.

TB-4-2 consists of seven-strand, 1-inch (2.54 cm) diameter steel cable.

TB-4-3 was generated by a section of defensive harbor obstructions put in place by the Confederate Corps of Engineers in 1862. This was found to consist of a mound of hand-made bricks approximately 30 ft (9.1 m) wide and 200 ft (61 m) long. The remains of either the Cremona or Carondelet are believed to be pinned under tons of brick ballast where she was sunk as an obstruction during the Civil War.

TB-4-4 consists of a length of 1.25-inch (3.1 cm) diameter 6-strand steel cable approximately 200 ft (61 m) long. The six strands are each composed of 12 wires wrapped around a hemp core. This type of cable is generally employed in mooring lines.

TB-6-3 was located in the midst of a group of log pilings. Despite extensive probing and excavation, the anomaly source was not located. The pilings, however, are thought to be associated with the unfinished Choctaw Point Spit Battery, erected in 1862 as part of the Confederate harbor defense network.

TB-6-4 consists of a steel drill casing pipe inserted vertically into the bay floor. The pipe is 4.8-inches (12 cm) in diameter and of indeterminate length. The upper end terminates in a collar which is interiorally threaded.

TB-7-3 is the remains of a 5-horsepower, 2-cylinder Elgin outboard motor manufactured between 1950 and 1953 for Sears, Roebuck and Co. The engine was removed from the seabed.

Transshipment Facility

Cluster B/C, detected on two survey tracks, consists of loops of 7-strand, 1-inch (2.5 cm) diameter wire cable. The majority of the cable was removed from the site.

Cluster D/E, also detected over two survey tracks, was generated by approximately 300 ft (91 m) of 1.25-inch diameter steel cable. This cable was not removed from the site.

Anomaly F was produced by a concentration of steel wreckage from a 1950s-era dredge barge crane assembly. It is not associated with any vessel and of no historical significance.

The Presence of Cable in a Bay Environment

Some statement should be made addressing the abundant amount of wire cable on the bottom of Mobile Bay. In a heavily industrialized commercial port, wire cable is utilized in a variety of shipboard activities. In Mobile, it is principally seen on shrimp boats to support the heavy net rigging and, in the case of the heavier cable, on the channel dredges. The large cargo vessels employ cable in lifting cranes and mooring lines. When the cable becomes worn or kinked, it is discarded. This can usually be interpreted as heaving it over the side. Whether through accident or intent, a substantial amount of cable ends up on the bay floor and serves to complicate the magnetic record. In cultural resource management, this results in a good deal of wasted time and expense. However, care should be exercised to determine that the cable does not mask other anomalous signatures. This is best accomplished through the physical removal of the cable from the area and resurvey with a magnetometer. One should also not immediately classify wire cable as intrusive, isolated junk. Steel cable began to supplant hemp in the standing rigging of ships in the latter part of the nineteenth century. By the turn of the century, almost all commercial sailing vessels were wire-rigged. Caution should therefore be exercised to determine if the cable is associated with the wreck of a wire-rigged vessel.

Context and Preservation Potential of Discovered Resources

Scarcely anything exists today of the once extensive network of defenses which had preserved Mobile from invasion by the armies of the north. Only the twin forts, Gaines and Morgan, still glower darkly on the white Gulf beaches at the bay's entrance, although Morgan has been thoroughly rebuilt since Federal cannon broached her masonry walls.

The three-tiered necklace of redoubts and redans which made Mobile invincible on the landward side have gradually been destroyed in over a century of city expansion. None of the earthen forts was investigated archaeologically; now, nearly all have been destroyed.

Traces of the two formidable water batteries, McIntosh and Gladden, still exist as deflated islands or rings of decaying pilings. Sections of the

obstructions, which, as even Farragut confessed, made Mobile invulnerable to a naval attack, were removed at the end of hostilities to restore commercial shipping to the city. What remains, however, is of the greatest significance.

As previously noted, the obstructions, designed in a "keystone" shape astride the confluence of the Mobile and Spanish river channels, had been implaced early in the war after the fall of New Orleans. The western and eastern sides of the keystone were constructed of rows of pilings set 11 to 16 ft (3.3 to 4.8 m) into the mud. Five rows of pilings, extending over 1.25 miles (2 km), comprised the eastern side, while nine to 13 rows of pilings extended over 0.25 mile (0.4 km) from Choctaw Point Spit on the west. The northern, or upper, line of obstructions, extending in a line over 0.75 mile (1.2 km) long, and 400 yds (365 m) in front of batteries MacIntosh and Gladden, was comprised of nine rows of piles 5 ft (1.5 m) apart.

Although of some historical significance, these obstructions would be of limited archaeological value were it not for the southern side and southern end of the western side where the engineers sunk "many a fine merchantman, useful coaster and swift-sailing fishing smack" (Sheliha, 1868:189). According to Merrill's report of 1866 to the U.S. Corps of Engineers, 17 vessels were sunk in the southwest corner of the obstructions, blocking the main channel. Merrill's information included the names of nine vessels (see Appendix A) and the notation: "other wrecks interspersed - all held in place by piles" (Merrill, 1866:Map "C").

The entire western side of the obstructions falls within the area of the proposed Turning Basin of the Mobile Ship Channel Widening and Deepening Project. This potentially includes three vessels: a flat filled with brick, the river steamboat Cremona, and the Carondelet, also a river steamboat. Merrill (1866) recommended that this section of the obstructions not be removed. He concluded: "The piles and wrecks northwest of the Carondelet are in such shoal water that they do not interfere with navigation and it is thought that they will act advantageously in directing the current towards the main channel".

A number of wrecks in the southern line were disturbed as a result of the reopening of the channel. Merrill (1866) recommended that a gap be opened from the Carondelet, past and including the wreck stake, and 200 yds (365.8 m) of the southern line of wrecks, probably including the William R. King. Also affected by the removal were the Colonel Clay, the Kentucky Brig, the William Jones, the Eclipse and two flats, one of which reposed on top of the Eclipse. On the condition of the vessels, Merrill (1866) reported:

> "The wrecks, without exception, were filled with brick and the debris of old buildings. I am assured that these substances have gradually settled into a species of concrete very difficult to remove. The only practical method seems to be to blow the vessels in fragments by large charges of powder . . ."

As many as seven vessels from the southern line may still be undisturbed. The most significant of these is the War Steamer Phoenix, "mate to the Nashville - 250' long". The Phoenix has long been one of the mystery ships of the Confederacy; almost nothing was known of her construction. The information that she was "mate to the Nashville" suggests that she was a casemated

ironclad. A few nights after August 7, 1864, when she was sunk to close the gap in the lower obstructions, the enemy boarded her and a section of her deck was blown off. Her upper works were then burned to the water line (Sheliha 1864a). This and the other vessels in the southern line should not be affected by the proposed widening and deepening although it is recommended that these vessels be positively located to assess the potential of impact.

The testing of anomalies conducted by EH&A in 1983 located one of the three vessels in the western line. Due to the inaccuracy of contemporary maps, it is uncertain which vessel was located at the coordinates of TB-4-3. It is believed, though, that the excavation of a sufficient amount of the brick ballast, revealing the hull structure, may permit a positive identification of the vessel.

Three different types of vessels are represented; the northernmost is a flat and would be of the least interest from an architectural standpoint. The middle vessel, the Cremona, is possibly the earliest surviving example of a stern wheel riverboat, representing a transition period from the sidewheel model. At her launching in 1852 she was described as "a beautiful boat, and will vie with the many splendid steamers we have sent to the Alabama rivers" (New Albany Daily Ledger 1852:3).

The least is known about the southernmost vessel, the Carondelet, which was sunk just above the gap. It is possible that she was a barge, later converted to steam. Her engines must have still been serviceable since they were removed before she was sent to the bottom. It may have been the cost of these engines which makes her purchase seem excessively expensive, $8,000 as opposed to only $1,250 for the Eclipse.

The vessels sunk as obstructions in the harbor at Mobile represent an invaluable cultural resource. While it is unlikely that they contain much in the way of material artifacts, owing to the circumstances of their sinking, their hulls represent several major types of both steam and sailing vessels from an era in which constructional documentation is nonexistent. They exemplify not only a range of vessel types engaged in antebellum commercial trade but also, in the case of the Phoenix, one of the early types of armored warships which forever changed the world's navies.

A question can naturally be raised as to the condition of the hulls after 120 years of submersion; it is likely to be quite good. The bottom of Mobile Bay is composed of a soft clayey mud with a very low oxygen content; a fairly high sedimentation rate also exists as a result of the outflow from the five major rivers which feed into the upper delta. In addition, the water, while brackish now, was considerably fresher before the dredging of the channel created a salt-water intrusion in the bay. It may be that Teredo worms, the major destroyer of wooden ships, were less prevalent in the Upper Bay in the 19th century (Robert Dean, personal communication 1984).

It might also be suggested that the weight of tons of bricks would crush the hull. On the contrary, past experience has shown that the weight of a heavy cargo presses the hull members into the bottom sediment and actually contributes to the preservation of those parts, usually the lower hull to the turn of the bilge, which are sandwiched between ballast and bottom. Structural elements of the Dartmouth (1680) had been pinned down by the vessel's iron

ballast on a gravel sea-bed. The hull was well preserved until it extended above the line of ballast (Muckelroy, 1978:53).

Due to the unique and undocumented construction of the hulls, the high potential of substantial hull preservation and the association of the obstructions with an important event in American history, the area should be considered to be of the highest value as a cultural resource of national interest. As such, it deserves scientific evaluation or protection.

National Register of Historic Places Eligibility Analysis

Of the anomalies tested by EH&A in Mobile Bay, only one (TB-4-3) is considered to be potentially eligible for inclusion in the National Register of Historic Places. This anomaly site, and its function within the network of harbor defenses erected by the Confederate Corps of Engineers between 1861 and 1865, has been discussed at length in the preceding chapters.

As a result of its connection with an important phase of U.S. history, TB-4-3 is recommended as potentially eligible for nomination to the National Register of Historic Places. Requirements for eligibility state:

> The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> 1. that are associated with events that have made a significant contribution to the broad patterns of our history; or
> 2. that are associated with the lives of persons significant in our past; or
> 3. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> 4. that have yielded, or may be likely to yield, information important in prehistory or history.

TB-4-3 represents an intact and well-preserved section of a network of Confederate defense works which has been largely destroyed as a result of municipal expansion and harbor improvements undertaken during Reconstruction (Hamilton 1913:375ff). It is associated with a specific and well-documented period of American history and may be likely to yield additional information relating to coastal defense construction during this period, as well as other artifacts dating to the Civil War period. Further, investigation of primary sources suggests that a contemporary vessel or vessels may be entombed within the tons of brick (Sheliha 1868:192). Judging from the condition of the pine pilings associated with the site, a ship's hull, pressed into the mud by its final cargo, is likely to be at least partially preserved and could provide important information on naval architecture of the period. As a result of these considerations, TB-4-3 is recommended as being potentially eligible for nomination to the National Register of Historic Places.

Any consideration of NRHP eligibility and any recommended mitigation plan for TB-4-3, believed to be one of two steamboats, must take into account the fact that this vessel is not a single isolated occurrence. Because of the manner in which TB-4-3 was selected for Phase II testing, it is emphasized that other anomalies, which were recorded by OSM during the Phase I magnetometer survey but not tested by EH&A, may also be potentially significant as they are likely to fall within the same line of Confederate obstructions, which runs diagonally through the proposed Turning Basin study area.

After a comparison of contemporary Civil War era maps to the modern USGS 7.5' Mobile Quad, the following anomalies (Mistovich and Knight 1983b) are thought to be potentially associated with the obstructions:

TB-2-3	10 gammas
TB-1-5	71 gammas
TB-3-2	17 gammas
TB-5-1	12 gammas
TB-7-1	35 gammas
TB-1-6	1,000+ gammas

TB-1-6 is of particular interest as a re-examination of the raw survey data has revealed an inadvertent error in the reporting of the gamma strength of this anomaly. Mistovich and Knight (1983b:25) recorded a gamma deviation of 123 while, in fact, it registered over 1,000 gammas with multiple peaks over a very broad area. An EH&A test run across the area east of tested anomaly M-99-1 has, quite by accident, confirmed the presence of a very large anomaly in this area. While Merrill's 1866 map does not indicate a hull sunk at this location (350 m north of TB-4-3), there is a distinct possibility that it is the remains of one of two vessels which are known to have run afoul of the obstructions with disastrous results. These are the tugboat Thomas Sparks (Mistovich and Knight 1983a:177), sunk in 1866, and the steamer Annetta (Merrill 1866:"F"), sunk in 1865. Since this area is archaeologically sensitive, the Phase II reconnaissance should be expanded to include other anomalies along the line of obstructions. It is recommended that a similar methodology to that described earlier in the text for the Upper Bay area be applied to this task.

Additional investigation is also proposed for the brick obstruction (formerly identified as anomaly TB-4-3 in the Basic Contract) located by EH&A archaeologists in 1983. Anomaly TB-4-3 was shown during the course of work under the Basic Contract to represent a section of the western arm of Civil War obstructions erected across the channel approximately one mile (1.6 km) south of the city. These obstructions consisted of vessels loaded with brick and sunk across the channel between shoals on either side. Twelve vessels altogether formed the southern, and portions of the western, arms of the line.

After the end of the war, a 600-ft (182 m) gap was proposed through the southern arm to reopen the channel to commercial ship traffic. The western arm, which runs through the proposed Turning Basin area, was left intact in the hope that it would assist in channelizing the river flow and keep the channel free of silt. The southernmost end of this line consisted of the vessels loaded with brick and sunk between the channel gap and Choctaw Point Spit. These three vessels were (from north to south): (1) an unnamed flat, (2) the river steamboat Cremona (190 ft (58 m) long), and (3) the river steamboat Carondelet (160 ft (48 m) long, engines removed). The brick obstruction is currently believed to be

the Cremona, due to its position in the line and the size and orientation of the deposit.

Recommended Excavation Plan

In 1983, the brick obstruction was found to measure 30 ft (9.1 m) wide and 200 ft (61 m) long, and is covered by between 0.5 and 5 ft (0.15 to 1.5 m) of silt. The vertical extent of the bricks in not known, although they are known to exceed 3 ft (1 m) amidships. The bricks are estimated to be a maximum of 6 ft (1.8 m) in depth. This figure is based on (1) water depth of 8 ft (2.4 m) in 1861 versus 2 ft (0.6 m) in 1983, and (2) the depth of the hold of a river steamboat. The nature of the site and the environment present a difficult, although not insurmountable, problem in underwater archaeology.

After the establishment of a permanent datum, the brick obstruction should be delineated using steel probes, and its boundaries marked with stakes. A proton precession magnetometer can then be deployed and the site surveyed along transects at approximate 10 ft (3 m) intervals. Anomalous readings within the site may then be buoyed using non-magnetic anchors.

At least three trenches should be placed to cut across the long axis of the site, with each trench delineated by a metal pipe or angle iron grid graduated in 1 ft (0.3 m) intervals. The grid should be tied into a datum positioned by a Motorola Mini-Ranger or similar equipment. The trench should be approximately 12 ft (3.6 m) wide at the surface and a minimum of 6 ft (1.8 m) wide at the base. Adequate slope must be left in the walls to ensure maximum stability and safety. Each trench should then be excavated until hull material or natural bottom is encountered. This is not expected to much exceed 6 ft (1.8 m) in depth of brick deposit.

The trenches must be placed in such a manner as to ensure the maximum retrieval of data. Two major considerations should guide the placement of the trenches: (1) areas of concentration of magnetic anomalies, and (2) hypothetical location within a ship's hull. The first trench should be excavated approximately "amidships", with the other two placed toward the bow and stern. These trenches can be placed in such a manner as to encompass magnetic anomalies, if possible, thereby maximizing the chances of artifact retrieval. Proper location of the trenches should determine the depth of the brick deposit and constructional details of the hull, if such exists. An attempted excavation of the entire hull or raising of the ship would be prohibitively expensive in terms of preservation alone. However, a sufficient amount of data should be acquired during the recommended testing to consider the site fully mitigated.

The trenches should be excavated by hand after the overburden is removed from the zone perhaps by a prop wash deflector, and the bricks removed from the area by a small, light-duty crane mounted on the dive barge. The final disposition of the bricks should be determined by the Mobile District, Corps of Engineers and the Alabama State Historic Preservation Officer, with a representative sample of brick conserved and curated. It is also recommended that a small section of the hull be raised and conserved for the purpose of analyzing constructional techniques and materials.

It is suggested that testing of the seven additional anomalies and investigation of the brick obstruction run concurrently. It is estimated that 40 work days will be required to complete field work on the anomalies, while 55 work days will be required for the investigation of the brick obstruction. The major unknown factor in calculating an excavation schedule for the brick obstruction is the depth of the deposit. Core drilling may resolve this question, although the extreme shallowness of the area has precluded this operation by the Corps of Engineers to date (Dorothy Gibbens, personal communication 1984).

Suggested Research Topics

The Confederate obstructions at Mobile are a unique and valuable historic resource as they are among the last remnants of the city's defenses, erected during a turbulent period of the nation's history. As part of an intricate "defense system", they contributed to the survival of Mobile as a Confederate port and source of resupply of imported war materials. As such, they contributed to prolonging the war and had a profound effect on both Union and Confederate strategy. As a result, the history of the Civil War could hardly be written without considering Mobile's defenses and their effect on the course of the war. Farragut's passage through the Lower Bay defenses is one of the best known exploits of the war, while the final battle at Blakely and Spanish Fort, almost a year later, was tactically necessary because of Mobile's invulnerability from the bay and western shore.

Aside from their historical impact, the obstructions would not be of great archaeological interest were it not for the Confederate Engineers' use of sunken vessels in the formation of part of this line. The potential survival of hulls from this era is of great importance to the study of the development of vessel construction, as almost nothing is known concerning the type of craft, the river steamboat, which played so vital a role in Mobile's economic development. Documentary evidence suggests that both a side-wheel and a stern-wheel steamer are sunk in or near the project area. Dating to a time when naval architects' plans are unknown for the vessels which plied the bay and rivers, the obstruction vessels are valuable records of the development of stream navigation.

It is recommended that the following research questions be considered in future investigation/mitigation efforts:

1. Does actual construction of the line of pilings agree with the documentary descriptions?
2. Can anomaly TB-4-3 be positively identified as one of the three vessels listed by Merrill in the vicinity?
3. Can the pre-war record be established for the vessel and how does this shed light on Mobile's role in trade and commerce between Alabama and the outside world?
4. What more can be learned regarding the constructional history of the vessel, and how does it apply to the shipbuilding industry and economy of those areas?
5. Where are the other two vessels indicated in Merrill's report for this area, and what is their condition?
6. Precisely where is the line and how much of it is affected by proposed dredging?

7. Does anything remain of the southern line of obstructions and is it in any way affected by the proposed dredging?
8. Does anything remain of the Civil War ironclad Phoenix, sunk in the old channel as an obstruction, and will it be impacted by the proposed dredging?
9. Can the pilings at TB-6-3 be confirmed as the unfinished Choctaw Point Spit Battery?

REFERENCES CITED

American Cable Co., Inc.
1932 Wire Rope User's Handbook. American Cable Co., New York.

Andrews, C. G.
1889 History of the Campaign of Mobile. D. Van Nostrand, New York.

Artinano, G. de
1920 La Arquitectura Naval Espanola. Madrid.

Aten, Lawrence E.
1983 Indians of the Upper Texas Coast. Academic Press, New York.

Barrett, F. S.
1864 Report of Lieutenant Barrett, C. S. Army, regarding sinking of the U.S.S. Tecumseh by torpedo, August 20, 1864. In Official Records-Navy I, 21:569f.

Beers, Henry P.
1968 Guide to the Archives of the Government of the Confederate States of America. Washington, G.S.A.

Berman, Bruce D.
1973 Encyclopedia of American Shipwrecks. Boston.

Boone, P. A.
1973 Depositional Systems of the Alabama, Mississippi and Western Florida Coastal Zone. Transactions of the Gulf Coast Association Geological Society 23:226-277.

Chapelle, Howard I.
1951 American Small Sailing Craft. W. W. Norton and Co., New York.

Chapman, F. H. af
1957 Architectura Navalis Mercatoria. Facsimile. Magdeburg. Originally published 1768.

Chase, David W.
1972 Evidence of Bayou LaBatre - Archaic Contact. Journal of Alabama Archaeology 18:152-161.

Cockrell, W. A. and Larry Murphy
1978 Pleistocene Man in Florida. In Archaeology of Eastern North America 6:1-13. Michigan.

Confederate Corps of Engineers
1863 Weekly Report concerning Negroes quartered in Mobile for the week ending Friday, February 20, 1863. Ms. in Maury Papers, Mobile History Museum, Mobile.

Cowles, Captain Calvin D.
1958 Atlas to Accompany the Official Records of the Union and Confederate Armies. Thomas Yoseloff, New York.

Curren, Calip B., Jr.
1976 Prehistoric and Early Historic Occupation of the Mobile Bay and Mobile Delta Area of Alabama with an Emphasis on Subsistence. Journal of Alabama Archaeology 22:61-84.

Dames & Moore
1981 Geologic Hazards and Cultural Resources Surveys for Proposed Mobile Bay Project. Report No. 00951-346-12, Houston, Texas. Prepared for Mobil Oil Exploration and Producing Southeast, Inc., New Orleans, Louisiana.

Dean, Robert.
1984 Personal communication. Dauphin Island Sea Lab. June 1984.

DeJarnette, David L.
1952 Alabama Archaeology: a Summary. Archaeology of Eastern United States, edited by James D. Griffin, pp 272-284. University of Chicago Press, Chicago.

1976 Highway Salvage Excavations at Two French Colonial Period Indian Sites on Mobile Bay, Alabama. Prepared for Alabama Highway Department.

Delaney, Caldwell
1981 The Story of Mobile. Haunted Book Shop, Mobile.

Elliott, J. H.
1970 The Old World and the New. Cambridge University Press, Cambridge.

Evans, Clement A.
1899 Confederate Military History. Confederate Publishing Company, Atlanta.

Farragut, David G.
1864a David Farragut to Gideon Welles, August 16, 1864. In Official Records-Navy I, 21:569.

1864b Report of Rear-Admiral Farragut, U.S. Navy, referring to the disposition of the C. S.S. Ram Tennessee and investment of Fort Morgan. In Official Records-Navy I, 21:527.

1864c Detailed Report of Rear-Admiral Farragut, U.S. Navy, Mobile Bay, August 12, 1864. In Official Records-Navy I, 21:415.

Farrere, C.
1956 Histoire de la Marine Francaise. Paris.

Fleming, Walter L.
1911 Civil War and Reconstruction in Alabama. Arthur H. Clark, Cleveland.

Floyd, Dale
1984 Personal Communication. U.S. Army Corps of Engineers. History Division, Fort Belvoir, Va. April, 1983.

Folmar, John K. (editor)
1981 From that Terrible Field. University of Alabama Press, University.

Frazer, Mell A.
1907 Early History of Steamboats in Alabama. Alabama Polytechnic Institute, Auburn.

Fremaux, L. J.
1864 Report of Captain Fremaux, C.S. Engineers, regarding the placing of obstructions in Lower Mobile Bay. In Official Records-Navy I, 21:899f.

Friend, Jack
1984 Personal communication. Mobile. March, 1984.

Gagliano, S. M.
1977 Cultural resources evaluation of the northern Gulf of Mexico continental shelf. Cultural Resource Management Studies. National Park Service, Washington, D.C.

Gibbens, Dorothy
1984 Personal Communication. U.S. Army Corps of Engineers, Mobile. February 1984.

Gilmer, Jeremy F.
1862 Letter to Captain Charles T. Liernur, C.S. Corps of Provisional Engineers, Mobile, November 14, 1862. Ms. in Maury Papers, Mobile History Museum, Mobile.

1864 Letter to Lt. Col. V. Sheliha, January 19, 1864 stating objections to ironclad battery at Mobile Pass. In Official Records-Army I, 21 pt. 2:577.

Glenn, John W.
1863 Report of Lt. Glenn to Gen. D. Leadbetter, C.S. Army, January 28, 1863. Ms. in Maury Papers, Mobile History Museum, Mobile.

Granger, Gordon
1864 Report on Conditions at Mobile. In Official Records-Army I, 39 p. t:529.

Hamilton, Peter J.
1976 Colonial Mobile. University of Alabama Press. University.

Haring, Clarence H.
1918 Trade and Navigation between Spain and the Indies. Harvard University Press, Cambridge.

Harris, Donald A. and Jerry J. Nielsen
1972 Archaeological Salvage Investigations at the Site of the French Fort Conde, Mobile, Alabama. Final report submitted to Alabama Highway Department.

Hitchcock, R. B.
1862 Report of Commander Hitchcock, U.S. Navy, commanding U.S.S. Susquehanna, regarding affairs in the vicinity of Mobile. In Official Records-Navy I, 18:568.

Holcombe, Robert
1984 Personal communication. Confederate Naval Museum. February 1984.

Huffstodt, James
1982 Campaigning for Mobile. Civil War Times Illustrated.

Hunley, H. L.
1862 A method of defending the Alabama River, April 30, 1862. Ms. in Maury Papers, Mobile History Museum, Mobile.

Hunter, Louis C.
1949 Steamboats on the Western Rivers. Harvard University Press, Cambridge.

Investigation Division
1984 Personal communication. U.S. Coast Guard. New Orleans, March 1984.

Joutel, H.
1862 A Journal of La Salle's Last Voyage. Reprinted. Corinth Books, New York. Originally published in 1714.

Kessler, Dr. A.
1862 Letter from the Secretary of the Navy to Flag Officer Farragut, U.S. Navy, transmitting letter of Dr. A. Kessler, regarding affairs at Mobile, Ala. In Official Records-Navy I, 18544.

Knight, Vernon J., Jr.
1975 Archaeological Investigations on Dauphin Island, Mobile County, Alabama. Report submitted to United States Department of the Interior, National Park Service.

1977 The Mobile Bay - Mobile River Delta Region: Archaeological Status Report - July 1976. Journal of Alabama Archaeology 23:137-154.

Kraft, J. C., D. F. Belknap and I. Kayan
1983 Potentials of Discovery of Human Occupation Sites on the Continental Shelves and Nearshore Coastal Zone. In Quaternary Coastlines and Marine Archaeology, edited by P. M. Masters and N. C. Flemming, pp. 87-120.

Landstrom, Bjorn
1961 The Ship. Doubleday and Co., Garden City, New York.

Leadbetter, Danville
1861 Letter to Samuel Lockett, C.S. Corps of Engineers, Mobile, August 22, 1861. Ms. in Confederate Engineer Records, Record Group 109, National Archives.

1863a Report of operations for the defense of Mobile, Ala., for the month of January. In Official Records-Army I, 15:1010.

1863b Report of operations for the defense of Mobile, Ala., for the month of February. In Official Records-Army I. 15:1014f.

Lonn, Ella
1940 Foreigners in the Confederacy. University of North Carolina Press. Chapel Hill.

Lord, Francis A.
1963 Civil War Collector's Encyclopedia. Castle Books, New York.

Lytle, William M.
1931 Merchant Steam Vessels of the United States, 1807-1856. U.S. Department of Commerce, Washington, D.C.

1952 Merchant Steam Vessels of the United States, 1807-1868, "The Lytle List". Steamship Historical Society of America Publication No. 6, Mystic, Connecticut.

Lytle, William M. and Forest R. Holdcamper
1975 Merchant Steam Vessels of the U.S., 1790-1868, the "Lytle-Holdcamper List". Steamship Historical Society of America, Staten Island, New York.

MacBride, Robert
1962 Civil War Ironclads. Chilton Books, Philadelphia.

Marchand, J. B.
1864 Report of Captain Marchand, U.S. Navy, forwarding information obtained from deserters sent from Mississippi Sound. In Official Records-Navy I, 21:105f.

Martin, W. B.
1862 Letter to General Forney, C.S. Army, informing him of appropriation for the defense of the Bay of Mobile. Ms. in Maury Papers, Mobile History Museum, Mobile.

Massey, George B.
1923 The Engineering of Excavation. John Wiley and Sons, New York.

Masters, P. M. and N. C. Flemming
1983 Quaternary Coastlines and Marine Archaeology. Academic Press, New York.

Maury, Dabney H.
1864 Statement by Gen. Maury, C.S. Army, on the sinking of the Tecumseh, September 26, 1864. In Official Records-Navy I, 21:570.

1877 The Defense of Mobile in 1865. Southern Historical Society Papers, 3:1-13.

Merrill, Col. W. E.
1866 Report on the Present Conditions of the Harbor of Mobile. Also Annual Report of the Chief of Engineers 1860. Ms. in National Archives.

Mistovich, Tim S. and Vernon J. Knight, Jr.
1983a Cultural Resources Survey of Mobile Harbor, Alabama. OSM Archaeological Consultants, Moundville.

1983b Cultural Resources Survey of Mobile Harbor, Alabama. Index Volume. OSM Archaeological Consultants, Moundville.

Mistovich, Tim S.
1983 Personal communication. OSM Archaeological Consultants, August, 1983.

Myer, Albert J.
1864 Report of Col. Albert J. Myer, U.S. Signal Corps to Chief Signal Officer, July 9, 1864. In Official Records-Navy I, 21:372.

Mobile Advertiser
1866 Advertisement for Sheliha and Fremaux, Consulting Engineers, September 1, 1866.

Muckelroy, Keith
1978 Maritime Archaeology. Cambridge University Press, Cambridge.

National Archives
ND Papers Pertaining to Vessels of or Involved with the Confederate States of America. Microfilm M909.

Neville, Bert
1962 Directory of River Packets in the Mobile - Alabama - Warrior - Tombigbee Trades, 1818-1932. Coffee Publishing Company, Selma.

New Albany Daily Ledger
1852 Launching of the Cremona, October 21, 1852 edition, p. 3.

New York Herald
1863 Stronghold in the Gulf. June 4 edition.

New York Sun
1864 Courthouse at Mobile Bay destroyed by fire. February 23, 1864 edition, p. 2.

Nichols, James L.
1957 Confederate Engineers. Confederate Centennial Studies, 5. Confederate Publishing Co., Tuscaloosa.

1959 Confederate Engineers and the Defense of Mobile. Alabama Review 12:181-194.

Osbon, Bradley S.
1864 Handbook of the United States Navy. D. Van Nostrand, New York.

Parker, Foxhall A.
1878 Battle of Mobile Bay. A. Williams and Co., Boston.

Perry, Milton F.
1965 Infernal Machines. Louisiana State University Press, Baton Rouge.

Petsche, Jerome E.
1974 The Steamboat Bertrand. National Park Service Publications in Archaeology No. 11, Washington, D.C.

Porter, J. W.
1862 Abstract of statement of J. W. Porter, a refugee from Alabama, who surrendered September 13, 1862, received from Rear-Admiral Farragut September 29. In Official Records-Navy I, 19:198f.

Prelini, Charles
1912 Dredges and Dredging. D. van Nostand, New York.

Rains, Gabriel
1863 Letter to General Leadbetter, C.S. Army, advocating the use of torpedoes to mine rivers. January 15, 1863. Ms. in Maury Papers, Mobile History Museum, Mobile.

Riesen (?), V.
1862 Letter to General Leadbetter, C.S. Army, on proposed defenses of Mobile Bay. Ms. in Maury Papers, Mobile History Museum, Mobile.

Robinson, William M., Jr.
1930 The Confederate Engineers. Military Engineer, 22:297-305.

Roorda, A. and J. J. Vertregt
1963 Floating Dredges. De Technische Uitgeverij H. Stam N.V., Haarlem, ND.

Ross, F. A.
1862 Letter dated February 11. Ms. in Maury Papers, Mobile History Museum, Mobile.

Ryan, J. J.
1969 A Sedimentologic Study of Mobile Bay, Alabama. Contribution 30, Sedimentological Research Laboratory, Florida State University, Tallahassee, Florida.

Sears, Roebuck and Company, Incorporated
1953 Sears, Roebuck and Company, Inc. 1953 Spring and Summer Catalog, Chicago.

1955 Sears, Roebuck and Company, Inc. 1955 Spring and Summer Catalog, Chicago.

Seaver, James T.

1864 Letter to Adm. David Farragut Aug. 6, 1864 in Official Records-Navy I, 21:506.

Sheliha, Viktor E. K. R. von

1863 Letter to C. C. Clay recommending reorganization of slave labor for C.S. Corps of Engineers, December 29. Ms. in Letters Sent, Engineer Bureau, Mobile. Record Group 109. National Archives.

1864a Report of Lt. Col. Sheliha, C.S. Engineers, requesting protection for obstructions placed off Ft. Morgan. In Official Records-Navy I, 21:865.

1864b Report to Maj. Gen. J. T. Gilmer, Chf. Eng. Bur. C.S.A., May 5, 1864. Ms. in Record Group 109, National Archives.

1864c Report to Col. G. G. Garner, C.S.A., on construction of batteries at Choctaw and Oven Bluff. January 22, 1864. In Official Records-Army I, 21 pt. 2:600.

1864d Report to Col. A. L. Rivers, Acting Chief Engineer, C.S.A., on conditions at Mobile, July 11, 1864. In Official Records-Army I, 39 pt. 2:705.

1864e Letter to Gen. J. T. Gilmer, C.S.A., asking to be relieved of duty, June 25, 1864. Ms. in Letters Sent, Engineer Office, Mobile, Record Group 109. National Archives.

1864f Letter of resignation to J. A. Sedden, Secretary of War, C.S.A., August 20, 1864. Ms. in Letters Sent, Engineer Office, Mobile, Record Group 109. National Archives.

1864g Telegram to Maj. Gen. J. F. Gilmer, C.S. Army, regarding ironclad battery. In Official Records-Army I, 39 pt. 2:764.

1864h Affidavit regarding disposition of Phoenix, September 7, 1864. Ms. in Letters Sent, Engineer Office, Mobile, Record Group 109, National Archives.

1864i Letter to the Directors of the Mobile Dry Dock Co., August 9, 1864. Ms. in Letters Sent, Engineer Office, Mobile, Record Group 109, National Archives.

1864j Order to Mr. King to hold Danube in position to be sunk, August 9, 1864. Ms. in Letters Sent, Engineer Office, Mobile, Record Group 109, National Archives.

1864k Order to Mr. Johnson to sink flats at lower obstructions, August 11, 1864. Ms. in Letters Sent, Engineer Office, Mobile, Record Group 109, National Archives.

1864l Letter to Commander Harrison, C.S. Navy. In Official Records-Navy I, 21:568f.

1864m Weekly Report on operations for the defense of Mobile during week ending November 19, 1864. In Official Records-Army I, 45 pt. 1:1230.

1868 A Treatise on Coast Defense. E. F. Spon, London.

Schiffer, Michael B. and George J. Gumerman
1977 Conservation Archaeology: A Guide for Cultural Resource Management Studies. Academic Press, New York.

Seaver, James T.
1864 Letter to Admiral David G. Farragut, August 6, 1864. In Official Records-Navy I, 21:506f.

Secretary of War
1872 A Report of the Board of Engineers Relative to the Improvement of Mobile Harbor. Executive Document No. 64. 42nd Congress, 2nd Session.

Sharf, J. Thomas
1887 History of the Confederate States Navy from its Organization to the Surrender of its Last Vessel. New York.

Shrankland, E. C.
1949 Dredging of Harbours and Rivers. Brown, Son and Ferguson, Ltd., Glascow.

Simpson, Col. J. H.
1872 Improvement of Harbor and Bay of Mobile, Alabama - July 31, 1872. In Report of the Chief of Engineers, 1872:574-584.

Smith, Edgard C.
1937 A Short History of Naval and Marine Engineering. University Press, Cambridge.

Still, William N., Jr.
1968 The Confederate States Navy of Mobile, 1861-August 1864. Alabama Historical Quarterly 30:130 ff.

Summersell, Charles G.
1949 Mobile: History of a Seaport Town. University of Alabama Press. University.

Surrey, N. M. Miller
1916 The Commerce of Louisiana during the French Regime, 1699-1763. Columbia University Press, New York.

Trickey, E. Bruce and Nicholas H. Holmes, Jr.
1971 A Chronological Framework for the Mobile Bay Region. Journal of Alabama Archaeology, 17:115-128.

U.S. Army Corps of Engineers-Mobile District
1982 Production of Natural Gas from the Lower Mobile Bay Field, Alabama. Final Environmental Impact Statement.

U.S. Army Corps of Engineers - Mobile District.
1984 Exploration and Production of Hydrocarbon Resources in Coastal Alabama and Mississippi. Draft Generic Environmental Impact Statement.

U.S. Army Engineer District, Mobile
1979 Technical Report on Mobile Harbor, Alabama. Corps of Engineers, Mobile.

U.S. Library of Congress, Map Division
ND Civil War Maps; an Annotated List of Maps and Atlases in the Map Collection of the Library of Congress. G.S.A., Washington, D.C.

U.S. Navy Department
1971 Civil War Naval Chronology: 1861-1865. GPO, Washington, D.C.

U.S. War Department
1880-1901 The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies. GPO, Washington, D.C.

1921 Official Records of the Union and Confederate Navies in the War of the Rebellion. GPO, Washington, D.C.

Walker, Jerry
1983 Personal communication. October 1983.

Waller, B. E.
1970 Some Occurrences of Paleo-Indian Projectile Points in Florida Waters. Florida Anthropologist 23:129-134.

Walthall, John A.
1980 Prehistoric Indians of the Southeast: Archaeology of Alabama and the Middle South. University of Alabama Press, University.

Wimberly, Steve B.
1953 McLeod Deptford Pottery Series. In Prehistoric Pottery of the Eastern United States, edited by James B. Griffin. University of Michigan Museum of Anthropology, Ann Arbor.

The (New York) World
1864 Article on defenses of Mobile. Saturday, August 16 edition, p. 3.

APPENDIX A

VESSELS SUNK IN THE LOWER LINE OF OBSTRUCTIONS, UPPER MOBILE BAY (DOG RIVER BAR)

1. Cremona — Stern wheel river steamboat, 268 tons (243 t), 182 ft (55.4 m) long, 30 ft (9.1 m) beam, 6.5 ft (1.9 m) hold. Built 1852 New Albany, Indiana by John Evans. Engines: 2-cylinder, 8 ft (2.4 m) stroke; 2 boilers, 42-inch (106 cm) diameter, built by Lint, South and Shipman. Cabin by Hart & Stoy; upholstered by Devinney; carpets by Hite and Small, Louisville, Kentucky. Purchased from A. T. Jones for $1,000 on May 15, 1862 by Confederate Engineers Authorized by Charles Liernur, Chief of Engineers Department of Alabama.

   Sources: Lytle and Holdcamper 1975; New Albany Daily Ledger, October 21, 1852; Vessel Papers, National Archives; Merrill 1866.

2. Carondelet — Possibly barge Carondelet, built 1849 St. Louis, Missouri; converted to steam 1853. Length given by Merrill as 160 ft (48 m). Machinery removed prior to sinking. Purchased May 8, 1862 from Cox, Brainard & Co. for $8,000.

   Sources: Lytle and Holdcamper 1975; Merrill 1866: Vessel Papers, National Archives.

3. Col. Clay — Gulf sidewheel steamship, 150 ft (45 m) long; 257 tons (233 t); 7 ft (2.1 m) hold, built 1847, Louisville, Kentucky.

   Sources: Lytle and Holdcamper 1975, Merrill 1866.

4. Kentucky Brig — 65 ft (19.8 m) long.

   Source: Merrill 1866.

5. William Jones — 180 ft (54.8 m) long. May be hull of William Jones, Jr., 391 tons (354 t.), built 1853 as a sidewheel river steamboat; burned March 26, 1855 in the Alabama River.

   Sources: Lytle and Holdcamper 1975, Merrill, 1866.

6. Eclipse — Purchased May 15, 1862 by Confederate Engineers for $1,250 from Cox, Brainard and Co. Sunk with flat on top.

Sources: Merrill 1866; Vessel Papers, National Archives.

7. William R. King — Although it would seem unlikely, the only known vessel of this name was built in 1846 in Louisville, Kentucky and sank February 2, 1847 in a collision with the Winona in the Tombigbee River. Built as a sidewheeler of 233 tons (211 t.).

Sources: Neville, 1962:29; Lytle and Holdcamper 1975:307.

8. Vernon — Barge, no further information.

Source: Merrill 1866.

9. Phoenix — Iron clad floating battery, 6 guns, 250 ft (176.2 m) long. Merrill (1866) states on Map C that the Phoenix was "mate to the Nashville". The Nashville was a large sidewheel ironclad built at Montgomery, Alabama 1862-1864. A sister to the Nashville was built at Selma, 1863-64 but was so severely damaged when launched in March 1864, that she could not be completed. Evidently, the Phoenix was Nashville's Selma sister. This would explain Farragut's confusion of the two during his inspection of the defenses on August 16, 1864 (Farragut 1864a). The Phoenix was sunk August 7, 1864 across the channel leading through the obstructions. A few nights later a section of her deck was blown off by the Federals and her upper works were ordered burned to the waterline. The vessel was valued at $644,307.34.

Sources: United States Navy Department, 1971: VI-283; Sheliha 1864a; Stewart 1906; Bob Holcombe, Confederate Naval Museum, personal communication 1984; Vessel Papers, National Archives; Sheliha 1868.

VESSELS EMPLOYED BY THE CONFEDERATE CORPS OF ENGINEERS, MOBILE BAY, 1861-1865

1. Alert (schooner; complement, 31; armament, one 32-pounder; disposition, passed to Confederate control 1864)
2. Dick Keys (sidewheel steamer; tonnage, 369 (334.7 t); date and place of construction, 1853, Cincinnati, Ohio; disposition, served as transport between Mobile and Forts Morgan and Gaines, assisted blockade runners, no further record after October 24, 1864)
3. Iron King (steamer; coal transport on Alabama River)
4. Le Grand (sidewheel steamer; tonnage, 235 (213 t.), date and place of construction, 1856, New Albany, Indiana)

5. Lewis Cass (schooner; complement, 45, armament, 1 68-pounder; originally U.S. Revenue Cutter)
6. Nelms (gunboat; may have been lost in Mobile Bay)
7. Ingomar (barge; tonnage, 254 (230 t.); date and place of construction, 1864 Chattanooga, Tennessee; converted to steam 1866; disposition, lost 1868)
8. Le Compte (barge; used to transport pilings and brick)
9. Natchez (steamer)
10. Whitman (barge)
11. Selma (barge)
12 C.S.M. (steamer)
13. Senator #2 (sidewheel steamer; tonnage, 295 (267 t.); date and place of construction, 1858 Mobile, Alabama; disposition, abandoned 1870)
14. Waverly (sidewheel steamer; tonnage, 197 (178 t.); date and place of construction, 1859, Mobile, Alabama; disposition, abandoned 1870)
15. Dixie (steamer)
16. Magnolia (sternwheel steamer; transported bricks to Fort Morgan) (Fig. 31)
17. Crescent (sidewheel steamer; tonnage, 171 (155 t.); date and place of construction, 1858, Mobile, Alabama)
18. Gunnison or A. C. Gunnison (steamer; tonnage, 52 (47 t.); date and place of construction, 1856, Philadelphia, Pennsylvania; passed to Confederate control 1861)
19. Ariel (?)
20. William Bagaley (sidewheel steamer; tonnage, 396 (359 t.); date and place of construction, 1854, Belle Vernon, Pennsylvania)
21 Danube (Floating Battery; tonnage, 980 (889 t.); length, 170'4" (52 m); beam, 30'11" (9.4 m); dr. 16'11" (5.1 m); armament, four 42-pounder; sunk as an obstruction, November 1864, in Conways Bayou)
22 Dalman (steamer; used as floating quarters for slaves)
23 Annetta (steamer)

VESSELS DAMAGED ON CONFEDERATE OBSTRUCTIONS BETWEEN OCTOBER 19, 1865 AND FEBRUARY 6, 1866

1. Jackson (steamer; sunk but recovered)
2. Lady Delight (schooner)
3. Annetta (steamer; destroyed)
4. Annie (steamer; injured, recovered)
5. Lizzie (steamer; injured)
6. Hermit (schooner; injured, recovered)

FEDERAL SHIPPING LOSSES DUE TO TORPEDOES IN MOBILE WATERS, 1864-1865

Nine Federal ships were reported as sunk by Confederate torpedoes in Mobile Bay (Nichols 1959:194). A list of those vessels, six of which may have been recovered, is provided in Table 3.

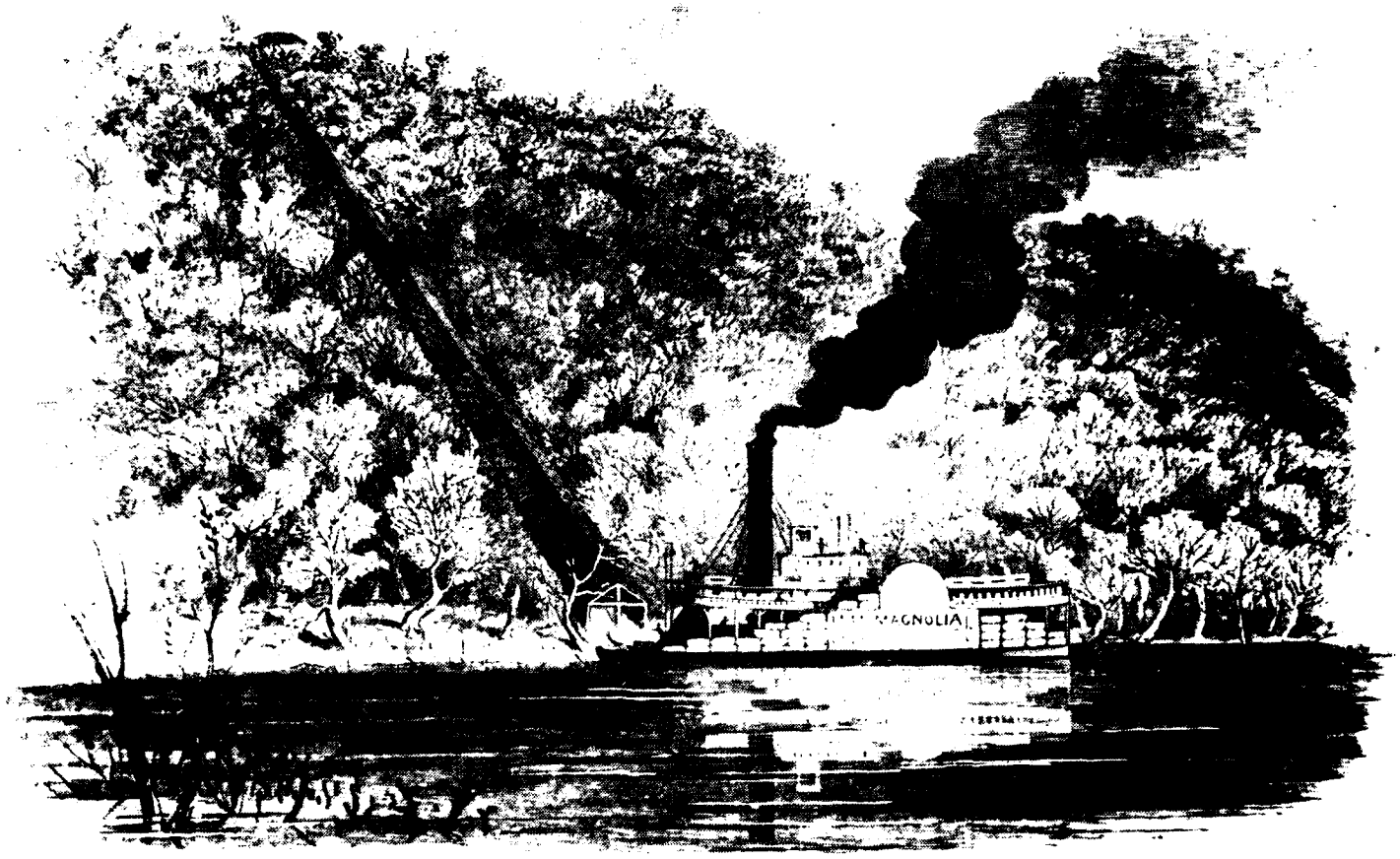


Figure 31
MAGNOLIA, CSA-UTILIZED VESSEL

TABLE 3

FEDERAL SHIPPING LOSSES DUE TO TORPEDOES IN MOBILE BAY WATERS, 1864-1865

(Nichols 1959:194)

Date	Place	Vessel	Class	Tons	Guns	Mine	Damage
5 Aug 64	Mobile Point	Tecumseh	Monitor	1,034	2	Singer	Sunk, 121 killed
7 Dec 64	Dog River Bar	Narcissus	Gunboat	101	2	Unknown	Sunk
12 Mar 65	Blakely River	Althea	Gunboat	72	1	Unknown	Sunk, recovered
28 Mar 65	Blakely River	Milwaukee	Monitor	970	4	Unknown	Sunk, recovered?
29 Mar 65	Blakely River	Osage	Monitor	523	2	Unknown	Sunk, recovered
1 Apr 65	Blakely River	Rodolph	Gunboat	217	6	Unknown	Sunk, recovered?
13 Apr 65	Blakely River	Ida	Gunboat	104	1	Unknown	Sunk, recovered
14 Apr 65	Blakely River	Sciota	Gunboat	507	5	Unknown	Sunk, recovered
12 May 65	Blakely River	R.B. Hamilton	Transport	400	0	Unknown	Sunk, 13 killed

APPENDIX B

DESCRIPTION OF MAPS IN NATIONAL ARCHIVES COLLECTION

I. Untitled (1864) - watercolor
Record Group 77, Drawer 121, Sheet 15-10

Shows semi-circular defense line anchored at Northeast Corner by "Spanish Battery". Pinto Battery at South end of present Pinto Island; Missouri Battery on mainland. Three batteries connected by "V"-shaped line.

Hand-written additions provide details of river obstructions in Blakely and Apalache (sic) River:

1. Apalachee - Torpedoes 2 ft (0.6 m) apart; seven rows of piles 2 ft (0.6 m) underwater just below confluence of Apalachee and Blakely.
2. Blakely - Torpedoes 2 ft (0.6 m) apart in a line 150 yds (135 m) south of 10 rows of piles 2 ft (0.6 m) underwater.

Batteries Tracy and Huger are properly placed but Huger is identified "Hujee". Other additions include number of guns at batteries and margin notes on channel depths of Blakely and Tensas rivers.

This Union-made map may predate others in the collection and show the state of the defenses, based on the best information available to Federals at the time gathered from spies and evacuees. Some additions were made after Farragut's entrance into Mobile Bay in August 1864. The appearance of the sunken hulk "Danube" gives a terminus post quem of August 11, 1864 for the hand-written additions.

II. Sheliha "Map of the Defenses of the City of Mobile" (Fig. 28)
Record Group 77, Drawer 121, Sheet 15-2

Drawn under direction of Lt. Col. V. Sheliaha (sic) chief engineer Dept. of the Gulf and approved by Samuel N. Lockett, Col. and Chief Engr., Dept. of Ala., Miss. and E. La. (Dept. created January 1864). Note in lower left-hand corner reads "Copy of the Official Rebel Map, furnished Bb. Eb. Col. W. E. (Smith) corps of Engr, Feby 9th 1866".

Shows intrenchment lines erected by Capt. C. T. Lierner (sic) (1862), Brig. Gen. D. Leadbetter (1863) and Lt. Col. V. Sheliaha (sic) 1864. Gives positions of batteries Gladden, MacIntosh, Camel, Tilghman, Tracy and Huger; two floating batteries and the Danube.

Scale, hand-written beneath legend, appears to be incorrect. Scale given is one mile = 3/4 inch. Based on comparison of landmarks to modern USGS map, scale should read 1 mi = 1-1/8 in. This scale places known positions of batteries at correct distances from one another and in correct perspective to landforms.

Assignment of names of Blakely and Apalachee River reversed.

III. Chart No. 2, "Illustrating Report of Bvt. Brig. Genl. J. H. Simpson Col. Corps of Engineers in reference to plans proposed by 'Board for the Improvement of the River, Harbor and Bay of Mobile'". Accompanying report to Chief of Engineers dated Dec. 16, 1871.
Record Group 77, J42-#3

Map shows a proposed jetty and canals for allowing the current to scour away the western half of Pinto Island. Shows west side of channel obstructions, labeled as to their composition.

1. Northern line: "Line of pile obstructions" (west of Choctaw Channel) and "Line of pile obstructions 9 row piles 5 ft apart" (east of channel).
2. Western line: "Line of lower obstruction Piles, Wrecks, Bricks".
3. Southern line: "Lower Line of Obstruction Piles, Wrecks, Bricks, Ballast, Sand etc."

Appears to be quite accurate in respect to location of obstructions in relation to town and to position of Battery Gladden. Also shows location of buildings in outlying parts of area.

Shows position of wreck stake immediately south of obstructions.

IV. Engineer's Office Department of the Gulf Map No. 54. Approaches to Mobile City by water, prepared by order of Capt. McAlester, Chief Engineer, M.D.W.D. under directions of Capt. P. C. Haines, U.S. Engineer Corps & Act. Chief Eng. Dept. of the Gulf, Nov. 1864.
Authorities, U.S. Coast Survey Maps & John Latourettes (Fig. 32)
Record Group 77, Drawer 121, Sheet 12

A printed map showing the Confederate defenses of Mobile as they were believed to exist by Federal engineers shortly after Farragut's entrance into Mobile Bay 5 August 1864. The circular plan of the lower obstructions suggests that it was based on spy reports available to Farragut in 1862 rather than direct observation. It is particularly suggestive of a statement received from J. W. Porter who surrendered to Federal forces September 13, 1862 (Porter 1862).

Numerous other mistakes suggest that it was prepared from reports and reconnaissance under wartime conditions. The pre-1864 names of the water batteries are used (Pinto Island for Gladden and Spanish Fort for MacIntosh). Battery Huger is spelled Hujee, probably as the result of a phonetic spelling of a French or Cajun pronunciation. The positions of batteries Tracy and Huger are also reversed.

V. Maps Accompanying Co. W. E. Merrill's Report to the Chief of Engineers, 6 February 1866 (Fig. 14-16).
Record Group 77, J33½

Five maps illustrating various points made in Merrill's report on the condition of the harbor of Mobile after the war with suggestions made for the reopening of the channel.

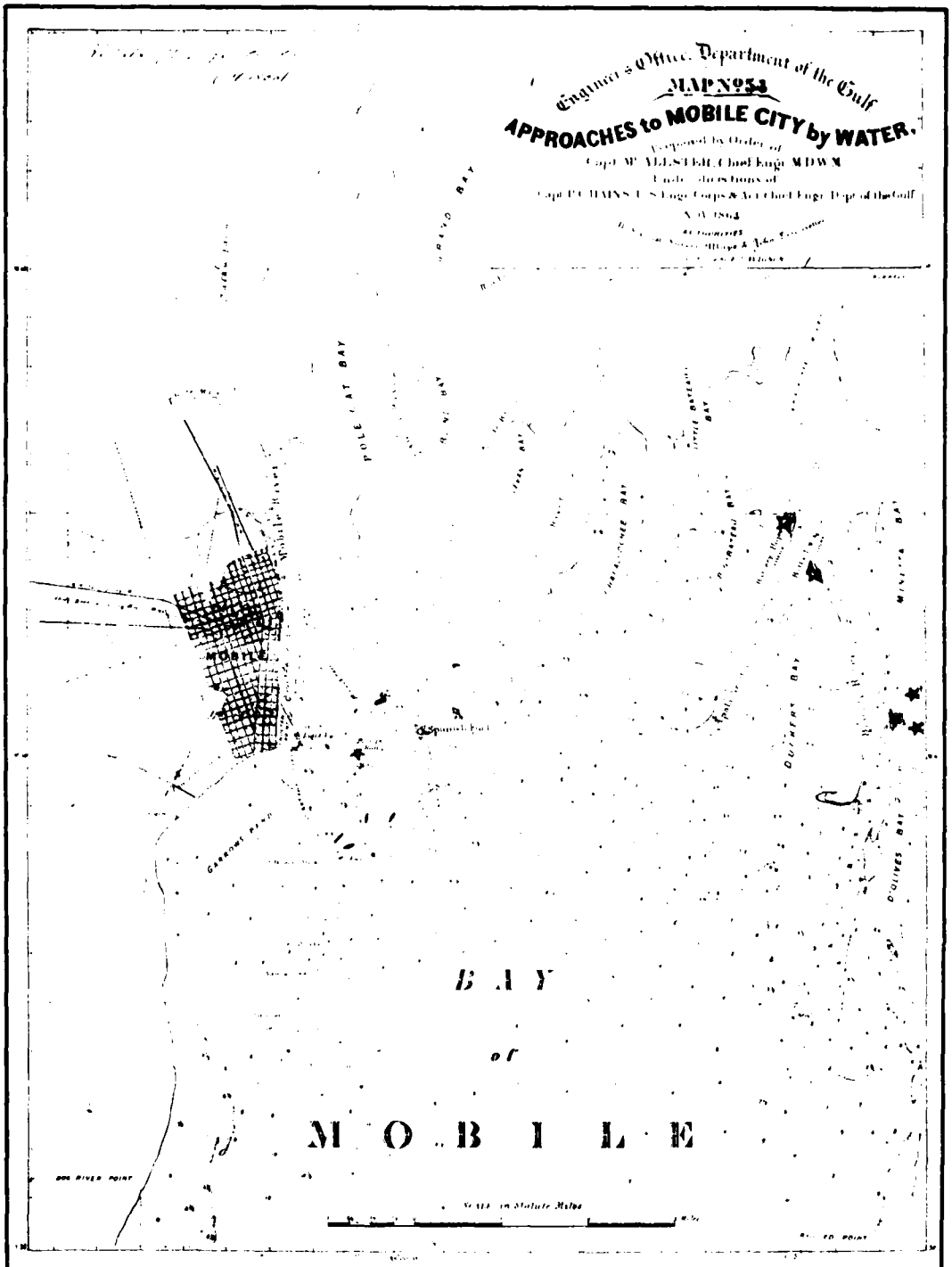


Figure 32
APPROACHES TO MOBILE CITY BY WATER (1864)

"A" - A manuscript map copied 17 February 1866 from the 1864 map of Mobile Bay made under the direction of Captain P. C. Haines (see No. IV) but correcting its errors and adding updated information on the shape and composition of the obstructions. The map is believed to be an accurate interpretation of the defenses as they existed at the fall of Mobile in April 1865. Merrill notes in his report that the map was prepared with the aid of "the rebel engineer Col. Sheliha" (Merrill, 1866:52).

Merrill's map A is particularly detailed in its location of navigation hazards such as torpedoes, rows of pilings and sunken hulks.

"B" - Detail of map "A" showing only the obstructions; provides details on number of rows and spacing of pilings.

"C" - Sketch map showing details of the composition of the lower line crossing the old channel at Dog River Bar. The channel is shown blocked by eleven vessels, forming the southwest corner of a tripartite line of obstructions. The other obstructions consist of five rows of pilings driven into shoal water. The southern line of obstructions is slightly over a mile south of batteries Gladden and MacIntosh. The vessels are numbered sequentially according to their place in the line:

1. Flat filled with brick.
2. River steamboat Cremonia (190 ft (58 m) long) (actual name - Cremona).
3. River steamboat Carondelet (160 ft (48.7 m) long, machinery removed).
4. Wreck stake.
5. Gulf steamboat Col. Clay (150 ft (45.7 m) long, no machinery - hull filled with brick and building debris used to close old gap).
6. Flat filled with broken brick 50 ft (15 m) long.
7. Kentucky Brig, filled with brick 50 ft (15 m) long.
8. Steamboat Wm. Jones, 180 ft (55 m) long.
9. Steamboat Eclipse with a flat on top.
10. Steamboat Wm. R. King.
11. Barge Vernon.
12. War steamer Phoenix - mate to the Nashville.

"Other wrecks interspersed, held in place by piles."

"D" - Detail of upper obstructions, showing numbers of rows of pilings and location of "1 gun iron clad battery" and "Sunken Camel", both recommended for removal.

VI. Copy of Map of Choctaw Pass, made by Mr. Hodges in 1867 or 1868, showing upper and lower obstructions and proposed improvements in Main Channel Mobile Bay. To accompany my Report of Aug. 5, 1870 Record Group 77, J42-#4

Shows position of obstructions in vicinity of Choctaw Pass and Channel with water depths. Section of obstructions in lower line in vicinity of channel indicated in parenthesis with notation "to be removed".

VII. Defense of Fort Morgan "Entrance of Mobile Bay" (Fig. 19)
Record Group 77, US 393-25

"A true copy of the Engineers Record of F. Gallimard, Capt. Eng. C.S.A. in charge lower bay line."

Two maps of different scale on one sheet. Upper map shows details of process of investment of Fort Morgan by Federal troops and positions of wrecks of Tecumseh, Gaines, and Oneida. The latter is an error and should read Philippi.

Lower map shows Lower Mobile Bay from Mississippi Sound to Bon Secour Bay.