

A CULTURAL RESOURCES ASSESSMENT  
OF SELECTED MAGNETIC ANOMALIES  
FREEPORT HARBOR, TEXAS  
45-FOOT PROJECT



AD A127184

by  
Clell L. Bond

Principal Investigator:  
Ervan G. Garrison

A report submitted to the U.S. Army Corps of Engineers,  
Galveston District, by the Texas A&M Cultural Resources  
Laboratory in partial fulfillment of Purchase Order  
Number DACW64-80-M-0869.

Cultural Resources Laboratory  
Texas A&M University  
College Station, Texas

DTIC  
ELECTE  
S APR 26 1983 D  
D

November, 1980

DTIC FILE COPY

Approved for  
Distribution

83 0 133

<b>REPORT DOCUMENTATION PAGE</b>	1. REPORT NO.	2.	3. Recipient's Accession No.
4. Title and Subtitle A Cultural Resources Assessment of Selected Magnetic Anomalies, Freeport Harbor, Texas, 45-Foot Project		5. Report Date November 1980	
7. Author(s) Clell L. Bond		6.	
9. Performing Organization Name and Address Cultural Resources Laboratory Texas A & M University College Station, Texas		8. Performing Organization Rept. No.	
12. Sponsoring Organization Name and Address U. S. Army Corps of Engineers, Galveston District P. O. Box 1229 Galveston, Texas 77553		10. Project/Task/Work Unit No.	
		11. Contract(C) or Grant(G) No. (C) DACW64-80-M-0869 (G)	
		13. Type of Report & Period Covered Final 1980	
15. Supplementary Notes		14.	
16. Abstract (Limit: 200 words) The Texas A & M Cultural Resources Laboratory conducted a series of 26 dives on or near Points 7, 13, 14, 15, 17, and 18 at the Freeport Harbor, Texas, 45-Foot Project. The search teams found an often dredge-disturbed clay bottom and an absence of culturally significant materials at the Corps of Engineers selected anomaly positions. Further work at the investigated points is not recommended.			
17. Document Analysis a. Descriptors			
b. Identifiers/Open-Ended Terms Freeport Harbor, Texas Underwater Archeology			
c. COSATI Field/Group			
18. Availability Statement Unrestricted	<b>DISTRIBUTION STATEMENT</b> Approved for public release Distribution Unlimited	19. Security Class (This Report) Unclassified	21. No. of Pages 17
		20. Security Class (This Page) Unclassified	22. Price

ABSTRACT

The Texas A&M Cultural Resources Laboratory conducted a series of 26 dives on or near Points 7, 13, 14, 15, 17, and 18 at the Freeport Harbor, Texas 45-Foot Project. The search teams found an often dredge-disturbed clay bottom and an absence of culturally significant materials at the Corps of Engineers selected anomaly positions. Further work at the investigated points is not recommended.

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By <i>Pex DTIC Form 50</i>	
Distribution/ <i>on file</i>	
Availability Codes	
Dist	Avail and/or Special
<i>A</i>	

DTIC  
COPY  
INSPECTED  
2

## CONTENTS

ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	iv
INTRODUCTION.....	1
BACKGROUND AND OBJECTIVES.....	1
Magnetometer Data.....	1
Previous Underwater Assessments.....	1
Anomalies to be Investigated.....	3
STRATEGY.....	4
Positioning.....	4
Dive Conditions and Planning.....	4
Search Execution.....	5
DIVE SUMMARIES.....	6
Point 7.....	6
Point 13.....	6
Point 14.....	6
Point 15.....	11
Point 17.....	11
Point 18.....	11
CONCLUSIONS AND RECOMMENDATIONS.....	12
REFERENCES CITED.....	13

## LIST OF FIGURES

1. Freeport Area Points to be Investigated.....	2
2. Location of Point 2 Search Coverage.....	7
3. Location of Point 13, 14 and 15 Search Coverage.....	8
4. Location of Point 17 (and 17 S) Search Coverage.....	9
5. Location of Point 18 Search Coverage.....	10

## ACKNOWLEDGEMENTS

This project would not have been accomplished without the considerable support supplied by the Galveston District Corps of Engineers. The Cultural Resources Laboratory extends their appreciation to Carolyn Good, District Archeologist, who organized and oversaw the project. A special note of thanks is also due to Lee Gana and his crew who ably and skillfully provided positioning and logistics.

Cultural Resources Laboratory support personnel who assisted in preparation and completion of the project included Liz Hill, Robyn Pearson, Mark Bray and Cheryl Degan.

## INTRODUCTION

During the period of September 22-25, 1980, the nautical division of the Texas A&M Cultural Resources Laboratory conducted a series of underwater cultural resource assessments in the vicinity of Freeport Harbor, Texas, for the U.S. Army Corps of Engineers, Galveston District. As originally defined in the Scope of Work (U.S. Army Corps of Engineers 1980) the investigation was to include an assessment of previously located magnetic anomalies in proposed navigation improvement projects at both Freeport Harbor and at the mouth of the Colorado River. Those anomalies to be investigated were chosen by the Corps of Engineers in consultation with the Texas Antiquity Committee (Carolyn Good, District Archeologist, personal communication 1980). The selected areas for underwater inspection included seven anomaly clusters at Freeport Harbor (Figure 1) and three anomaly clusters at the mouth of the Colorado River.

Inclement weather and high seas on the windward facing shore forced cessation of the assessment process after only four days of diving. Four areas totaling 30 magnetic anomalies, all located in and/or around the Freeport Harbor entrance channel improvement, were examined by marine archeologists using open circuit SCUBA. The investigation at the Freeport area is detailed in this report.

## BACKGROUND AND OBJECTIVES

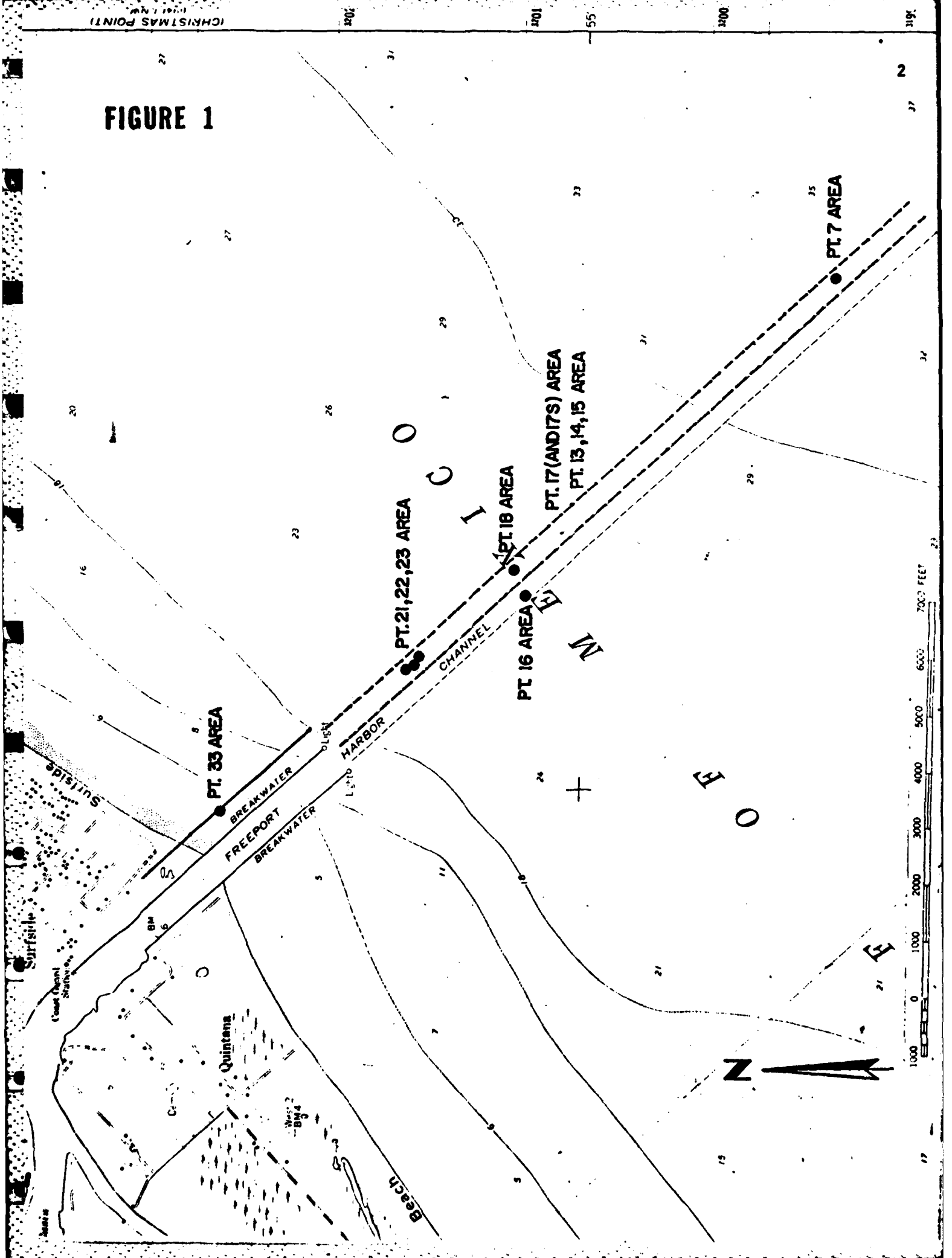
### Magnetometer Data

Prior to the A&M underwater assessment, the project area had been subjected to two separate magnetometer investigations conducted in conjunction with the proposed channel improvement. The first investigation consisted of a reconnaissance survey conducted in 1978 (Odom Offshore Surveys, Inc. 1978), which tentatively identified and located 40 anomalies. The second investigation was conducted by Fairfield Industries (1979) and was designed to relocate the previously identified anomalies and further assess those anomalies with refined magnetometer techniques. Using fine-grained lane spacing, the Fairfield survey re-examined the 40 Odom derived anomalies as preplotted points and found a large number of specific anomaly sources scattered around many of the points.

### Previous Underwater Assessments

In January of 1980 a team of underwater archeologists with the Southwest Regional Office of the National Park Service examined one of the anomaly clusters identified by the Fairfield Industries survey (Murphy and Lenihan 1980). The examined anomaly, located to the north of existing jetties and in the area of proposed channel widening, was identified as being of modern origin.

FIGURE 1



### Anomalies to be Investigated

A list of the seven Freeport Channel anomaly clusters selected for inspection is presented below, and their positions are illustrated in Figure 1. The interpretations were directly abstracted from the Fairfield (1979:44) report and do not necessarily reflect the opinions of the Texas A&M investigators. The point designations of this report were provided by the Corps of Engineers and do not exactly duplicate the Fairfield (1979) designations. For specific anomalous numbers and gamma counts of individual anomalies the reader is referred to Appendix III of the Fairfield (1979) report.

Point 7: Closely spaced magnetometer runs suggested a cluster of anomalies to the east of the preplot point. Fairfield (1979:44) suggested the source indicated a ton of metal; however, because of its seaward location, further investigation was not recommended.

Points 13, 14, and 15: Surrounding these points in an area of approximately 150 m in diameter were numerous small anomalies and one cluster of anomalies just south of Point 14, the cluster being spread over 50+ m and containing individual anomalies indicating as much as one ton of iron. The anomalies lie in the ship channel and were interpreted as probably representing modern material.

Point 16 (Fairfield's Point 19): This point included two small, isolated sources, neither of which was recommended for further investigation.

Point 17: Point 17 was located near two clusters of relatively large anomalies. The southern cluster was described as metal contained in an area of 20 m, the second cluster being more dispersed in an area of 50-60 m in length. Both anomaly clusters were described as being in the dredged channel.

Point 18: Eight scattered anomaly sources of generally less than 200 pounds were identified around Point 18. The Fairfield report (1979:50) noted that the anomalies could represent a chance concentration of debris or a disintegrated shipwreck and that there was no fathometer indication of wreckage.

Points 21, 22, and 23: Point 21 was described as a series of six large anomalies and a scatter of smaller ones. Although there was no fathometer indications of bottom objects, additional investigation was recommended. Point 22 included one large anomaly and four other anomalies in the immediate vicinity. Point 23 also included one large single point anomaly source of greater than one ton. Neither Points 22 or 23 were recommended for additional investigation by Fairfield(1979:70).

Point 33: Located almost in the surf, anomalies were detected on four lines within 40 m of the point. As there appeared to be no substantial concentration of metal, the anomalies were considered to be of insignificant cultural importance (Fairfield 1979:70).



## STRATEGY

### Positioning

Positioning was supplied entirely by the Corps of Engineers who used both electronic and optical equipment. Shore reference points were known and/or designated as "Captain" and "E-5". The electronic navigation equipment consisted of a line-of-sight radio positioning system interfaced with a track plotter mount on the Corps of Engineers launch King and a transponder located at each of the two shore reference points. The optical system consisted of two theodolites also oriented over the reference points of Captain and E-5. A third backup system consisting of a boat-mounted, reel-distributed measured cable was available but not utilized. Prior to initiation of fieldwork, Corps of Engineers surveyors had calculated bearings, backsights, distances, and during the course of the dive operations, continually checked their calculations against those provided by the Fairfield (1979) survey.

As each point or anomaly was selected for investigation, the calculated position was located with the radio positioning system aboard the launch King. As each position was crossed, an anchor attached to a short tethered buoy was set. The position was then immediately rechecked with the intersection of theodolite sights. Once established in the primary position, the theodolites were also utilized to monitor any drift, measure anchor line scope and replot any moves in the search pattern. During the course of the investigation, the A&M investigators expressed complete confidence in the Corps of Engineers positioning.

### Dive Conditions and Planning

Dive conditions during the course of the investigation were highly variable. Dive depths ranged from 9.1 m to 15.2 m (30-50 ft). Seas averaged 1.2-2.1 m (4-7 ft), and in addition to contributing to crew seasickness, at depths of less than 12.2 m (40 ft) often created a strong bottom surge. Underwater visibility near the surface at high or slack tide reached as much as 2.6 m (12 ft); however, bottom visibility on all dives was essentially zero or "black water conditions". Usually the turbid layer which obscured the bottom was 1.2-1.8 m (4-6 ft) thick, above which at least some light could be perceived. During periods of ebb tide, the entire operations area was covered with a very murky water flowing out of the Freeport Channel. Visibility in the murky water never exceeded 0.9-1.2 m (3-4 ft) at the surface and light perception was reduced to zero by 3-3.7 m (10-12 ft) below the surface. The murky water presented a special hazard to the divers as it contained massive concentrations of jellyfish.

The dive team consisted of five to six divers and a tender. The dives were conducted by two diver "buddy" teams with a rigged standby diver. All diving operations were conducted from open boats provided by the Corps with the Corps' larger diesel launch King standing by just outside the dive area.

Divers were equipped with full wet suits to reduce jellyfish contact and abrasions. An attempt was made to maximize bottom search time between the various dive teams; however, all dives were calculated so as to be no decompression dives utilizing U.S. Navy standard dive tables.

### Search Execution

After a couple of brief test dives that ascertained that there would be no bottom visibility, all searches were made using a tethered dive technique. The tether consisted of a 11 m (36 ft) long 1.9 cm (3/4 in) thick nylon rope which was knotted at 1.8 m (6 ft) intervals.

The dive team followed either the dive boats' or bouy's anchor line to the bottom and shackled the tether line to the 1.2 m (4 ft) long anchor chain. One diver then remained at the anchor insuring its immobility and signaled down the search line each time the other diver had completed one 360° circle search. At the completion of each 360° circle the swimming diver then moved to the next adjacent knot and initiated another search. Essentially each search pattern consisted of a series of at least six evenly spaced concentric circles with a maximum diameter of 21.9 m to 24.3 m (72 to 80 ft). Usually the circling diver groped his way along the clay bottom on his hands and knees, and there was a general consensus among the divers that any significant bottom debris would have been felt by the divers and/or would have been snagged by the search line.

During the initial phases of the project, it was assumed that the very accurate positioning provided by the Corps of Engineers would allow the divers to locate the Fairfield (1979) identified anomalies with traditional circle search techniques. After over twenty dives had produced negative results and numerous calculations had indicated that our positioning was comparable to that of the Fairfield survey, a decision was made to recheck some of the anomaly locations with a magnetometer.

The magnetometer utilized by the Texas A&M investigators was a Geometrics Model G-816 Portable Proton Magnetometer. This instrument measures total field intensity and has a sensitivity of  $\pm 1$  gamma over a range of from 20,000 to 90,000 gammas. The sensor for the magnetometer was mounted on the end of a wooden boom of approximately four meters in length mounted parallel to the water's surface and suspended from the bow of an outboard motor driven fiberglass skiff. The magnetometer was set on a four second cycle, and testing revealed a very stable field strength with a variation of no more than one to two gammas. To recheck the anomalies the Fairfield preplotted points and/or anomaly clusters were relocated with the positioning equipment. The magnetometer was then utilized to conduct a spiral shaped search pattern around the point. If the magnetometer registered an anomaly of greater than three gammas in the spiral search pattern, a concentrated effort was then made to bracket the anomaly with the magnetometer and to bout its position. Divers then checked the bouyed position.

## DIVE SUMMARIES

Before the investigation was terminated because of inclement weather, a total of 26 dives were conducted. The following dive summaries abstracted from the field notes and organized by area designation briefly detail the various dives. The approximate location of the dives and search patterns are illustrated in Figures 2-5.

Point 7 (Figure 2): Dive 3. Positioned approximately 15 m east of Point 7 in approximately 13.5 m of water, the investigating divers found a smooth clay bottom. The clay was noted to be firm but very cohesive under a 10-15 cm thick layer of suspended and/or partially suspended clay particles.

Dive 4. Centered over Point 7, the divers found a smooth undisturbed clay bottom.

Dive 5. Bouyed over anomaly 145, the bottom predominantly consisted of smooth clay although some minimal bottom disturbance seems to have occurred in the eastern portion of the search area.

Dive 6. Located approximately 20 m east of anomaly 145, the search pattern again found a uniform clay bottom with a single groove of 0.5 m wide by 0.5 m deep gouged in the clay. A single waterlogged driftwood fragment of approximately 10 cm in diameter and 20 cm in length was recovered.

Dive 21. Positioned over or very near anomaly 139 in 12.6 m of water, the magnetometer indicated a 12 gamma point source. The divers found a relatively smooth clay bottom but failed to locate any materials which might have caused the 12 gamma magnetometer reading.

Dive 22. This search was centered over an 11 gamma anomaly approximately 25 m southeast of plotted anomaly 146. The divers found a dredge scar in the clay bottom, a modern fire brick fragment reading "...LLSUILLE...AVAGE," a one m length of very rusty welded link chain (approximately five cm link length), two very rusty sheet iron fragments and one small fragment of friable (charred?) wood.

Dive 23. Located 46 m due east of anomaly 146, this dive was to examine a magnetometer-indicated 10-11 gamma anomaly source. No anomaly source was located by the search.

Point 13 (Figure 3): Dive 7. Centered over Point 13, the dive was made in 12 m of water and found a relatively smooth clay bottom and a single small waterlogged driftwood fragment.

Dive 8. This search was centered off an anchor set approximately 12 m west of Point 13 near anomaly 127. The divers found a smooth clay bottom and a single somewhat corroded 12 oz beverage container bearing the barely legible label "Miller Lite."

Point 14 (Figure 3): Dive 11. Centered on the buoy set on Point 14, the dive encountered a clay bottom gouged with at least two dredge scars of approximately 1.5 m in width and up to 0.5 m deep.

Dive 12. Dive 12 was made off of a boat anchor set over anomaly 131. The divers found that the clay bottom had been marred by a number of dredge scars. A short length (1-1.5 m) of nylon rope (approximately 3 cm in diameter) was found.

FIGURE 2  
POINT 7 AREA

○ APPROXIMATE SEARCH PATTERN COVERAGE

⊙ FAIRFIELD (1979) ANOMALIES

0 200 400 FEET

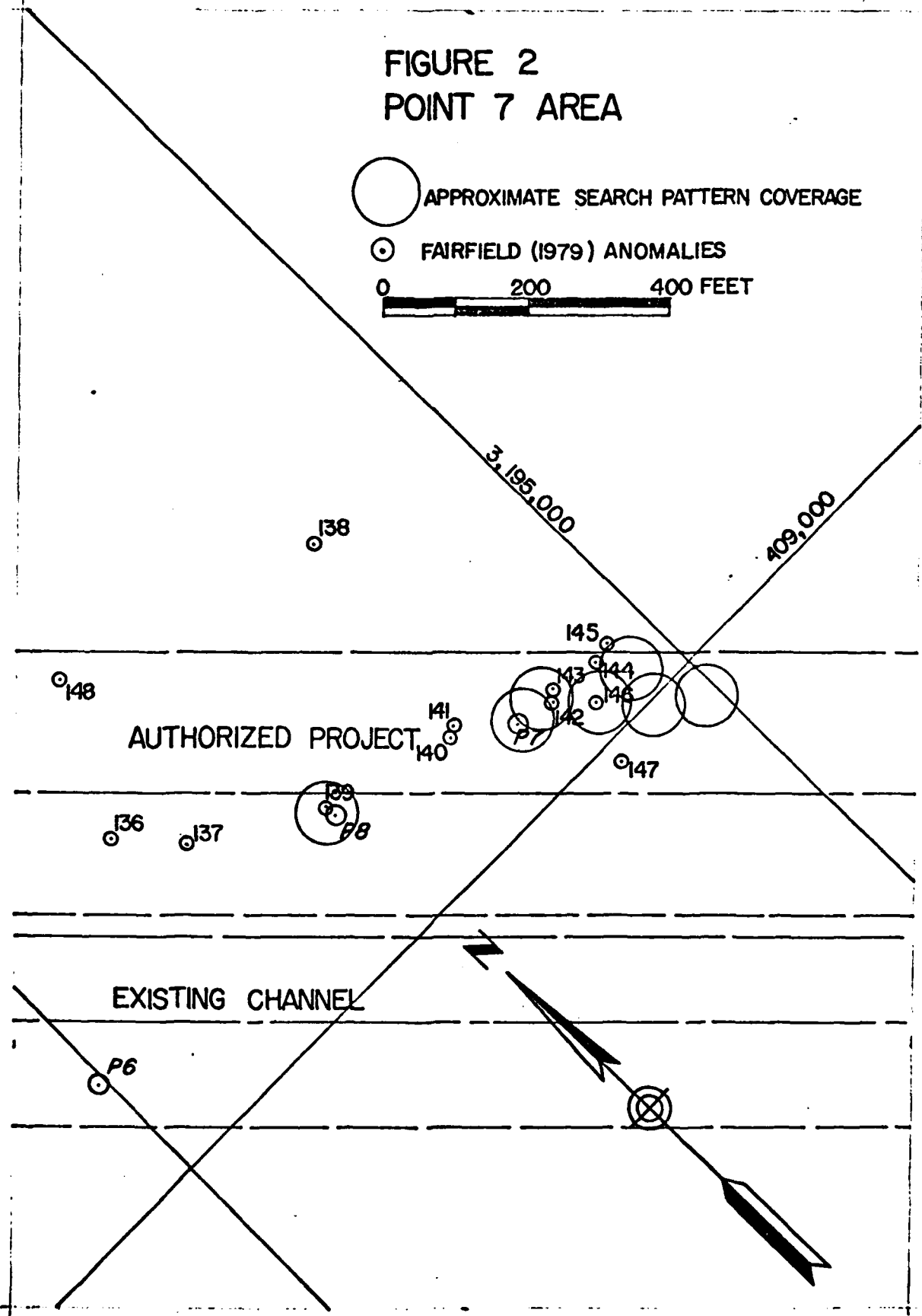
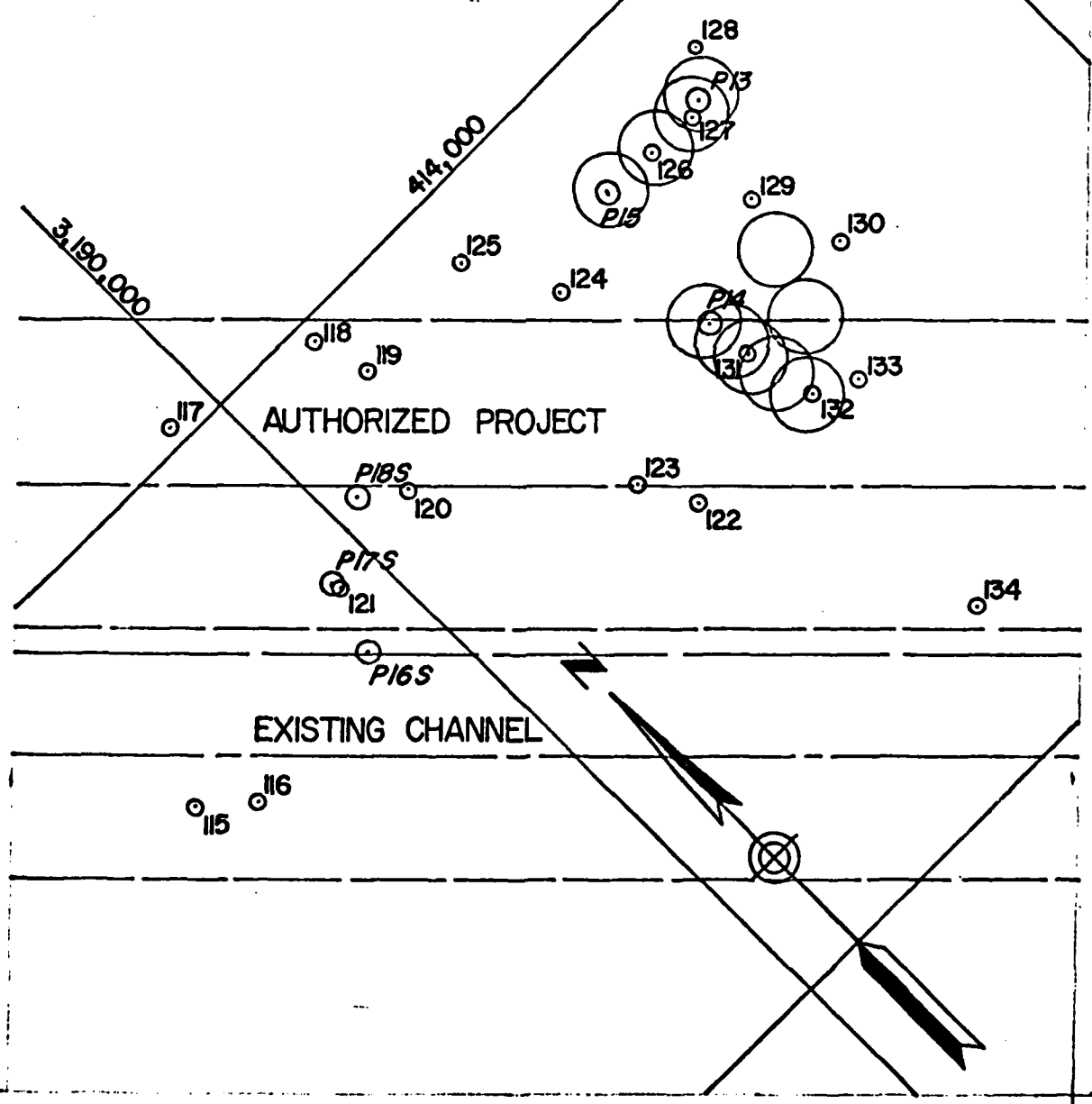
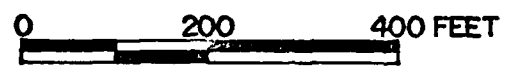


FIGURE 3  
POINT 13,14 AND 15

○ APPROXIMATE SEARCH PATTERN COVERAGE

⊙ FAIRFIELD (1979) ANOMALIES



# FIGURE 4 POINT 17 (AND 17 S) AREA

○ APPROXIMATE SEARCH PATTERN COVERAGE

⊙ FAIRFIELD (1979) ANOMALIES

0 200 400 FEET

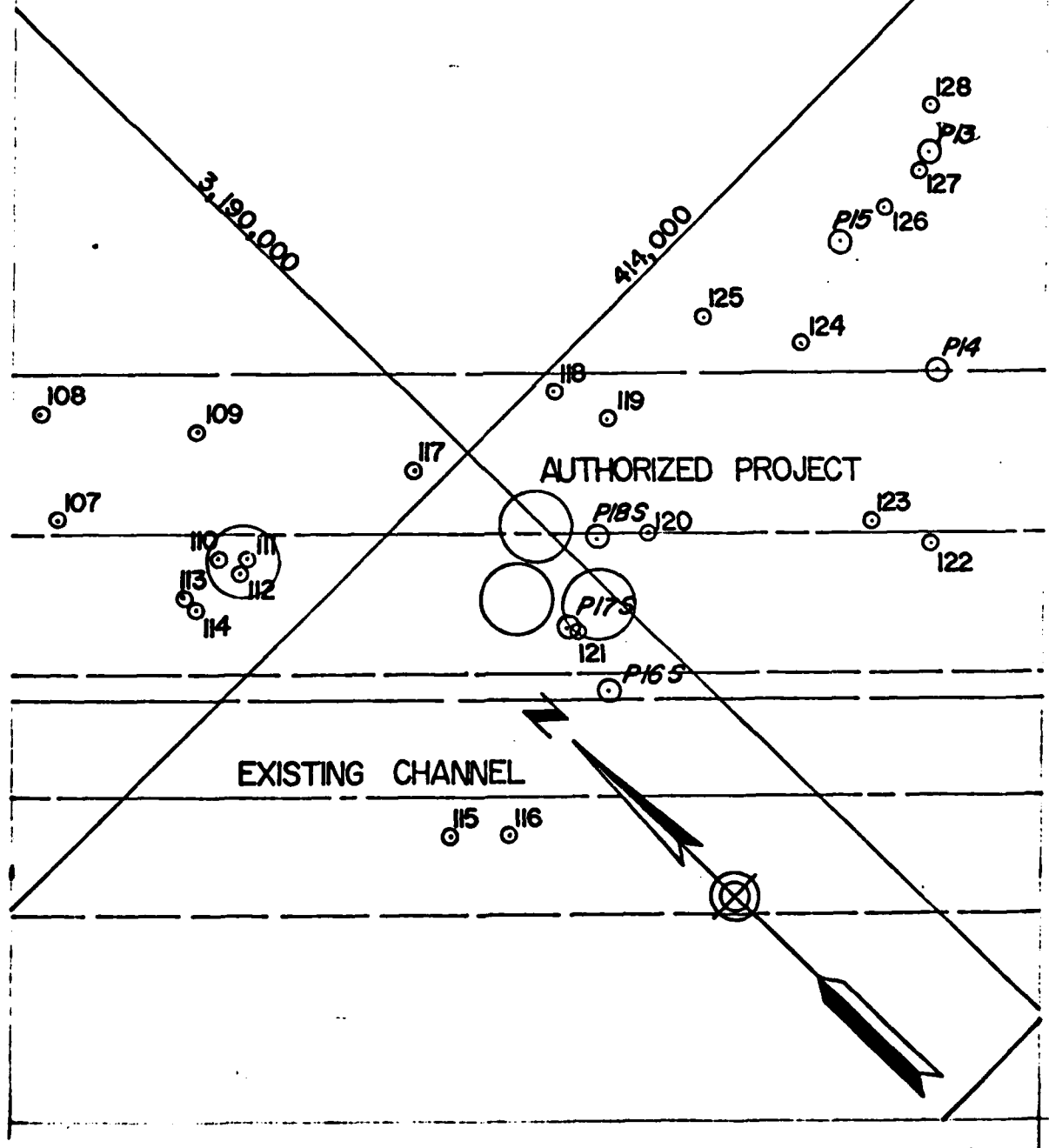
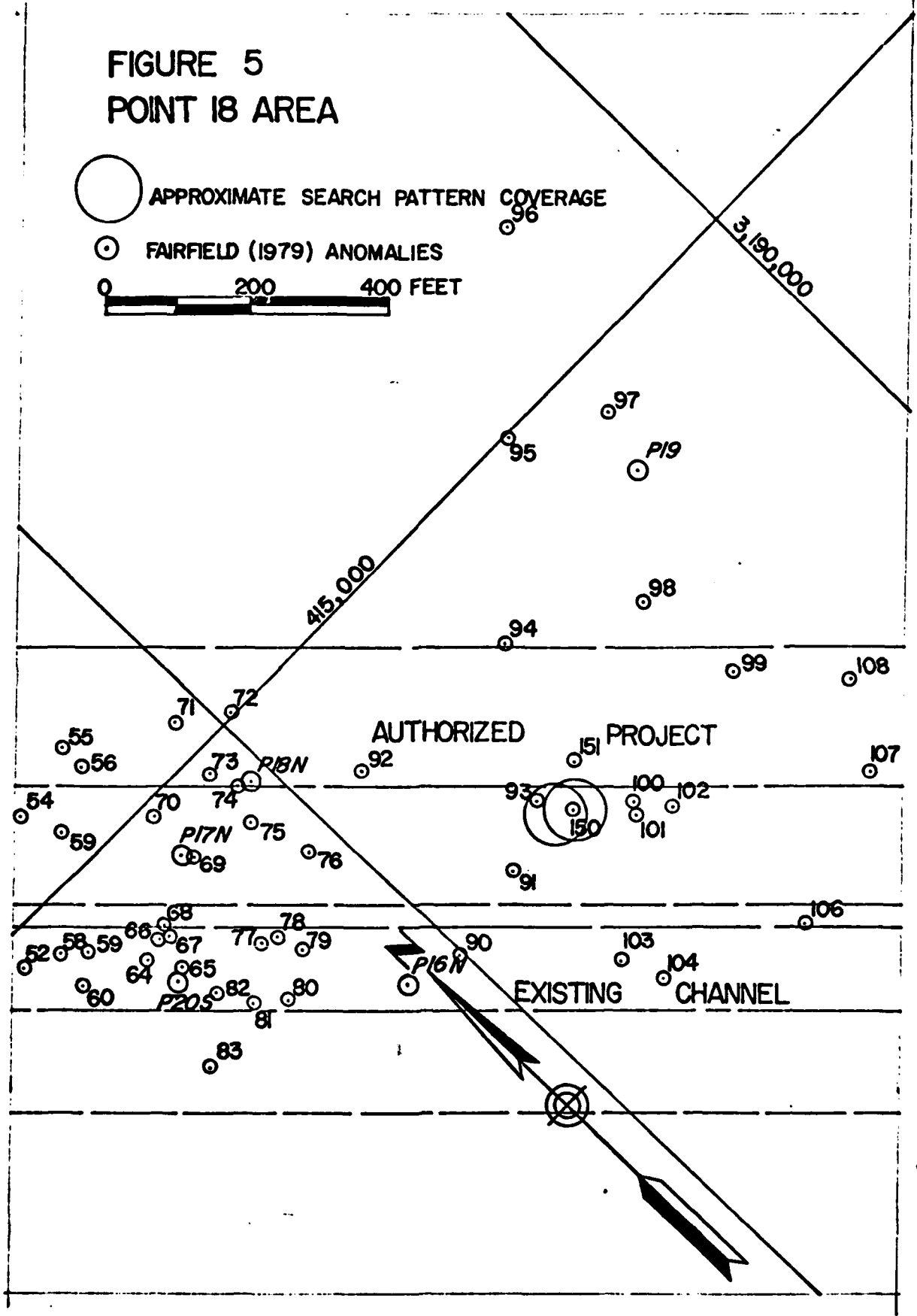


FIGURE 5  
POINT 18 AREA

○ APPROXIMATE SEARCH PATTERN COVERAGE

⊙ FAIRFIELD (1979) ANOMALIES

0 200 400 FEET



Dive 13. Centered between anomalies 131 and 132, the search found a dredge-damaged bottom consisting predominantly of clay and a light scattering of apparently disturbed oyster shells. A modern waterlogged board of approximately 2 cm X 15 cm X 1 m was recovered in the search.

Dive 14. Dive 14 was made from an anchor located on anomaly 132. The divers reported finding numerous dredge scars in the clay bottom, a few scattered oyster shells and a small thin lens of sand mixed with shell. No artificial materials were located.

Dive 15. Placed roughly 37 m east of Point 14, the divers found only a few shallow dredge trenches in the clay and a thin scattering of oyster shell fragments.

Dive 16. Centered approximately at the midpoint between Point 14 and anomaly 131, this dive rechecked the area examined by dives 11 and 12, again with negative results.

Dive 17. Dive 17 was conducted from an anchor approximately 37 m south-east of Point 14 and overlapped two of the previously checked search patterns. Additional disturbances were noted on the clay bottom; however, no cultural debris was found.

Point 15. (Figure 3): Dives 1 and 2. Essentially these two dives were tests conducted to determine visibility and bottom conditions. After brief exploratory free-swimming bottom searches, the divers determined that a tethered technique would be required to provide an adequate search pattern. Artificial illumination was found to be of no assistance in the light-diffusing, turbid waters near the bottom.

Dive 9. This circle search was conducted off a boat anchor which was set over anomaly 126. A smooth clay bottom was encountered.

Dive 10. This dive was centered off a buoy anchor set at Point 15. The divers found a smooth clay bottom which was cut with a single long, narrow (0.5 m wide and 10.5 m deep) groove. A very corroded aluminum beverage can was recovered.

Point 17 (Figure 4): Dive 18. The only dive conducted in the immediate Point 17 area was centered on anomaly 111. The clay bottom was found to be extensively damaged by dredging. Trenches of over one meter in width and up to 1.5 m in depth made the bottom search difficult and hazardous. Except for a few shell fragments, nothing except bottom clay was found in the search.

Dive 24. Approximately 25 m north-northwest of Point 17 S over a 10 gamma magnetometer "hit", the divers found an extensively gouged bottom and a short length of wire rope. The recovered two fragments of wire rope were approximately one m in length, three centimeters in diameter and were badly corroded and encrusted.

Dive 26. Located approximately 37 m northeast of Point 17 S the divers found a dredge disturbance but failed to locate the cause of a 15 gamma magnetometer reading.

Point 18 (Figure 5): Dive 19. The dive boat was anchored over anomaly 150 from which the search was centered. The dive team reported that the bottom clays were scarred by more trenches presumed to be dredge scars.

Dive 20. The dive was centered off Corps of Engineers point 18A about nine m northwest of anomaly 150 and overlapping the search area of dive 19.



The dredge disturbed condition of the bottom was reaffirmed. The dive team found a sunken treated piling of approximately 1.5 m in length lying horizontally on the bottom. The divers reported the object had metal fasteners and possessed only a small amount of marine growth.

### CONCLUSIONS AND RECOMMENDATIONS

With excellent support and positioning supplied by the Corps of Engineers, Galveston District, the Cultural Resources Laboratory investigative team made a total of 26 dives on the Freeport Channel areas identified as Points 7, 13, 14, 15, 17 and 18. The investigation was halted because of inclement weather, and the originally planned examinations of three other Freeport areas (Points 16, 21, 22, 23 and 33) and three points at the mouth of the Colorado River were not completed.

The dive teams found that the bottom in the area was totally obscured by a layer of turbid water, and a tethered circle search technique was required on all dives to obtain accurate search coverage. The bottom was found to consist of a dense cohesive clay (Pleistocene Beaumont clay) with the only encountered shells and sand being located near Point 14. Generally, as indicated by the well-publicized 1554 wrecks (Arnold 1978), cultural materials on the Texas coast do not significantly penetrate below such clay. Except for the investigated area in the deepest water and the most distant from shore (Point 7), the divers found the bottom to be extensively disturbed by dredge created trenches. It was noted that at the time of investigation a Corps of Engineers dredge was actively repairing the damage caused to the Freeport Channel by Hurricane Allen.

During the 26 searches conducted on six points or anomaly clusters, the divers failed to identify any culturally significant materials. Several specific anomaly positions identified by the Fairfield (1979) investigation were checked by multiple searches with negative results. To further aid in the location of the previously identified anomalies, some of the positions were rechecked with a Geometrics G-816 magnetometer. The magnetometer search did not exactly duplicate the positions of the anomaly and anomaly clusters described in the Fairfield (1979) survey although six anomalies were located. Divers checked five of the latter locations and in two locations found modern metal debris and in three locations could not locate any source of the magnetic deflection.

It is the opinion of the participating archeologists that the search of the areas around Points 7, 13, 14, 17 and 18 was more than adequate to find any cultural materials should they have been present and further investigation is not warranted. It was noted that the extensive dredging which has occurred in most of the areas investigated may have damaged and/or destroyed any historic materials. Further, it was a general consensus among the archeologists that excavation and/or probing of the Beaumont clay which comprised the bottom would be unnecessary and unwarranted.

## REFERENCES CITED

- Arnold, J. Barto III  
1978 The Flota Disaster of 1554. In Beneath the Waters of Time: The Proceedings of the Ninth Conference on Underwater Archaeology (edited by J. Barto Arnold). Texas Antiquities Committee Publication 6. Austin.
- Fairfield Industries  
1979 U.S. Army Corps of Engineers, Galveston District, Freeport Harbor, Texas 45-Foot Project Cultural Resources Assessment, August - October, 1979. Galveston.
- Murphy, Larry, and Daniel Lenihan  
1980 A Report on a Two-Day Submerged Cultural Resources Assessment Survey, Freeport Harbor, Texas. 45-Foot Project. Letter Report submitted to the Corps of Engineers, Galveston District. Galveston, Texas.
- Odum Offshore Surveys, Inc.  
1978 Report of Survey Cultural Resources Reconnaissance, Freeport (Texas) Harbor 45-Foot Project. Survey for a U.S. Army Engineer District Contract DACW64-77-C-0076. Galveston.