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COMPLETION REPORT INTERIM MEASURE FOR AREA OF CONCERN 500 (AOC500) WITH
TRANSMITTAL CNC CHARLESTON SC
8/19/1998
CNC CHARLESTON



COMPLETION REPORT

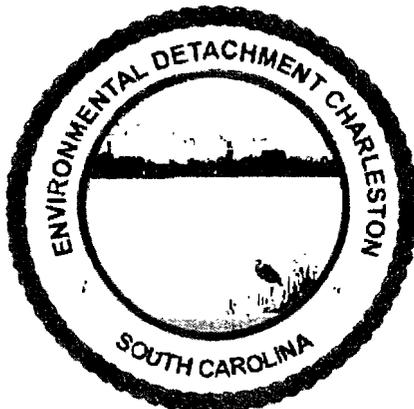
INTERIM MEASURE FOR
AOC 500

NAVAL BASE CHARLESTON
CHARLESTON, SC



Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON SC



Prepared by:

Supervisor of Shipbuilding, Conversion and Repair,
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1899 North Hobson Ave.
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August 17, 1998



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IN REPLY REFER TO:

Ser: 718

AUG 19 1998

Mr. G. Randall Thompson, Director
Division of Hazardous and Infectious Waste Management
Bureau of Solid and Hazardous Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29201

Dear Mr. Thompson:

The enclosed interim measure completion report for Area of Concern (AOC) 500 is submitted to fulfill the requirement of Permit Condition IV.D.6 for Permit Number SCO 170 022 560. If the Department of Health and Environmental Control should have any questions, please contact Reece Batten of Southern Division Naval Facilities Engineering Command (NAVFAC) at (803) 820-5578.

Sincerely,

E.R. Dearhart
Director

Encl:

(1) AOC 500 Completion Report

Copy to:

SCDHEC (Mr. Tapia, Mr. Bergstrand)
USEPA (Mr. Spariosu)
CSO Naval Base Charleston (H. Shepard)
NAVFAC (Mr. Batten)
EA&H (Ms. Maddux)
DDESB (Klinghoffer)

COMPLETION REPORT

Interim/Stabilization Measure for

AOC 500

Charleston Naval Complex, Charleston, SC

Engineering Branch Head:

J. M. Tinsell

Date:

3/19/98

Prepared By:

J. T. Frazier

Date:

3/18/98

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COMPLETION REPORT

INTERIM MEASURE FOR
AOC 500

NAVAL BASE CHARLESTON
CHARLESTON, SC



Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
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August 17, 1998

TABLE OF CONTENTS

Front Cover	i
Table of Contents	ii
List of Appendices	iii
Acronyms, Abbreviations, and Symbols	iv
1. Introduction	1
1.1 Installation Restoration Program	1
1.2 Interim Measures	1
1.3 Area of Concern 500	1
1.4 Area of Concern 500 Interim Measure	2
2. Interim Measure Execution	3
2.1 Actions Required By Interim Measure Work Plan	3
2.2 Performance of Quality Assurance/ Quality Control	3
2.3 Observation Noted	3
2.4 Problems Encountered	4
3. Interim Measure Outcome	5
3.1 Site Conditions Following Completion Of Work	5
4. Waste Generation	6
4.1 Non-Hazardous Waste	6

APPENDICES

Appendix A Site Maps..... A-1
Appendix B Photographs B-1
Appendix C Safe Environment Inc Dive Plan. C-1
Appendix D Safe Environment Inc. Final Report..... D-1

LIST OF FIGURES

Figure 1 AOC 500 Ordnance Location..... A-1
Figure 2 AOC 500 Search Area A-2
Figure 3 AOC 500 Site Map Circa 1946 A-3

ACRONYM LIST

ACGIH	American Council of Governmental Industrial Hygienists
AFOL	Automated Ferrous Ordnance Locator
AOC	Area of Concern
AOE	Automated Ordnance Excavator
CEERD	Charleston Environmental Engineering and Remediation Detachment
CFR	Code of Federal Regulations
CHASP	Comprehensive Health and Safety Plan
CSAP	Comprehensive Sampling and Analysis Plan
CRZ	Contamination Reduction Zone
DDESB	Department of Defense Explosive Safety Board
DET	Environmental Detachment Charleston
DOT	Department of Transportation
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ERT	Emergency Response Team
EZ	Exclusion Zone
HAZWOPER	Hazardous Waste Operations and Emergency Response
HW/HM	Hazardous Waste/Hazardous Material
IDLH	Immediately Dangerous to Life and Health
IM	Interim Measure
LEL	Lower Explosive Limit
MARAD	Maritime Administration
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
POTW	Charleston Publicly Owned Treatment Works
PPE	Personal Protective Equipment
PPM	Parts Per Million
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RFI	Facility Investigation
SHSO	Site Health and Safety Officer
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SSHSP	Site-Specific Health and Safety Plan
SZ	Support Zone
TLV	Threshold Limit Values
TNT	2,4,6-trinitrotoluene
UXO	Unexploded Ordnance

1. INTRODUCTION

1.1 INSTALLATION RESTORATION PROGRAM. The purpose of the Department of the Navy (DON) Installation Restoration Program (IRP) is to identify, assess, characterize and clean up or control contamination from past hazardous waste disposal operations and hazardous material spills at Navy and Marine Corps activities. The Defense Environmental Restoration Program (DERP) is codified in the Superfund Amendments and Reauthorization Act (SARA) Section 211 (10 USC 2701).

1.1.1 Naval Base Charleston IRP. At Charleston Naval Base Complex, a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) was prepared which divided the Naval Complex into zones and identified Solid Waste Management Unit (SWMUs) and Areas of Concern (AOCs) within each zone. The RFA evaluated each SWMU and AOC and determined which sites required further investigation. Based on the RFA, a RCRA Facility Investigation (RFI) work plan has been or is being prepared for each zone containing SWMUs and AOCs requiring further investigation. Upon completion of the RFI for each Zone, an RFI report will be prepared for that zone. The RFI reports will identify SWMUs and AOCs containing hazardous wastes requiring remediation. Eventually, Corrective Measures Studies (CMSs) will be prepared to determine the best means of remediating each site.

1.2 INTERIM MEASURES. Interim Measures (IM) performed as part of the IRP are intended to eliminate sources of environmental contamination or limit the spread of environmental contaminants and eliminate hazards prior to the completion of the RFI CMSs.

1.3 AREA OF CONCERN 500. AOC 500 is identified as an area expected to contain unexploded ordnance (UXO). This site is identified on Charleston Naval Base Map H606-285 at coordinates M-16, as depicted in Figure 1, at a depth varying from 5 to 40 feet. The affected area at AOC 500 consists of 66,928 ft² area in the Cooper River at the northwest end of Pier T in Zone J (see Figure2).

The ordnance at AOC 500 consists of two Mark 47 Torpex loaded depth bombs, which were dropped on January 28, 1945.

1.4 AREA OF CONCERN 500 INTERIM MEASURE. During the interval between the RFI and the completion of the CMS, it was decided by Southern Division Naval Facilities Engineering Command (SOUTHDIV) that an IM would be performed by Supervisor of Shipbuilding, Conversion and Repair, Portsmouth Va., Environmental Detachment Charleston (SPORTENVDETCHASN). The objective of this IM was to locate, excavate, and remove identified anomalies/ UXOs and any associated contaminated soil. If the UXOs were not found, the secondary objective was to perform a due diligent search and verify via a geophysical survey that the ordnance was either previously removed or is located several feet below the river bottom to allow for unrestricted release of the property.

2. INTERIM MEASURE EXECUTION.

2.1 ACTIONS REQUIRED BY INTERIM MEASURE WORK PLAN. The actions performed at AOC 500 consisted of searching a 300' by 300' area, which is bordered by the pier on the east side and the wharf on the south side. Safe Environment Inc. was contracted to perform the search and diving operations. The Jackstay Search Method, which consists of an underwater line attached to the west 300-foot baseline, was used. The divers searched on one side of the line towards the pier and on the other side back towards the baseline. The baseline had marker clips every ten feet; and, the pier was also marked in increments every ten feet. The line was moved in ten-foot increments once the diver reached the baseline. The divers used the White Surfmaster PI, which is a watertight hand held instrument with headphones. The White Pulse PI uses the detection principle of pulse induction and is capable of detecting metal objects to a depth of four feet below the river bottom. The divers completed the search area in three and a half days. Items found included: angle iron, pipe, welding rods, cable, sheet metal, and cans. No ordnance was discovered during the search of the 66,928-ft² area.

2.2 PERFORMANCE OF QUALITY ASSURANCE/ QUALITY CONTROL. A circle search of AOC 500 was used as the preferred method of quality control (QC) for this area. The area chosen was 50 feet from the beginning of the pier and 60 feet from the side of the pier. The divers performed circle searches at 6', 12', 18', 24', and 30' radii. No metal objects were discovered during the QC check.

2.3 Observations Noted. The divers were reporting a very silty bottom and they also noticed the deep cuts from previous dredge operations. This particular area was last dredged in October of 1997 where 20 feet of silt and mud was removed. Pier T was not constructed in 1945 when the Mark 47 Torpex Depth Bombs were reportedly dropped (see Figure 3).

2.4 PROBLEMS ENCOUNTERED. A Maritime Administration Ship, Cape Edmont was docked over the area of AOC 500 and was temporarily relocated to another pier during this evolution.

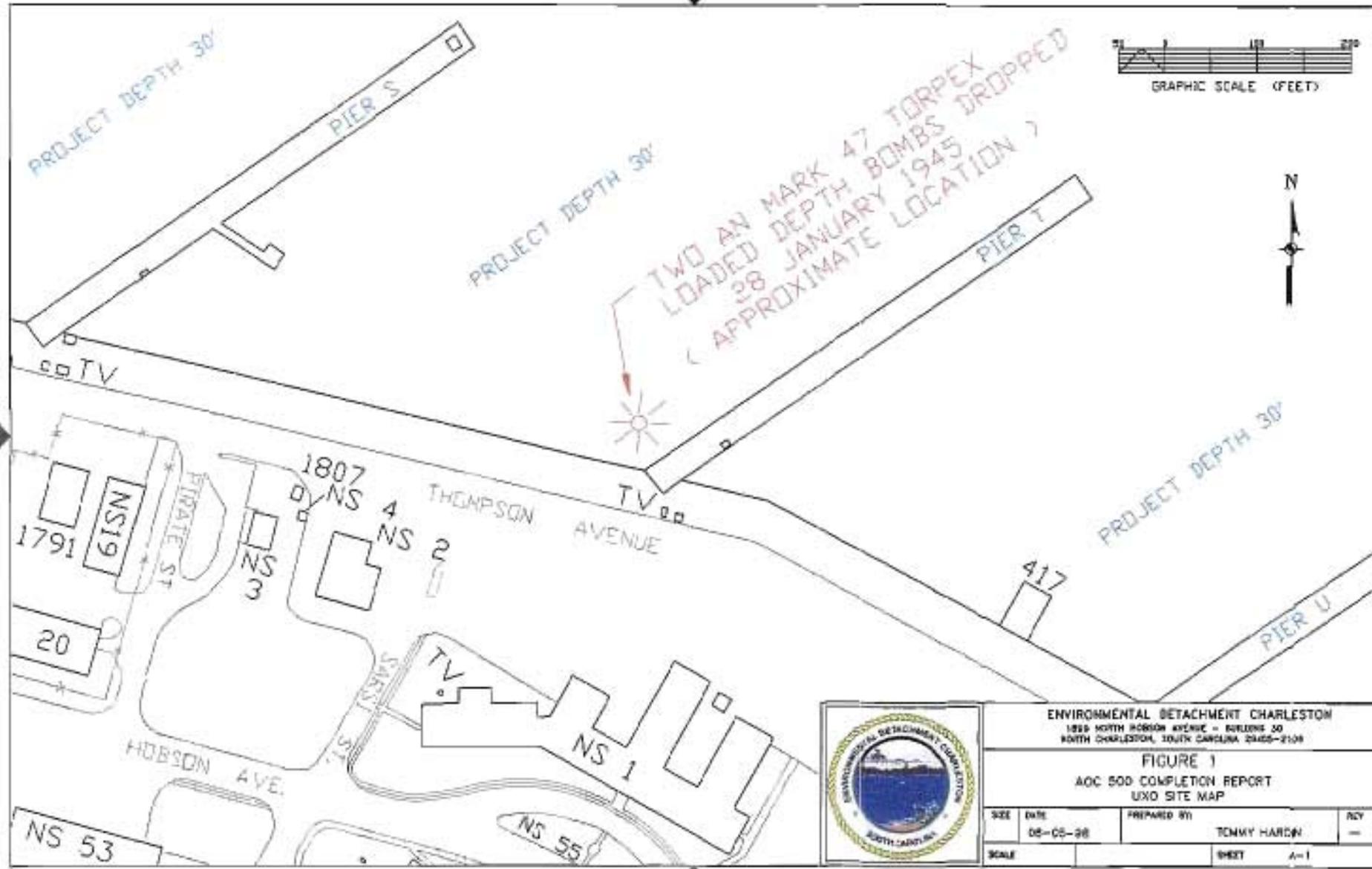
3. INTERIM MEASURE OUTCOME.

3.1 SITE CONDITIONS FOLLOWING COMPLETION OF WORK. Following the completion of all site work and data review on June 1, 1998, the Detachment had investigated all potential UXO targets and proved through geophysical surveys that no other potential UXOs exist within four feet from the river bottom at AOC 500. Therefore, the Detachment has met the intent of performing a due diligent search and verifying via a geophysical survey that the ordnance was either previously removed or located at least four feet below the river bottom.

4. WASTE GENERATION.

4.1 NON-HAZARDOUS WASTE. No waste was generated during AOC 500.

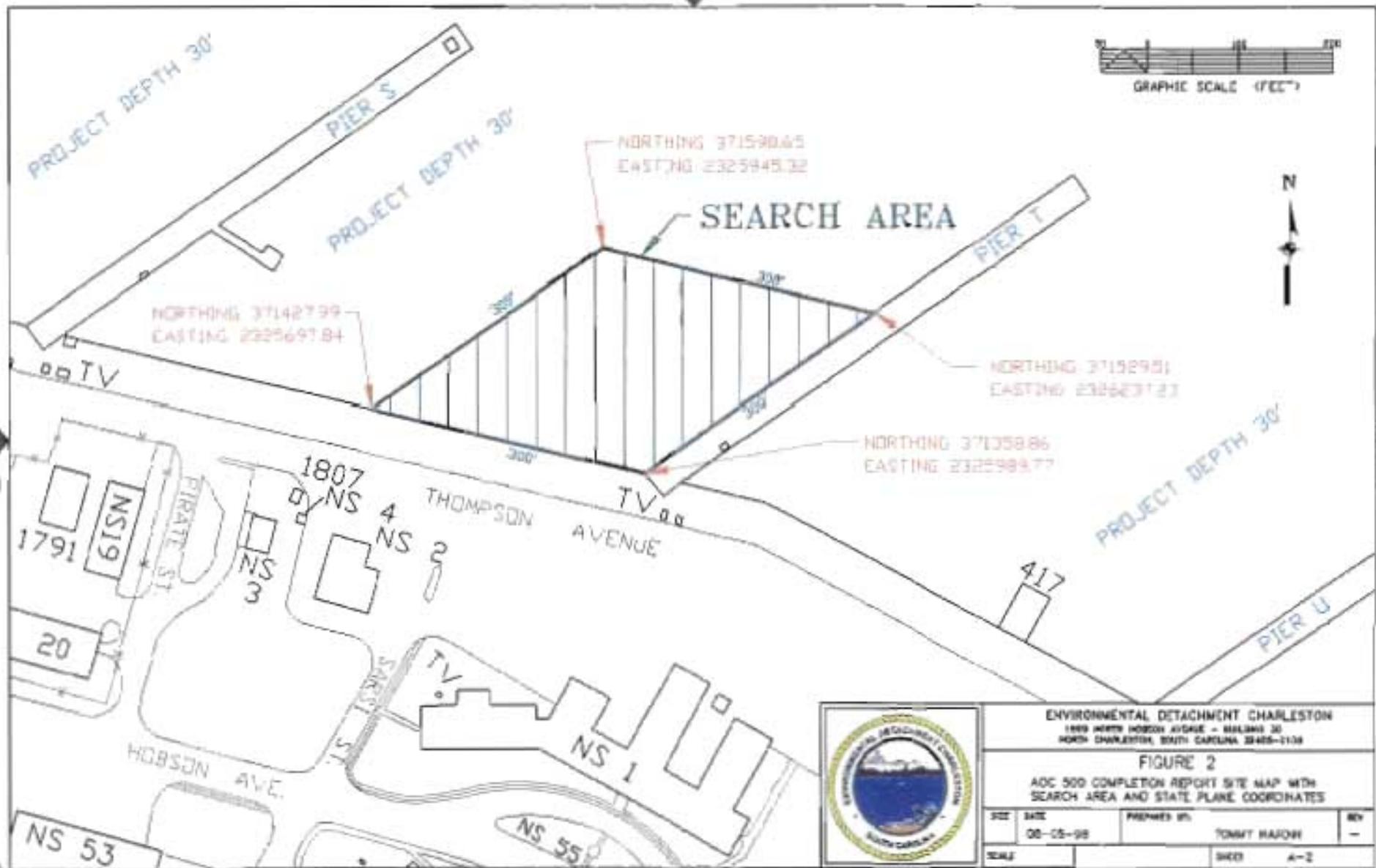
APPENDIX A
Site Maps



ENVIRONMENTAL DETACHMENT CHARLESTON
 1850 NORTH HOBSON AVENUE - BUILDING 50
 NORTH CHARLESTON, SOUTH CAROLINA 29405-2108

FIGURE 1
 AOC 500 COMPLETION REPORT
 UXO SITE MAP

SIZE	DATE	PREPARED BY	REV
SCALE	08-05-98	TOMMY HARCHER	-
		SHEET	4-1



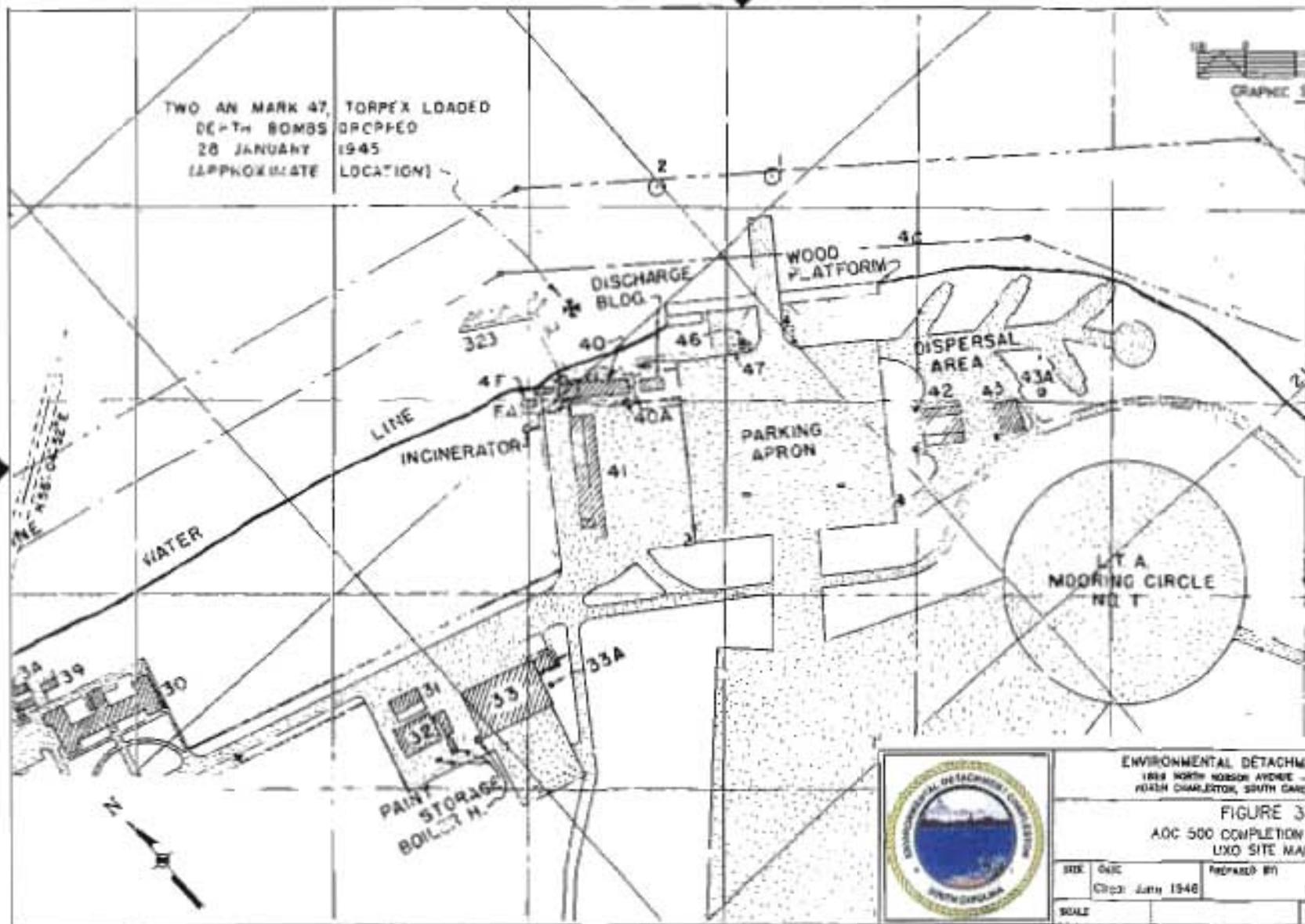
ENVIRONMENTAL DETACHMENT CHARLESTON
 1809 NORTH HOBSON AVENUE - BUILDING 30
 NORTH CHARLESTON, SOUTH CAROLINA 29405-1108

FIGURE 2

ADC 500 COMPLETION REPORT SITE MAP WITH
 SEARCH AREA AND STATE PLANE COORDINATES

DATE	PREPARED BY	REV
08-05-98	TOMMY HAJOSI	-
SCALE	SHEET	A-2

TWO AN MARK 47 TORPEX LOADED
DE-TH BOMBS DPCPED
28 JANUARY 1945
(APPROXIMATE LOCATION)



ENVIRONMENTAL DETACHMENT CHARLESTON
1819 NORTH HOBSON AVENUE - BUILDING 30
FORTH CHARLESTON, SOUTH CAROLINA 29405-2108

FIGURE 3
AOC 500 COMPLETION REPORT
LIXO SITE MAP

SKK	GUC	PREPARED BY	REV
	Clp: July 1948	TOMMY HARDIN	-
SCALE		SHEET	A-3

manufacturing, method of assembly, or specialized application.

3-25.2.1. Full or Reduced Charge. The propelling charge, full or reduced, (figure 3-46) consists of a brass or steel cartridge case of a straight taper design. The propelling charge is assembled with a Primer Mk 13 (combination) or Primer Mk 48 (electric). It is loaded with 15.5 (SPD) or 17.0 (SPCF) pounds of smokeless powder in the full-service charge and 4 pounds of propellant in the reduced charge. A cardboard wad and a distance piece, secured by a cork or polyurethane foam closure plug, serve to hold the propellant in place and complete the unit. The distance pieces are cut to the required length as governed by the propellant production packing depth.

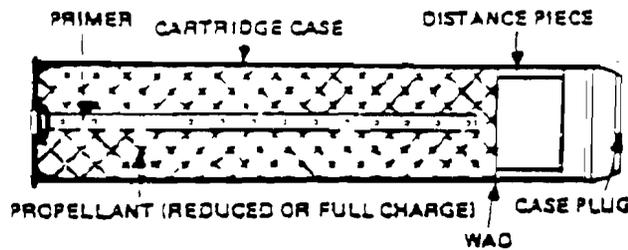


Figure 3-46. 5-Inch, 38-Caliber Propelling Charge

3-25.2.2. Clearing Charge. The clearing charge (short charge) is similar to the full and the reduced charges, the major difference being that the cartridge case is 6.7 inches shorter. Clearing charges are used to clear guns by firing out projectiles after a propelling charge misfires or loading jams. The D296 charge differs from the D227 and the D306 charges in that it has a coned polyurethane or elastomeric foam closure plug instead of the flat cork closure plug and it uses a polyethylene wad and bonds the wad to the cartridge case sidewall instead of using a cardboard wad and a distance piece. The D296 clearing charge is identified and

issued as a common 5-inch (5-inch, 38-caliber/5-inch, 54-caliber) clearing charge.

3-26. PACKING. The ammunition is handled and shipped in accordance with OP 4 and OP 5. The ammunition is painted, marked, and lettered in accordance with WS 18782, and an ammunition data card (MIL-STD-1167) is placed in each container or under the waterproof protecting cap. The following palletizing requirements apply:

<u>Projectile</u>	<u>Requirement</u>
Standard	MIL-STD-1323-4
Rocket assisted	MIL-STD-1323/136C
<u>Propelling Charge</u>	<u>Requirement</u>
Tanking	OR-68/42
Palletizing	MIL-STD-1323/3-1

3-27. BALLISTIC DATA. The ballistic data for the 5-inch, 38-caliber projectile is as follows:

3-27.1. Muzzle Velocity. The average muzzle velocity is:

<u>Projectile</u>	<u>Propelling Charge</u>	<u>Muzzle Velocity</u>
Mk 49 or Mk 51	Full-service	2500 feet per second
Mk 49 or Mk 51	Reduced	1200 feet per second
RAP	Full-service	2500 feet per second

3-27.2. Range. The maximum range is:

<u>Projectile</u>	<u>Propelling Charge</u>	<u>Range</u>
Mk 49 or Mk 51	Full-service	17,393 yards
Mk 49 or Mk 51	reduced	8,874 yards
RAP	Full-service	26,657 yards

Section VIII. 5-INCH, 54-CALIBER AMMUNITION

3-28. GENERAL. The 5-inch, 54-caliber ammunition described in this chapter fits within the separated ammunition category since the projectile and the propelling charge are two separate components, but they are loaded with the gun chamber in a single operation (i.e., one-ram cycle). A complete round of ammunition consists of the projectile and a propelling charge which is packed, shipped, and issued separately. This system is used as a tactical weapon against surface and air targets and for shore bombardment. In a load-and-fire operation the ammunition is handled

somewhat differently by the three types of 5-inch, 54-caliber gun mounts (Mk 39, Mk 42, and Mk 45).

3-28.1. Projectiles. The basic configurations of projectiles in the 5-inch, 54-caliber ammunition inventory are as follows:

<u>Projectile</u>	<u>Abbreviation</u>	<u>DODIC</u>
High explosive, controlled variable time	HE-CVT	D350/D295

Table 3-9. 5-Inch, 54-Caliber Projectile Data

Projectile			Explosive		Fuze			Total weight (lb) (approx.)	DODIC
Type	Assembly	Body	Filler	Wt (lb)	Nose	ADF or booster	Base		
HE-CVT	—	Mk 41	A-3	8.64	Mk 360 (M514A1)	Mk 52	Plug	68.60	D350
	—	Mk 55	A-3	8.64	Mk 360 (M514A1)	Mk 52	Plug	68.60	D295
	—	Mk 64	A-3	8.64	Mk 360 (M514A1)	Mk 52	Solid	68.60	D295
	—	Mk 65	A-3	8.64	Mk 360 (M514A1)	Mk 52	Solid	68.60	D295
	Mk 81 Mk 127	Hi-Frag Mk 64	PBXN-106 A-3	6.37 8.64	M732 Mk 360/1 (M728)	— —	Solid Solid	68.49 68.02	— D295
HE-PD	—	Mk 41	A-3/D	7.87	Mk 30	Mk 43	Plug	68.17	D330
	—	Mk 41	A-3/D	7.87	Mk 30	Mk 52/3	Plug	68.17	D330
	—	Mk 41	A-3/D	7.87	Mk 30	Mk 54	Plug	68.17	D330
	—	Mk 61	Expi-D	7.87	Mk 30	Mk 52/3	Plug	68.17	D330
	—	Mk 61	Expi-D	7.87	Mk 30	Mk 54	Plug	68.17	D330
	—	Mk 64	A-3/D	7.87	Mk 30	Mk 52/3	Solid	68.17	D330
	—	Mk 64	A-3/D	7.87	Mk 30	Mk 54	Solid	68.17	D350
	Mk 80	Mk 64	A-3	7.87	Mk 30/5	Mk 395	Solid	68.17	D330
	Mk 83 —	Hi-Frag Mk 64	PBXN-106 A-3	6.37 7.87	Mk 407 Mk 407/1	— —	Solid Solid	68.83 68.17	D330 —
HE-MT/PD	Mk 115	Mk 64	A-3	8.74	Mk 393	—	Solid	68.39	D338
	Mk 82	Hi-Frag	PBXN-106	6.37	Mk 393	—	Solid	67.68	D340
HE-IR	—	Mk 41	A-3	8.76	Mk 91	—	Plug	70.40	D327
	Mk 107	Mk 64	A-3	7.61	Mk 91	—	Solid	70.40	D327
	Mk 84	Hi-Frag	PBXN-106	6.37	Mk 404	—	Solid	70.40	D342
HE-VT-SD	—	Mk 41	A-3	7.76	Mk 73/2.4	Mk 44/&30	Plug	69.71	D316
	—	Mk 41	A-3	7.76	Mk 73/3.5	Mk 44/&30	Plug	69.71	D317
	—	Mk 64	A-3	7.76	Mk 73/4	Mk 30 bstr	Solid	69.71	D331
	—	Mk 64	A-3	7.76	Mk 73/8.10	Mk 39 bstr	Solid	69.71	D331
	—	Mk 64	A-3	7.76	Mk 73/5	Mk 30 bstr	Solid	69.71	D332
	—	Mk 64	A-3	7.76	Mk 73/9.11	Mk 39 bstr	Solid	69.71	D332
	—	Mk 64	A-3	7.76	Mk 73/13	Mk 39 bstr	Solid	69.71	D332
	Mk 116/0	Mk 64	A-3	7.76	Mk 73/13	Mk 39 bstr	Solid	69.71	D332
	Mk 116/1	Mk 64	A-3	7.76	Mk 73/13	Mk 39 bstr	Solid	69.71	D332
	Mk 86	Hi-Frag	PBXN-106	6.37	Mk 418	—	Solid	68.61	—
	Mk 117/0	Mk 64	A-3	8.64	Mk 73/2.4,8.10	—	Solid	69.59	D331
HC	—	Mk 41	Expi-D	8.74	Mk 30	Mk 43/1	Plug	69.63	D320
	—	Mk 41	Expi-D	8.74	Mk 30	Mk 44/2	Plug	69.63	D320
	—	Mk 41	Expi-D	8.74	Mk 30	Mk 52/3	Mk 31/2	69.63	D320
	—	Mk 41	Expi-D	8.74	Mk 30	Mk 54/2	Mk 31/2	69.63	D320
	Mk 108/0	Mk 61	Expi-D	8.74	Mk 30/5	Mk 395	Mk 33	69.63	D320
	Mk 108/1	Mk 64	A-3	8.74	Mk 399/0	—	Solid	69.63	D339
	Mk 108/2	Mk 64	A-3	8.74	Mk 407/1	—	Solid	69.63	D339
AAC	—	Mk 41	Expi-D	7.38	Mk 25 or 342	Mk 43 or 54	Mk 28 or 31	67.31	D319
	—	Mk 41	Expi-D	7.38	Mk 25 or 342	Mk 43 or 54	Mk 28 or 31	67.31	D319
	—	Mk 41	A-3	7.38	Mk 342	Mk 52/3 or 54	Mk 31/2	67.31	D319
	Mk 121	Mk 61	Expi-D	7.38	Mk 342	Mk 395	Mk 33	67.31	D319
RAP	Mk 58	Mk 78	A-3	3.74	M514A1	Mk 52/0	—	62.00	D325
COM	—	Mk 42	Expi-D	2.14	—	—	Mk 64	70.00	D322

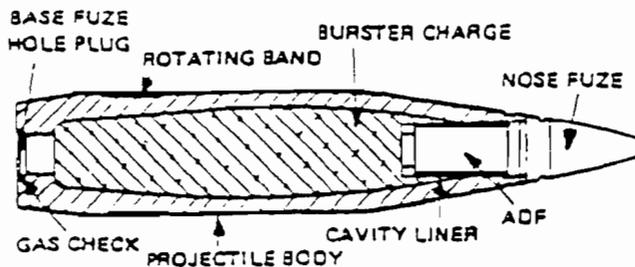


Figure 3-47. 5-Inch, 54-Caliber High Explosive Projectile

3-30.1.1.1. High Explosive, Controlled Variable Time (HE-CVT). This projectile is available with either a high-fragmentation steel body (D346) or a conventional low-fragmentation steel body (D350 or D295). The high-fragmentation body projectile was designed primarily for use against personnel and light surface targets. The HE-CVT can be used in the antiaircraft role in an emergency; however, the reliability is lower than VT or IR fuzed projectiles in this mode. The nose of the projectile body is threaded internally and fitted with a conventional, variable-time radio-frequency proximity and auxiliary detonating fuze. The fuze is separated from the Composition A-3 explosive load by a cavity liner to permit fuze replacement without remote equipment. The base of the projectile is either plugged or solid.

3-30.1.1.2. High Explosive, Point Detonating (HE-PD). This projectile is also available with either a high-fragmentation steel body (D343) or the conventional low-fragmentation steel body (D330). The nose of the projectile body is threaded internally for an auxiliary detonating fuze adapter which is fitted with a point-detonating and auxiliary-detonating fuze, with or without a cavity liner. The low-fragmentation steel body with a Composition A-3 explosive-loaded projectile was designed for use against surface targets vulnerable to an impact burst. The high-fragmentation projectile is explosive loaded with PBXN-106. The base of the projectile is either plugged or solid.

3-30.1.1.3. High Explosive, Mechanical Time/Point Detonating (HE-MT/PD). This high-fragmentation projectile (D340) or low-fragmentation projectile (D338) is fitted with a nose fuze that has the capability of functioning in either a mechanical time or a point detonating mode. The point detonating mode acts as a backup mode if the fuze impacts before the preset time has elapsed. The body is filled with either PBXN-106 (D340) or Composition A-3 (D338). The base of both types are solid.

3-30.1.1.4. High explosive, Infrared (HE-IR). This low-fragmentation, Composition A-3, explosive loaded projectile (D327) or the high-fragmentation, PBXN-106, explosive loaded projectile (D342) is designed exclusively for use

against "hot" airborne targets. The nose of the projectile body is threaded internally and fitted with a variable-time, infrared proximity fuze which has an integral ADF. A point detonating feature is also incorporated into the nose fuze in the event the target is missed. The fuze is separated from the explosive load to permit fuze replacement without remote equipment. The base of the projectile is either plugged or solid.

3-30.1.1.5. High Explosive, Variable Time (HE-VT). This low-fragmentation steel body projectile (figure 3-46) is designed for use against targets that are vulnerable to air-burst. The nose of the projectile body is threaded internally and fitted with a variable-time, radio-frequency proximity fuze, which is supplemented by a booster. A self-destruct capability is incorporated into the nose fuze of projectiles D316 and D331. Beginning in the mid 1970s, the self-destruct feature was determined to be no longer required for modern warfare tactics and will eventually be phased out. The self-destruct feature is omitted in projectiles D317 and D332. The nose fuze is separated from the Composition A-3 explosive load by a cavity liner to permit fuze replacement without remote equipment. The base of the projectile is either plugged or solid.

3-30.1.2. High Fragmentation (HI-FRAG).

WARNING

HI-FRAG projectiles dropped less than 5 feet shall be examined carefully for joint separation and damaged rotating bands. Projectiles dropped more than 5 feet shall be disposed of in accordance with OP 5. Accidental drop of a projectile often results in widening of the mid-body joint between the forward and aft projectile halves. If a projectile is found with a joint opening exceeding 1/16 inch (the thickness of a U.S. penny), the round should be set aside for return to an ammunition activity. Accidental drop of a projectile may result in a cracked or broken rotating band. These projectiles warrant close band inspection. If a cracked or broken rotating band is found, the round should be set aside for return to an ammunition activity.

The HE-CVT Mk 81, HE-PD Mk 83, the HE-MT/PD Mk 82, and the HE-IR Mk 84 HI-FRAG projectiles (figure 3-48) are general purpose rounds, designed for a multitude of tasks including antiaircraft fire, shore bombardment, and use against unarmored or lightly armored ships and vehicles. These projectiles combine high lethality, extended range, tighter dispersion, and greater freedom from disastrous premature firings. Each projectile consists of

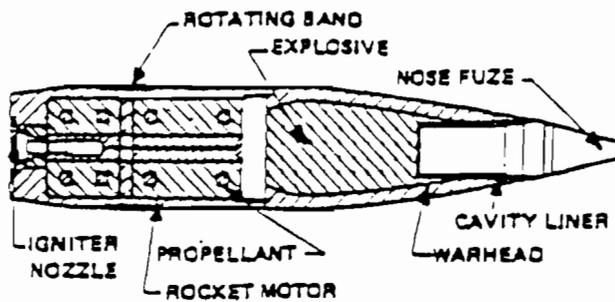


Figure 3-51. 5-Inch, 54-Caliber Rocket Assisted Projectile

be fired with a cartridge having a 1-inch-diameter by 2-5/8-inch-deep hole centered in the front face of the plug. Cartridges equipped with either cork or plastic plugs with holes will normally be supplied by a depot. The rocket motor is ignited when the gas pressure generated by the propelling charge propellant flexes a bellville spring which strikes a percussion primer assembly, initiating the pyrotechnic delay column. After a 23-second delay, the delay column burns the ignition charge, which ignites the propellant grain in the rocket motor. When the motor is ignited the igniter, which is sealed into the motor case base with a gas check gasket, is blown out. The rocket assistance extends the projectile range by approximately 6300 yards.

3-30.1.6. Common (COM). The COM projectile (figure 3-52) is designed to penetrate approximately one-third of its caliber of armor. This projectile has both a base plug and a BDF. Once inside the target, the delayed-action base fuze functions to detonate the explosive filler. Prior to modern gun fire control system technology, various colored spotting dyes were used to identify firing accuracy. Dyes are no longer required, and issues may or may not have dyes included. The projectile, which is made of forged steel, is loaded with 2.14 pounds of Explosive D.

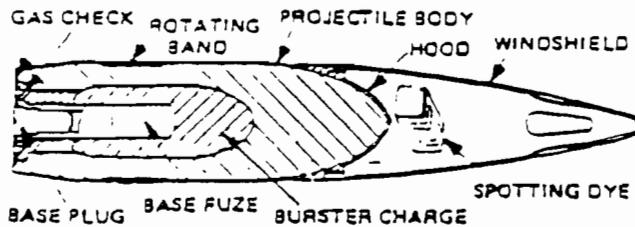


Figure 3-52. 5-Inch, 54-Caliber Common Projectile

3-30.1.7. Illuminating (ILLUM). The ILLUM projectile (figure 3-53) is designed to deploy a parachute-suspended pyrotechnic candle for target illumination. The projectile illuminating load and a small black powder explosive charge are sealed within the mechanical time fuze projectile by a

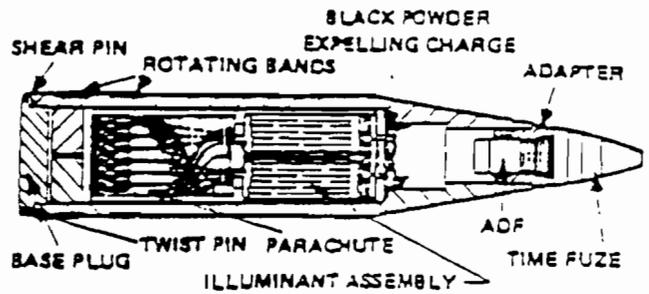


Figure 3-53. 5-Inch, 54-Caliber Illuminating Projectile

base plate. When the MTFs and the ADFs function, the ADF ignites the black powder which expels the projectile illuminating load. The illuminating composition is a powdered magnesium mixed with an oxidizer which burns for approximately 50 seconds with a candlepower of 600,000 lumens.

3-30.1.8. White Phosphorus (WP) (Smoke). The intended use of the WP projectile (figure 3-54) is to provide spotting, antipersonnel screening, and limited incendiary effects. It may be used with a PDF (D314) or with an MTF (D313). When the fuze functions, it sets off the expelling charge which ignites the delay element and forces the canister (Mk 14) from the rear of the projectile. The burster tube of the canister detonates and disperses a cloud of white phosphorus approximately 50 yards in diameter and lasts 7 minutes in still air. The tendency of white phosphorus to break into very small pieces that burn rapidly and its low melting point led to coating white phosphorus with synthetic rubber. This coated product is called plasticized white phosphorus (PWP).

NOTE

Both WP and PWP can be extinguished by immersion in water. To prevent reignition after drying, copper sulfate can be used.

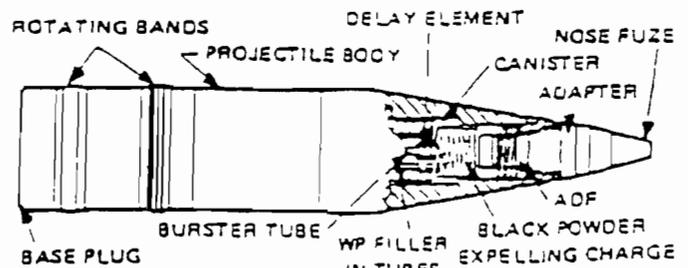


Figure 3-54. 5-Inch, 54-Caliber White Phosphorus Projectile

of black powder. Ignition of the expelling charge by the fuze discharges a payload of foil strips which reflects the radar beams. The useful lifetime of a chaff cloud is generally 10 minutes, provided that: (a) the cloud attains maximum size 15 seconds after the chaff is dispensed at a selected fuze time, (b) the fall rate factor is 2 feet per second, and (c) the wind turbulence is at a minimum.

3-30.1.12. Blind Loaded, Plugged (BL-P). Various conventional projectile bodies are filled with inert material to bring them within the weight tolerance of the service projectile. The high fragmentation body is loaded with beakers filled with inert material. Noses are fitted with dummy nose plugs. Bases are either plugged or solid, as applicable.

3-30.1.13. Dummy. The conventional projectile bodies are filled with inert material to bring them within the weight tolerance of the service projectiles. Before filling the projectile bodies, the rotating bands of the projectiles are machined so that projectile surfaces are flush. Either a

dummy nose plug or an inert MTF Mk 342 Mod 1 is used for the nose fuze. Bases are plugged or solid, as applicable.

3-30.2. Propelling Charge. The propelling charge is that component of the complete round that provides the force to propel the projectile from the gun to the target. Assembly of the propelling charge in a single, rigid protective case increases the ease and rapidity of loading and reduces the danger of flare-backs. Also, case-loaded ammunition prevents the escape of gases toward the breech of the gun. The case expands from the heat and pressure of the exploding propellant and forms a tight seal against the gun barrel chamber. Table 3-10 is a listing of variations that are available, either through material change, means of manufacturing, method of assembly, or specialized application.

3-30.2.1. Full or Reduced Charge. The propelling charge, full or reduced (figure 3-58), consists of a brass or steel cartridge case of a straight taper design. The propelling charge is assembled with Primer Mk 153 or Mk 45 (electric) and loaded with 17.5 (SPD) or 20.0 (SPCF) pounds of smokeless powder (propellant) in the full service charge and

Table 3-10. 5-Inch, 54-Caliber Propelling Charge Data

Type	Cartridge case	Primer	Propellant		Closure plug	DODIC
			Type	Weight (lb)		
Full charge, nonflashless	Mk 7 Brass or Mk 9 Steel	Mk 45 Electric	SPD	17.5	Mk 9 Cork	D304
Full charge, flashless	Mk 7 Brass or Mk 9 Steel	Mk 45 Electric	SPDF	17.5	Mk 9 Cork	D305
Full charge, universal	Mk 9 Steel	Mk 45 Electric	SPCF	20.0	Mk 9 Cork	D324
Full charge, universal	Mk 9 Steel	Mk 45 Electric	SPCF	20.0	Mk 12 Polyurethane	D326
Reduced charge, flashless	Mk 9 Steel	Mk 153 Electric	SPDF	6.2	Mk 9 Cork	D297
Clearing charge	Mk 9 Steel Modified	Mk 48/2 Electric	SPCF	10.0	Elastomeric or Cured Polyurethane	D296
Dummy charges	Brass or Steel	—	—	—	Bronze or Steel	D308
Test cartridge	Mk 5 Brass Modified	Mk 15 Lock	—	—	—	DW46
<u>Special Charges</u>						
Full charge, flashless	Mk 9 Steel	Mk 45 Electric	M26	20.0	Mk 9 Cork	D300
<u>Unserviceable-NAR-15-74</u>						
Full charge, nonflashless	Mk 6 Brass	Mk 13 Combination	SPD	17.5	Mk 3 or Mk 6 Cork	D309
Full charge, flashless	Mk 6 Brass	Mk 13 Combination	SPDF	17.5	Mk 3 or Mk 6 Cork	D310

Appendix C

Dive Brief

DIVE BRIEF

1. Diving Conditions

- Water Temperature
- Weather for the Day
- Current
- Visibility in Water
- Recompression Chamber Status
- Scheduled Water Traffic
- Expected Depth of Dive
- Dive Profile
- Underwater Hazards (entanglement, bottom debris, etc.)

2. Diving Operations

- Purpose of Dive
- Progress Update
- Progress Expected Today
- Dive Team Assignments
- Diving Support Assignments
- Diver Recall Procedures
- Diver Communication
- Diver Casualty Procedures

3. UXO

- UXO Recon
- Safety Precautions for Target Ordnance

4. Safety

- Diving Support Safety
- Diving Safety (Diving Supervisor covers topic from Navy Diving Manual each morning.)
- Emergency Transport Routes

Safe Environment, Inc.

Diving Plan

For

Naval Base Charleston

AOCs 500 and 502

Table of Contents

SECTION ONE -- INTRODUCTION	1
A. Applicability	1
B. Background.....	1
C. Site Conditions.....	1
D. Procedures	1
SECTION TWO -- DIVE PLAN.....	2
A. Dive Station Assignments	2
B. Dive Station.....	3
C. Diving Operations	4
D. Diving Emergencies	4
E. Boating Safety	5
APPENDICES	
Appendix A -- Emergency Contact Numbers	A-1
Appendix B -- Target UXO Description	B-1
Appendix C -- Dive Brief	C-1
Appendix D -- Commercial Diving Operations	D-1
Appendix E -- Contract Diving Operations	E-1
Appendix F -- Diver Line Pull Signals	F-1
Appendix G -- Diving Safety and Planning Checklist	G-1

Section One -- Introduction

A. Applicability

This Diving Plan, as an annex to the client-provided work plan, is intended to be used solely by Safe Environment, Inc. (SEI) divers. SEI divers have received their diving training through the U.S. Navy and hold U.S. Navy Diver Identification Cards. Additionally, they are all graduates of the Naval School, Explosive Ordnance Disposal, Indian Head, MD.

B. Background

Naval Base Charleston has two underwater sites where unexploded ordnance (UXO) items are known to exist. AOC 500 is located at the northwest end of Pier T in Zone J, where two MK 47 depth bombs were dropped in 1945. It is a 90,000 square foot area (2.1 acres) with depths ranging from 5 to 30 feet. Appendix B provides an illustration and sufficient information to identify the MK 47 depth bomb.

AOC 502 is located at the southwest end of pier G in Zone J, where three 5 inch projectiles were dropped in 1944. It is also a 90,000 square foot area (2.1 acres) with depths ranging from 5 to 35 feet. Appendix B provides an illustration and sufficient information for positive identification of 5 inch projectiles of WWII vintage.

C. Site Conditions

The water current at both locations is anticipated to be less than one knot, with typical harbor sediment accumulations, metallic debris other than UXO, and limited visibility. The underwater investigation of both AOCs are planned for late spring to allow for warmer water temperatures to maximize bottom time.

D. Procedures

The White Pulse Induction 2000 is no longer in production and will not be available for the geophysical search. This instrument has been superseded by the White Surfmaster PI, which uses the same detection principle of pulse induction, has improved discrimination between metal types, and same detection capability. The water tight integrity depth limit is 100 feet, which should not become a factor at either of the AOCs.

Standard U. S. Navy diving procedures will be followed using Volume 1. U.S. Navy Diving Manual. The underwater search will utilize the jack stay search grid procedure to ensure overlapping coverage in the anticipated limited visibility.

Standard U. S. Navy underwater UXO reconnaissance procedures will be followed using EODB60A-1-1-37, **less confidential pages**.

Section Two -- Dive Plan

A. Dive Station Assignments

SEI divers assigned to this investigation are senior personnel, and are qualified to rotate through all dive station positions. This will ensure all divers have adequate surface intervals and equal time in the water. The SEI Site PM for this project, Mr. Lee Dickson, will also rotate through all dive station positions as well as manage contract and day-to-day operations. Mr. Dickson will initiate and maintain a daily site log detailing field operations.

Diving Supervisor - will obtain daily marine weather forecast, call recompression chamber for status and inform chamber of the day's dive schedule, call harbor control to notify that divers are in the water and their location and inquire of ship and sonar activity in the immediate area. The Diving Supervisor will brief the dive station on the schedule and make diving assignments the day before the dive. Contents of the dive brief are contained in Appendix C.

Standby Diver - will be fully dressed and ready to enter the water on command by the Diving Supervisor; maintain daily dive log; assist the Diving Supervisor in monitoring divers' position and watching for surface hazards such as incoming vessels or small boats.

Red Diver - will be physically ready and mentally alert to dive the plan and perform geophysical investigations in jack stay grid; check out diving equipment prior to entering water; check out Surfmaster PI prior to dive; assist in jack stay placement and advancement prior to diving; review and sign his dive log and complete a repetitive dive sheet prior to entering the water for a second dive in the same work day.

Green Diver - will be physically ready and mentally alert to dive the plan and perform anomaly investigation and marking in jack stay grid; check out diving equipment prior to entering water; change positions with Red Diver at start of each new search leg to prevent operator tone fatigue on Surfmaster PI; assist in jack stay placement and advancement prior to diving; review and sign his dive log and complete a repetitive dive sheet prior to entering the water for a second dive in the same work day.

Diver Tender (2 each) - will assist in jack stay placement and advancement; assist in monitoring divers' position and watching for surface hazards; maintain line pull communication by **receiving** and **returning** only then verbally relaying signal to Diving Supervisor. Diver Tender will not initiate diver pull signals which may cause diver to inadvertently move UXO; prepare and maintain boats for daily work.

Shore Logistics Supervisor - will ensure dive tanks are filled and ready prior to each dive; assist in dive station setup and dismantling; assist in loading and unloading jack stay rigging; maintain first aid kit in readiness; maintain and position vehicle for emergency transport of diver if necessary; become familiar with route to recompression chamber and hospital. Maintain daily supply of fuel and oil for boats and set up refueling station with spill prevention and containment equipment; standby for other assignments from Diving Supervisor.

B. Dive Station

The dive station will be transported and stored in a 16-20 foot cargo truck, removed and staged on the pier at a point giving access to and visibility of the portion of the AOC being investigated. The dive station will be disassembled and loaded into the truck for safe overnight storage and may be taken off base if desired. The dive station shall consist of the following equipment:

1. Dive Gear - All divers will be responsible for their personal dive gear:

- a) Personal Dive Gear
 - Mask, one per diver and one spare.
 - Fins, one pair per diver and one extra pair.
 - Dive Knife, one per diver and one spare.
 - Watch, one per diver and one spare.
 - Depth Gage one per diver and one spare.
 - Buoyancy Compensating Device (BCD), one per diver.
 - Regulator, one per diver and one spare.
- b) Scuba Cylinders, 10 each.
- c) Diving Supervisor Box.

2. Safety Equipment:

- Stretcher
- PFDs, 7 each
- Cellular
- Oxygen bottle w/valve, hose, and mask
- Blankets
- EMT Kit
- Flash lights
- Liquids, hot and cold

3. Support Equipment:

- Saw
- Tape
- Tarp, 10'x20'
- Buoys, 40 each
- General Tool Box
- Shackles, various sizes
- Pulleys, small and large sizes
- Clumps (concrete blocks), 40 each
- Line, 1800 feet 0.5 inch dia polypropylene
- Leather work gloves, 1 pair per diver, and 3 extra pairs

APPENDIX D
Safe Environment Inc. Final Report

FINAL Report

**Search, Locate and Destroy
Ordnance**

Contract #N62467-97-M-4503

Prepared for:

**Navy Public Works Center
Charleston Naval Shipyard
Charleston, South Carolina**

Prepared by:

**Safe Environment, Inc.
11005 Edgepark Circle, Suite 102, Manassas, VA 20109
Ph: 703-392-7200 •* Fax: 703-392-6620
E-mail: nobombs@erols.com**

May 5, 1998

Table of Contents

1.0 Introduction.....	1
1.1 General.....	1
1.2 Location.....	1
2.0 Scope of Work Execution.....	1
2.1 Personnel Training.....	1
2.2 Equipment.....	1
2.3 Procedures.....	2
3.0 Scope of Work Completion.....	2
3.1 Exposure Data.....	2
3.2 Search Area Investigation.....	3
4.0 Summary.....	3
4.1 Conclusions.....	3
4.2 Quality Control (QC) Checks.....	3
5.0 Waste Generation.....	3

Appendix A – Scope of Work
Appendix B – Photographs
Appendix C -- Search Grid Summary
Appendix D – Site Logs

1.0 Introduction

1.1 General

Safe Environment, Inc. (SEI) was awarded a contract by the Navy Public Works Center, Charleston Naval Shipyard, Charleston, South Carolina to search, locate, and destroy ordnance at Area of Concern (AOC) 500 and Area of Concern (AOC) 502 that were dropped into the water of the Cooper River from Naval war ships. The work was performed under Contract #N62467-97-M-4503. This effort was mandated in accordance with the requirements of the South Carolina Department of Environmental Control, the United States Environmental Protection Agency, and the Department of Defense Explosive Safety Board (DDESB) Ammunition and Explosive Safety Standards for real property contaminated with ammunition and explosives.

1.2 Location

AOC 500 and AOC 502 are located in the Cooper River, Charleston Naval Shipyard, Charleston, South Carolina. AOC 500 is located at the northwest end of Pier T in Zone J, which is located in the Cooper River (see Appendix A, Figure 1). AOC 502 is located at the southwest end of Pier G in Zone J, which is located in the Cooper River (see Appendix A, Figure 2).

2.0 Scope of Work Execution

2.1 Personnel Training

SEI divers received their diving training through the U.S. Navy and hold U.S. Navy Diver identification cards. Additionally, they are all graduates of the Naval School, Explosive Ordnance Disposal, Indian Head, MD.

2.2 Equipment

The dive station was transported and stored in a 15 foot cargo truck, removed and staged on the pier at a point giving access to and visibility of the portion of the AOC being investigated. The dive station was disassembled and loaded into the truck for safe overnight storage. The dive station consisted of the following equipment:

1. Dive Gear - All divers will be responsible for their personal dive gear:

a) Personal Dive Gear

- Mask, one per diver and one spare.
- Fins, one pair per diver and one extra pair.
- Dive Knife, one per diver and one spare.
- Watch, one per diver and one spare.
- Depth Gage one per diver and one spare.
- Buoyancy Compensating Device (BCD), one per diver.
- Regulator, one per diver and one spare.

- b) Scuba Cylinders, 10 each.
- c) Diving Supervisor Box.

2. Safety Equipment:

- Stretcher
- PFDs, 7 each
- Cellular
- Oxygen bottle w/valve, hose, and mask
- Blankets
- EMT Kit
- Flash lights
- Liquids, hot and cold

3. Support Equipment:

- Saw
- Tape
- Tarp, 10'x20'
- Buoys, 40 each
- General Tool Box
- Shackles, various sizes
- Pulleys, small and large sizes
- Clumps (concrete blocks), 40 each
- Line, 1800 feet 0.5 inch dia. polypropylene
- Leather work gloves, 1 pair per diver, and 3 extra pairs
- G-881 magnetometer (2)
- 18 ft. wide beam work boat

2.3 Procedures

Standard U.S. Navy diving procedures were followed using the U.S. Navy Diving Manual, Volume 1. The underwater search utilized the jackstay search grid method to ensure overlapping coverage in the AOCs.

Standard U.S. Navy underwater UXO reconnaissance procedures were followed using EODB 60A-1-1-37, less confidential pages.

3.0 Scope of Work Completion

3.1 Exposure Data

- Total dive time = 45 hours
- Total dive support time = 465 hours
- Total equipment/logistics time = 98 hours

3.2 Search Area Investigation

Refer to Appendix C, Search Grid Summary.

4.0 Summary

4.1 Conclusions

A thorough search of AOC 500 and AOC 502 was conducted using the "jackstay" search method. This method was used because it provides excellent search coverage in waters with poor visibility and it permits overlapping coverage of the search area. The "jackstay" is the most effective diver search technique for murky water when a relatively large area must be covered with any degree of thoroughness. The target ordnance at AOC 500 and AOC 502 was not found at a search depth of 4 feet below the river bottom. The items are either several more feet below the river bottom in the soft silt and sediment or the items were dredged up and deposited on land at some point in time.

4.2 Quality Control (QC) Checks

The results of Quality Control checks for each AOC are listed below. A circle search of AOC 500 was used as the preferred method of QC check for this area. The jackstay method was used as the preferred method of QC check for AOC 502.

- **AOC 500 – QC of "T" Pier U/W Search**

Wednesday, 29 April 1998

Executed circle search of "T" pier U/W search.

Measured 50' from beginning of pier and 60' out in the water for center of circle search. Circled at 6', 12', 18', 24' and 30' radii.

Results: Found piece of net but no metals.

- **AOC 502 – QC of "G" Pier U/W Search**

Wednesday, 29 April 1998

Executed jackstay search of "G" pier.

Searched a rectangular area from 70' to 120' mark on the pier and from 10' to 35' out in the water.

Results: Found crumpled soda can and "D" cell battery.

5.0 Waste Generation

No hazardous waste was generated during this project. No waste was generated other than household type refuse, all of which was removed from the job site at the end of each work day and disposed of in proper trash bins. No pier side refueling was done during the operation.

Appendix A
Scope of Work

OFFICER IN CHARGE OF CONSTRUCTION
BUILDING 30, NAVAL BASE
CHARLESTON, SOUTH CAROLINA

SPECIFICATION FOR: UNEXPLODED ORDNANCE (UXO) SEARCH, EXCAVATE,
& DISPOSAL

1. INTRODUCTION: NAVBASE Charleston has two waterborne sites where exploded ordnance (UXO) are known to have existed. These areas are listed as Areas of Concern (AOC) numbered 500 and 502. These sites are identified in the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Zone J dated June 9, 1995 provided by Ensafe/Allen and Hoshall of Memphis TN. The only documentations of the description and location of these UXOs are Charleston Naval Base maps. A description and location of each of these sites are listed below:

1. AOC 500: The scope of work for Area of Concern (AOC) 500 consist of searching, locating and destroying ordnance that has been dropped into the waters of the Cooper River from naval war ships. The ordnances at AOC 500 consist of two Mark 47 Torpex loaded depth bombs, which were dropped on January 28 1945. AOC 500 is located at the northwest end of Pier T in Zone J, which is located in the Cooper River identified on map H606-285 at coordinates M-16, at a depth varying from 5 to 30 feet (See Figure 1). The area to be searched has been defined to an area approximately 300 feet by 300 feet adjacent to the end of Pier T on the Charleston Naval Base. Explosive disposal of unexploded ordnance (UXO) is to be performed by the active duty Navy EOD unit with cognizant EOD response authority for the Charleston Naval Base. A geophysical investigation will need to be performed with a Whites Pulse Induction 2000 Underwater Metal Detector or an equivalent instrument. The objective of the subsurface geophysical survey is to accurately locate and record the location of target anomalies (potential UXO) for excavation, investigation and removal actions. Once anomalies are located, they will need to be excavated to the point that positive identification can be determined and large enough to permit placement of an explosive charge by the Navy EOD Team. This effort is mandated in accordance with the requirements of the South Carolina Department of Environmental Control, the United States Environmental Protection Agency, and the Department of Defense Explosive Safety Board (DDESB) Ammunition and Explosive Safety Standards for real property contaminated with ammunition and explosives. All proposed on-site personnel shall have received Hazardous Waste Operations and Emergency Response (HAZWOPER) training, in accordance with Title 29 Code of Federal Regulations (CFR) 1910.120(e) and be enrolled in a medical surveillance program, per 29 CFR 1910.120(f).

2. AOC 502: The scope of work for Area of Concern (AOC) 502 consist of searching, locating and destroying ordnance that has been dropped into the waters of the Cooper River from naval war ships. The ordnances at AOC 502 consist of three 5 inch shells, which were dropped in September 1944. AOC 502 is located at the southwest end of pier G in Zone J, which is located in the Cooper River identified on map H606-284 at coordinates K-35, at a depth varying from 5 to 35 feet (See Figure 3). The area to be searched has been defined to an area approximately 300 feet by 300 feet adjacent to Pier G on the Charleston Naval Base. Explosive disposal of unexploded ordnance (UXO) is to be performed by the active duty Navy EOD unit with cognizant EOD response authority for the Charleston Naval Base. A geophysical investigation will need to be performed with a Whites Pulse Induction 2000 Underwater Metal Detector or an equivalent instrument. The objective of the subsurface geophysical survey is to accurately locate and record the location of target anomalies (potential UXO) for excavation, investigation and removal actions. Once anomalies are located, they will need to be excavated to the point that positive identification can be determined and large enough to permit placement of

an explosive charge by the Navy EOD Team. This effort is mandated in accordance with the requirements of the South Carolina Department of Environmental Control, the United States Environmental Protection Agency, and the Department of Defense Explosive Safety Board (DDESB) Ammunition and Explosive Safety Standards for real property contaminated with ammunition and explosives. All proposed on-site personnel shall have received Hazardous Waste Operations and Emergency Response (HAZWOPER) training, in accordance with Title 29 Code of Federal Regulations (CFR) 1910.120(e) and be enrolled in a medical surveillance program, per 29 CFR 1910.120(f).

2. CURRENT CONDITIONS: The waterborne UXOs (AOCs 500 and 502) have had no previous investigation to date. These sites have not been previously investigated by Ensafe/Allen and Hoshall of Memphis, TN., due to these sites' special nature. An Explosive Ordnance Disposal (EOD) subcontractor has been selected to conduct these investigations.

3. INTERIM MEASURES OBJECTIVE: The objective of this interim measure (IM) for sites AOC 500 and 502 is to locate, excavate and expose UXO to the point that permits the placement of an explosive counter charge by a Navy EOD Unit.

4. DESCRIPTION OF EXECUTION:

4a. SEARCH AREA: The search area of AOC 500 and 502 will both consist of a 300' x 300' area as shown in Figures 1 and Figure 3. A "Jack Stay" search method will be used to ensure complete coverage of each AOC. The Jack Stay method is proposed because it provides excellent search coverage in waters with poor visibility and it permits overlapping coverage of the search area.

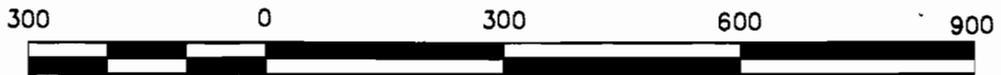
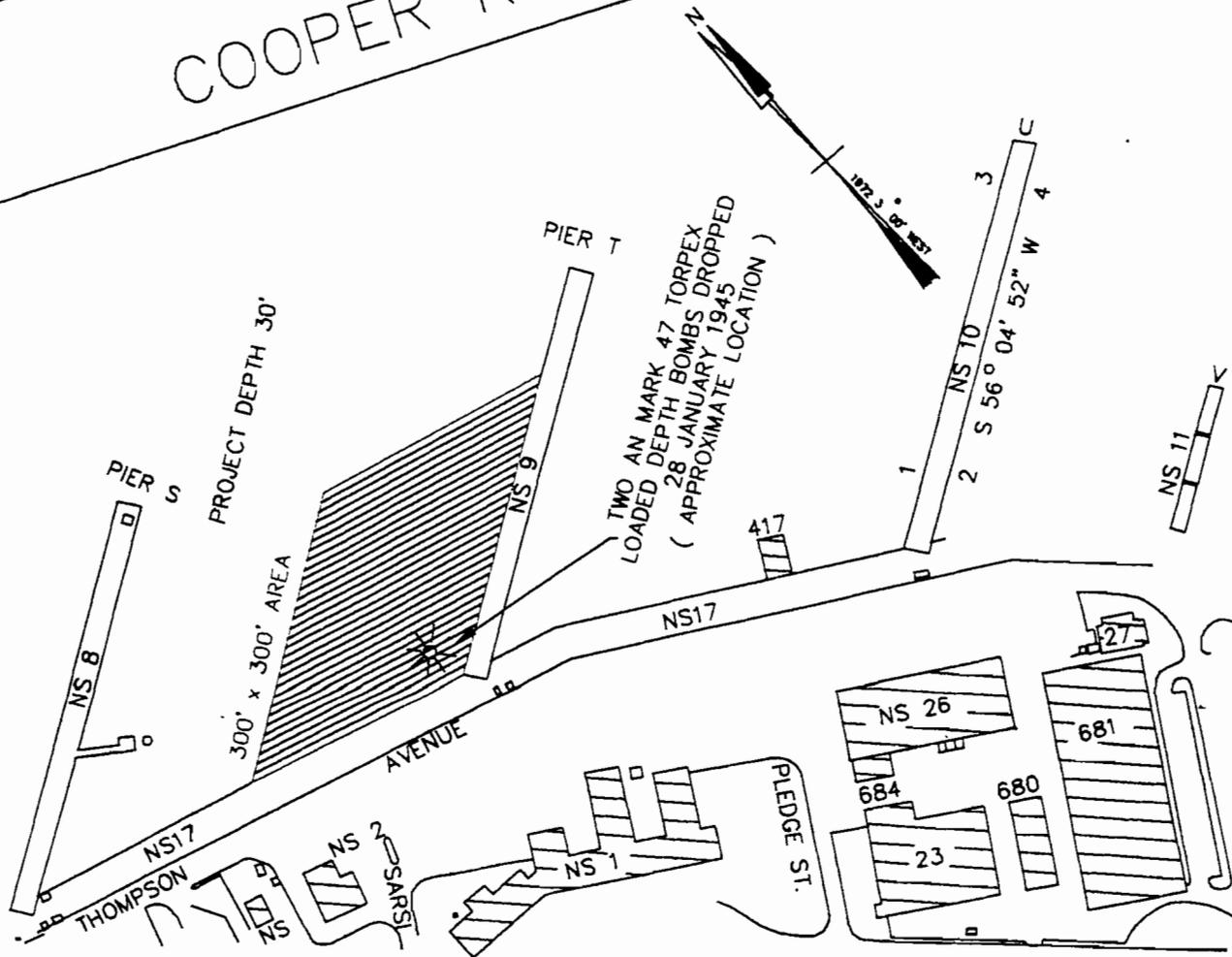
4b. UXO SUBSURFACE GEOPHYSICAL SURVEY: The objective of the subsurface geophysical survey is to accurately locate and record the location of target anomalies (potential UXO) for excavation, investigation and removal actions. Ordnance subcontractors proposes to use the White Pulse Induction 2000 Underwater Metal Detector. The instrument maintains water tight integrity to a depth of 200 feet of sea water and is capable of detecting 5-inch projectiles at a depth of 4 feet.

4c. EXCAVATION: Ordnance subcontractors will perform minor dredging operations and/or physical removal of soil to determine the profile of the anomaly by depth, size, relative shape to ascertain if the anomaly is representative of a target item. Due to the deep silt anticipated, cofferdams may be constructed from 55-gallon drums with the ends removed to facilitate excavation of the site. Anomalies will only be excavated to the point that permits positive identification. In the case of UXO, excavations will be expanded to permit placement of an explosive charge by the Navy EOD Team.

4d. DISPOSAL OF ORDNANCE: Charleston Navy Weapons Station Mobile Unit Six Detachment 14 will be contacted to dispose of any recovered UXO. Detachment 14 will perform disposal actions with standard operating procedures.

AOC 500

COOPER RIVER

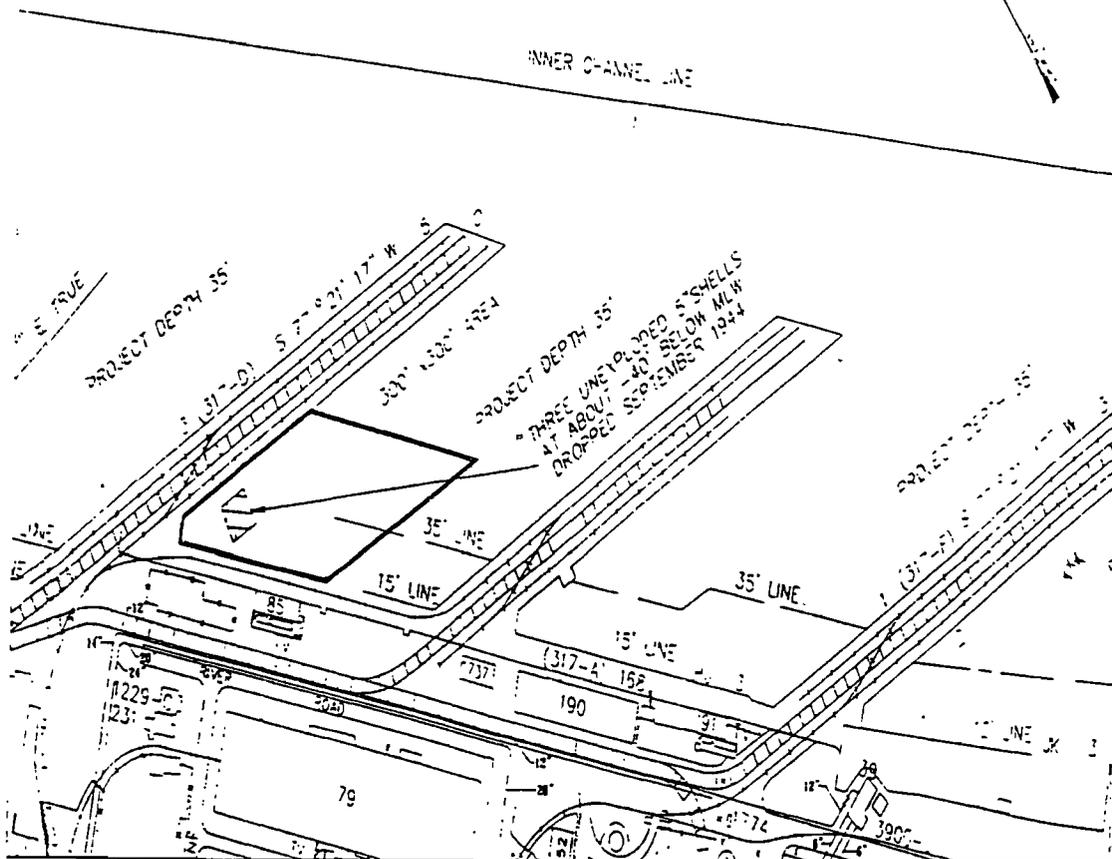


GRAPHIC SCALE

AOC 502



GRAPHIC SCALE



Appendix B
Photographs



Dive Station Preparation



Crew en route to job site



Preparing to dive



Entering the water



Divers en route to search area



Diver on water surface in search area



Divers entering boat after concluding search



Crew returning from job site

Appendix C
Search Grid Summary

AOC 502: Diver progress at "G" Pier, Charleston Naval Station

Monday, 20 April 1998

- 0 Sheet metal, welding rods, wire. Oyster shells & mud bottom.
- 10 Sheet metal, metal object, welding rods. Oyster shells & mud bottom.
- 20 Flange, welding rods, woods & wire. Oyster shells & mud bottom.

Tuesday, 21 April 1998

- 30 Welding rods, pc. metal. Mud & silt bottom.
- 40 Rescue buoy stand, welding rods. Mud & silt bottom.
- 50 Pc pipe, 3' diameter pipe running across lane. Mud & silt bottom.
- 60 Paint can, welding rods. Mud & silt bottom.
- 70 Welding rods. pc metal. Mud & silt bottom.
- 80 Tin can, "D" cell batteries, welding rods. Mud & silt bottom.
- 90 Welding rods, deep cut on bottom from dredge operations.
- 100 Welding rods. Mud & silt bottom.
- 110 Mud & silt bottom.
- 120 Mud & silt bottom.
- 130 Found paint shack. Mud & silt bottom.
- 140 Paint shack in lane. Mud & silt bottom.
- 150 Paint shack in lane. Mud & silt bottom.
- 160 Soda can. Mud & silt bottom.
- 170 Mud & silt bottom.
- 180 Mud & silt bottom.
- 190 Mud & silt bottom.

Wednesday, 22 April 1998

- 200 Mud & silt bottom.
- 210 Mud & silt bottom.
- 220 Mud & silt bottom.
- 230 Mud & silt bottom.
- 240 Mud & silt bottom.
- 250 Mud & silt bottom.
- 260 Mud & silt bottom.
- 270 Mud & silt bottom.
- 280 Mud & silt bottom.
- 290 Mud & silt bottom.

AOC 502: Diver progress at "G" Pier, Charleston Naval Station

Thursday, 23 April 1998

- 300 Mud & silt bottom.
- 310 Mud & silt bottom.
- 320 Mud & silt bottom.
- 330 Mud & silt bottom.
- 340 Mud & silt bottom.
- 350 Mud & silt bottom.
- 360 Metal beam. Mud & silt bottom.
- 370 Metal beam. Mud & silt bottom.
- 380 Mud & silt bottom.
- 390 Soda can. Mud & silt bottom.
- 400 Light bulb. Mud & silt bottom.
- 410 Mud & silt bottom.
- 420 Mud & silt bottom.
- 430 Mud & silt bottom.
- 440 Mud & silt bottom.
- 450 Mud & silt bottom.
- 460 Mud & silt bottom.
- 470 Pc of flexible hose. Mud & silt bottom
- 480 Mud silt bottom.
- 490 Crumpled soda can. Mud & silt bottom.
- 500 Small pc metal. Mud & silt bottom.
- 510 Flange. Mud & silt bottom.
- 520 Mud & silt bottom.
- 530 Mud & silt bottom.
- 540 Mud & silt bottom.
- 550 Mud & silt bottom.
- 550 End of AOC 502 search area.

AOC 500: Diver progress at "T" pier, Charleston Naval Station

Friday, 24 April 1998.

300 First lane. Mud & silt.
290 Mud & silt bottom.
280 Mud & silt bottom.
270 Mud & silt bottom.
260 Mud & silt bottom.
250 Mud & silt bottom.
240 Mud & silt bottom.
230 Mud & silt bottom.
220 Mud & silt bottom.

Monday, 27 April 1998

210 Mud & silt bottom.
200 3 bottle caps. Mud & silt bottom.
190 Mud & silt bottom.
180 Mud & silt bottom.
170 Mud & silt bottom.
160 Mud & silt bottom.
150 Mud & silt bottom.
140 Mud & silt bottom.
130 Mud & silt bottom.
120 Mud & silt bottom.

Tuesday, 28 April 1998

110 Mud & silt bottom.
100 Mud & silt bottom.
90 Old broken piling. Mud & silt bottom.
80 Old broken piling. Mud & silt bottom.
70 Short piece of cable. Mud & silt bottom.
60 Small can. Mud & silt bottom.
50 Small piece of sheet metal & welding rods.
40 Welding rods & 10' piece of pipe. Mud & silt bottom.
30 Welding rods & pc sheet metal. Steep drop from dredging operations.
20 Welding rods & broken piling.
10 Welding rods, can, pieces of angle iron & pipe.
00 Cans, welding rods, pieces of angle iron & pipe, broken piling.
00 End of AOC 500 search area.

Appendix D

Site Logs

4-20-98 CHARLESTON ADCs 500 AND 502 Monday

0630 SET DIVE TEAM ARRIVED AT PASS OFFICE, FORMER NAVAL STATION
CHARLESTON, SC.

0700 MET TOM HARDIN FROM CHARLESTON ENVIRONMENTAL DETACHMENT. OBTAINING
BADGES AND VEHICLE PASS FOR TRUCK. DISCUSSED PARKING AND ACCESS TO
SHIPYARD AREA FOR ADC

0730 DEPARTED PASS OFFICE, PARKED POV'S; DROVE TRUCK TO G PIER AREA;
LAUNCHED SET BOAT; TOOK CHARGE OF BOAT PROVIDED BOAT. CIVILIAN BARGE
BLOCKED SIGNIFICANT PORTION OF SEARCH AREA. BARGE WAS RELOCATED
BY 11:30.

11:00 HOLD SAFETY BRIEFING AND OPS BRIEFING WITH TOM HARDIN ATTENDING

11:30 BEGAN JACKSTAY PREPARATION AND CORNER REFERENCE BUOY PLACEMENT

14:20 DIVERS IN THE WATER RUNNING JACKSTAY Laterally BETWEEN
PIERS. COMPLETED 2 JACKSTAY LANES. ITEMS FOUND:
WELDING RODS, SCRAP IRON, SLAG, PIPE SECTIONS, RUST SCALE,
AND FLANGE SECTIONS. DIVERS OUT AT 16:05, DIVE DEPTH 10'.

16:15 CLEANED GEAR, BROKE DIVE STATION AND LEFT G PIER AT

16:50 16:50.

16:55 RETRIEVED BOATS & CLEANED REMAINING GEAR

4-21-98 Charleston ROCE 500 and 502 Tue

0630 Departed Hotel in two groups one group to launch boat and transit to pier G. The other group to pier G to set up dive station.

0800 Tailgate Safety Brief

0815 Dive Sup Brief

0838 First Divers in water (Jenkins - Skip) B-T 122

1044 2nd set of Divers in water (Bhansal - Dickson) B-T 1:10

1100 Phil went to Dive Shop to charge empty tanks and to buy more weights.

1250 3rd Divers in water (Take - Beers) B-T 1:24

1448 4th Divers in water (Kate - Skip) B-T 1:51

Dive Sup & Standby for 1st Dive ^{on} Take - Beers

2nd Take - Kate

3rd Jenkins

4th Skip

Take

1550 Secured diving ops started gear clean up

1630 Recoured boat, took all hand on tour of next dive

site at pier T

1645 Washed down boat with fresh water, took empty tanks to Dive Shop

1700 Secured for the Day

4-21-98 CONT

1330 DIVERS FOUND YARDS LEFT DOG HOUSE IN LANE NO. MID LANE
PUT MARKER ON IT.

DIVERS FOUND SAME ITEMS AS THE DAY BEFORE.

4-22-98 Wed Sunny + mild with bad weather forecast

0630 Departed motel, 2 men to launch and transport boats to
dive site. Rest of the crew to set up dive station.

0800 Safety Brief

0830 Dive Sup made phone ~~calls~~ calls and gave Dive Brief

0845 1st Dive pair left surface

0945 Divers return to surface

1022 2nd set of Divers left surface

1115 Divers back on the surface

1120 Secured diving operations while yard tug moved &
Barge out of the target area. Use down time to rig
and place a new 300' Jack stay base line. Phil
charged empty tanks.

1345 Replaced down lags and started Dive ops again

1402 The day's third set of Divers left the surface

1445 Returned to surface.

1521 4th pair of Divers left surface

1608 Divers returned to surface - Secure Dive ops

1630 2 men returned boats to ramp then transport them to
compound and wash with fresh water. Rest of the
crew to wash and check gear stores in truck, then
fill bottles.

GO!T NEXT PAGE

1700 Secure for the day.

NOTE:1 DIV2 TARGET AREA HAS A NEW SHAPE BUT THE
SAME SQUARE FOOTAGE, CHANGE WAS MADE AT TODAY
HANDIN REQUEST. (MORE SHIPS IN AREA)

NOTE:2 LAST DIV2 pair ADVISED LAZ 300 APPROX. $\frac{2}{3}$ OF
AREA COMPLETED.

4-23-98 Thur Cool and cloudy AIR Temp 62 WATER 68

0700 launched SSI Boat and set up dive site.

0745 SAFETY BRIEF.

0755 Dive Sup. BRIEF START DIVE OPERATIONS

0832 1st Dive pair left surface

0924 1st pair back on surface

0945 2nd Dive pair left surface

1025 2nd pair back on surface.

1100 3rd pair left surface

1140 3rd pair back on surface

1224 4th pair left surface

1315 4th pair back on surface after finishing lane 550

which was the last lane in AOC 502.

1320 Secured from diving operations at Pier G.

picked up Jackstay base lines, ~~the~~ cleaned and

pack all equipment into truck

1430 Moved to Pier T established Jackstay base lines

and marked out lanes on pier. Recovered boat

washed and stored same. Filled tanks.

1700 Secured for day

4-24-98 Fri Cool & Sunny Very nice

0700 SET UP DIVE STATION AT END OF PICK T, LAUNCHED BOAT.

0730 SAFETY BRIEF

0745 DIVE SUP. BRIEF

0809 1st DIVE PAIR LEFT SURFACE, WATER 68° TIDE IS HIGH

DEPTH IS 40' BOTTOM IS VERY SOFT MUD. DIVERS HAD PROBLEMS GETTING BASE LIVESUCKERS OUT OF THE MUD BUT WITH MUCH EFFORT AND A LITTLE TIME THEY GOT EVERYTHING WORKING AS PLANNED. STARTED @ THE 300' MARK WORKING INLAND

0905 DIVERS @ SURFACE - BOTTOM WERE SOFTER THAN OTHER SITE

0945 2ND SET OF DIVERS LEFT SURFACE

1015 2ND SET ON SURFACE ONE DIVER HAD SMALL AIR LEAK FROM O RING. REMOVED 2 DIVERS FROM WATER

1100 FILLED BOTTLES

1300 3RD SET OF DIVERS LEFT SURFACE

1342 3RD PAIR OF DIVERS RETURNED TO SURFACE

1350 SECURED FROM DIVING OPERATIONS, CLEANED GEAR STOWED IN TRUCK, RECOVERED BOAT AND WASH WITH FRESH WATER, FILLED EMPTY TANKS, FILL OUT TIME SHEETS

1700 SECURED FOR WEEK. TODAY WE SHOWED THE PACE DOWN A BIT DUE TO THE FACT WE ARE AHEAD AND GETTING

A little tired. Today's Dives covered from 300 to 210.

4-27-98 Monday Sunny & Mild 70° AIR 70 WATER

0730 SAFETY BRIEF after setting up dive station and handling boat.

0745 Dive Sup Brief, waiting for chamber to come on line.

0800 Chamber on line.

0817 1st set of divers left surface.

0850 Divers on the surface.

0933 2nd pair of divers left surface.

1005 Divers back on surface.

1040 3rd set of divers left surface.

1115 Divers back on surface.

1304 4th set of divers left surface.

1339 Divers back on surface.

1501 5th set of divers left surface.

1537 Divers on the surface.

1550 Secure from diving operations, pick up diving flags.

1600 Break down dive site and recover boat.

1630 Wash boat and equipment, fill tanks at dive shop.

1700 Secure for day.

Today's dives covered from 210 thru 110. Nothing found.

4-28-98 Tue Cool & Windy 67° Air Water 68°

0700 Launched Boat and Set up Dive Station

0730 Safety Brief

0745 Div Sup Brief - Chamber is being used will
NOT be available till 10:30

1040 Chamber is free and on line START Dive ops.

1104 1st Set of Divers left Surface

1138 Divers on Surface

1318 2nd Set left Surface

1417 2nd Set of Divers Surfaces

1523 3rd Set of Divers left Surface

1606 Divers on The Surface

1640 Sent two men to sweep under pier end, lots of
junk but no bombs TIDE WAS OUT

1630 Broke down Dive Station and Dive ops for the Day
Recovered 5EL Boat. Filled Tanks and washed down
Boat. Today's diving covered hours from 110 to 30

1700 Secured for the day.

4-29-98 WED Cool & mild - 15 kts of wind

0700 LAUNCHED BOAT AND SET UP DIVE STATION

0730 Safety Brief

0745 Dive sup. Brief - Chambers in use, will not
be available till 1030. USED TIME TO RECORD
Spikes MEAN ACROSS THE RIVER, FOUND PULL UP
40 m. ROUND THAT HAD BEEN DREDGE UP FROM
PIER AREA.

1058 START DIVING OPS 1ST SET OF DIVERS LEFT
SURFACE.

1140 DIVER RETURNED TO SURFACE THIS DIVE
COMPLETED JACK STAY MASS IN AOC 500.

1342 DIVERS LEFT SURFACE DOING A CIRCLE
SEARCH OF TARGET AREA, LANE 50 FT 50 FT
OUT FROM PIER T. THIS IS A QC OF AOC
500.

1404 DIVERS ON THE SURFACE

1407 MOVED TO PIER G FOR QC AND TO
RECOVER SMALL BUILDING FOR YARD.

1449 DIVERS LEFT SURFACE TO DO QC CHECK
OF AOC 502.

1510 DIVERS ON THE SURFACE. QC COMPLETED

- LANES 80-120 FIFTY FEET OUT FROM PIER
- 1515 DIVER ASSISTED YARD IN RECOVERING THEIR
SMALL DRY HOUSE
- 1535 PROVIDED ESCORT FOR MR. HARRIS IN SPORTS
AREA AND POINTED OUT 40 M.M. FOUND
SHELLS
- 1600 PICKED UP JACKSTAY BASE LINES AND CHAINS
- 1630 WASHED EQUIPMENT RECOVERED BOAT RETURNED
TO MOOR
- 1700 SECURED FOR DAY. ALL DIVING OPERATIONS
COMPLETED.