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**FINAL**  
**WATER AREA MUNITIONS STUDY**  
**Former Deep Sea Munitions Disposal Area**  
**Naval Air Station Brunswick, Maine**

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**APRIL 2005**

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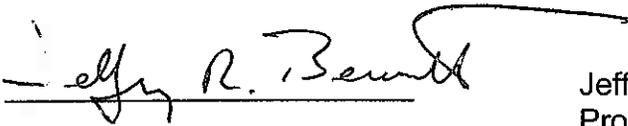
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**FINAL  
WATER AREA MUNITIONS STUDY  
Former Deep Sea Munitions Disposal Area  
Naval Air Station Brunswick, Maine**

DoD Contract Number: N62472-02-D-1300

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Malcolm Pirnie, Inc., prepared this report at the direction of Engineering Field Activity Northeast. This document should be used only with the approval of the Engineering Field Activity, Northeast. This report is based, in part, on information provided in other documents, and is subject to the limitations and qualifications presented in the referenced documents.

**April 2005**

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## ACRONYMS

<sup>o</sup> F	Degrees Fahrenheit
AN	Army Navy
BRAC	Base Realignment and Closure
CD	Compact Disc
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DoD	Department of Defense
EFANE	Engineering Field Activity, Northeast
EOD	Explosive Ordnance Disposal
FUDS	Formerly Used Defense Site
FY	Fiscal Year
HMX	Oxyhydro 1,3,5,7-tetranitro-1,3,5,7-tetrazocine
LANTDIV	Atlantic Division
MEC	Munitions and Explosives of Concern
MC	Munitions Constituents
MMRP	Military Munitions Response Program
MPI	Malcolm Pirnie, Inc.
MRP	Munitions Response Program
NAS	Naval Air Station
NASB	Naval Air Station Brunswick
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan
NM	Nautical Miles
NOAA	National Oceanic and Atmospheric Administration
OE	Ordnance and Explosives
POC	Point of Contact
RDX	2,3,5-trinitro-1,3,5-triazine

## FINAL WATER AREA MUNITIONS STUDY

RG	Record Groups
RPM	Remedial Project Manager
SARA	Superfund Amendment and Reauthorization Act
TNT	2,4,6 trinitrotoluene
TPX	Torpex
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USEPA	U.S Environmental Protection Agency
UXO	Unexploded Ordnance
WAMS	Water Area Munitions Study

## GLOSSARY OF TERMS

**Base Realignment and Closure (BRAC)** – A Department of Defense (DoD) program that focuses on compliance and cleanup efforts at military installations undergoing closure or re-alignment, as authorized by Congress in four rounds of base closures for 1988, 1991, 1993, and 1995. A BRAC parcel is eligible for the Military Munitions Response Program (MMRP) if the release occurred prior to September 30, 2002; if the release is not at an operational range, formerly used defense site (FUDS), active munitions demilitarization facility, or active waste military munitions treatment or disposal unit that operated after September 30, 2002; or, if the site was not identified or included in the Restoration Management Information System prior to September 30, 2002.

**Closed Range** – A range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a DoD component.

**Defense Site** – All locations that are or were owned by, leased to, or otherwise possessed or used by the DoD. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used or was permitted for the treatment or disposal of military munitions.

**Discarded Military Munitions** – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.

**Explosive Ordnance Disposal (EOD)** – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance. It may also include explosive ordnance that has become hazardous by damage or deterioration.

**Explosives Safety** – A condition where operational capability and readiness, personnel, property, and the environment are protected from the unacceptable effects of an ammunition or explosives mishap.

**Formerly Used Defense Site (FUDS)** – A DoD program that focuses on compliance and cleanup efforts at sites that were formerly used by the DoD. A FUDS property is eligible for the MMRP if the release occurred prior to October 17, 1986; the property was transferred from DoD control prior to October 17, 1986; and the property or project meets other FUDS eligibility criteria.

**Munitions Constituents (MC)** – Any materials originating from unexploded ordnance, military munitions or other military munitions, including explosive and non-explosive materials and emission, degradation, or breakdown elements of such ordnance or munitions.

**Munitions and Explosives of Concern (MEC)** – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: unexploded ordnance, discarded military munitions or munitions constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

**Operational Range** – A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities, or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities.

**Other than Operational Range** – Encompasses closed transferred and transferring ranges. A closed military range has either been taken out of service as a range and has been put to new uses that are incompatible with range activities or that is no longer considered to be a potential range area. A closed range is still under the control of a DoD Component. A transferred range is a military range that is no longer under the control of a DoD component and has been leased, transferred, or returned to another entity, to include other federal, non-DoD entities, for use. A transferring military range is a range that is proposed to be leased or transferred from DoD to another entity or disposed of by conveying title to a non-federal entity. An active range will not be considered a “transferring range” until the transfer is imminent.

**Range** – A designated land or water area set aside, managed, and used for range activities of the DoD. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access and exclusionary areas, and airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration.

**Transferred Range** – A range that is no longer under military control and had been leased by DoD, transferred, or returned from DoD to another entity, including federal entities. This includes a military range that is no longer under military control, but that was used under the terms of an executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager. Additionally, property that was previously used by the military as a range, but did not have a formal use agreement also qualifies as a transferred range.

**Transferring Range** – A range that is proposed to be leased, transferred, or returned from the DoD to another entity, including federal entities. This includes a military range that was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager or property owner. An active range will not be considered a transferring range until the transfer is imminent (generally defined as the transfer date is within 12 months and a receiving entity has been notified).

**Unexploded Ordnance** – Military munitions that have been primed, fused, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and remain unexploded either by malfunction, design, or any other cause.



## EXECUTIVE SUMMARY

The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP) to address munitions and explosives of concern (MEC) (including unexploded ordnance (UXO) and discarded military munitions (DMM)) and munitions constituents (MC) at other than operational military ranges and other sites. Closed, transferred, and transferring military ranges and sites not located on an operational range are considered other than operational. Although other than operational can include Formerly Used Defense Sites (FUDS) and Base Realignment and Closure (BRAC) ranges and sites, this report addresses other than operational ranges and sites at an active installation. It may include transferred and/or transferring ranges and munitions disposal sites associated with an active installation if they are not included in BRAC or FUDS.



However, by definition munitions related sites located in water are not addressed under the MMRP. For example, deep-sea sites including former munitions disposal areas and ranges are not addressed under the MMRP. In order to document the history of these areas in a standard format, a Water Area Munitions Study (WAMS) report is compiled. This report represents the WAMS for the Former Deep Sea Disposal Area associated with the Naval Air Station Brunswick (NASB), Maine.

The Former Deep Sea Munitions Disposal Area is approximately 130 square miles in size with its center located near where Casco Bay meets the Atlantic Ocean, approximately 18 nautical miles (NM) south of the installation and 12 NM east of Cape Elizabeth. The United States Navy (Navy) used the area in the 1940s, and potentially in the early 1950s, for the disposal of unserviceable ammunition. The general area is currently used for both recreational and commercial fishing.



The routine disposal of ordnance in deep water is no longer an accepted practice. However, the past practices of the Navy, as documented in their early policy and guidance documents, allowed for the disposing of unserviceable ammunition by sea. In total, nine archival documents dated from 1944 to 1946 related to munitions disposal activities at the area were discovered and reviewed. The nine records all came from the National Archives in College Park, Maryland and Suitland Park, Maryland. The lack of records remaining on the disposal activities makes it

## FINAL WATER AREA MUNITIONS STUDY

impossible to present a comprehensive list of items disposed of at the area. Instead, this report presents a summary of the records obtained and provides a list of ammunition known to have been stored at NASB during the early 1940s. The items dumped at the site have been submerged underwater for more than 50 years. The extent of potential MC contamination and potential environmental impacts, if any, is unknown. Given the amount of water, the length of time the items have been submerged, and the limitations of detection technologies, it is highly unlikely that the presence of MC can even be detected.

The area is currently open water; several navigation charts list the area as a “Danger Zone”, Ordnance Dumping Area”, or “Unexploded Depth Bombs”, so it appears that the presence of MEC in the area is well known.

## 1. INTRODUCTION

The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP) to address munitions and explosives of concern (MEC) [including unexploded ordnance and discarded military munitions] and munitions constituents (MC) at other than operational ranges. The term "at other than operational ranges" includes closed, transferred and transferring military ranges, as well as any other past-use site known or suspected to contain MEC or MC that is not located on an operational range. Although other than operational can include Formerly Used Defense Sites (FUDS) and Base Realignment and Closure (BRAC) ranges and sites this report addresses other than operational ranges and sites at an active installation. It may include transferred and/or transferring ranges and munitions disposal sites associated with an active installation if they are not included in BRAC or FUDS.

However, by definition munitions related sites located in water are not addressed under the MMRP. For example, deep-sea sites including former munitions disposal areas and ranges are not addressed under the MMRP. In order to document the history of these areas in a standard format, a Water Area Munitions Study (WAMS) report is compiled. This report represents the WAMS for the Former Deep Sea Munitions Disposal Area associated with the Naval Air Station Brunswick (NASB), Maine.

This WAMS is organized into the following sections:

- Section 1 – Introduction
- Section 2 – Installation Background
- Section 3 – Physical and Environmental Characteristics
- Section 4 – Summary of Data Collection Effort
- Section 5 – Site Characteristics

The following supporting information is appended to this WAMS:

- References (Appendix A)
- Project Source Data – General (Appendix B)
- Project Source Data – Site Specific (Appendix C)
- Ordnance Technical Data Sheets (Appendix D)

### **1.1.Purpose**

This WAMS summarizes the history of munitions use at the Former Deep Sea Munitions Disposal Area at NASB and provides an assessment of the current environmental conditions of the site. The WAMS provides the necessary information for Navy and regulatory decision-makers to develop a Conceptual Site Model (CSM) for the site. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the area and 3) actual, potentially complete, or incomplete exposure pathways that link them. The CSM is the basis for the risk evaluation, prioritization, and remediation cost estimate.

### **1.2.Project Management**

This WAMS is being coordinated and managed by the Navy Engineering Field Activity Northeast (EFANE), a component of the Atlantic Division (LANTDIV) of the Naval Facilities Engineering Command (NAVFAC). The EFANE performs engineering functions for Navy installations throughout the Northeast U.S. and is the Program Manager for this WAMS. Malcolm Pirnie, Inc. has been contracted to prepare this WAMS. The Navy Remedial Project Manager (RPM), Mr. Lonnie Monaco from EFANE and the installation point of contact (POC), Mr. Anthony Williams for NASB, Maine provided valuable information and assistance throughout the WAMS data collection process. The Navy RPM is the responsible party for this WAMS.

### **1.3.Water Area Munitions Study Approach**

The WAMS process for the Former Deep Sea Munitions Disposal Area involved collecting and reviewing existing and available information about the site. A summary of the data collection process for the Former Deep Sea Munitions Disposal Area is presented in Section 4.

## FINAL WATER AREA MUNITIONS STUDY

This WAMS is inclusive and makes use of all available data relating to munitions use at the Former Deep Sea Munitions Disposal Area, including historical records, field data, anecdotal evidence, interviews with site personnel, and professional knowledge and experience. It is based, in part, on information provided in documents referenced in Appendix A and is subject to the limitations and qualifications presented in the referenced documents.

## 2. INSTALLATION BACKGROUND

NASB is the last active duty DoD airfield remaining in the Northeastern U.S. NASB is home to three active duty and two reserve squadrons and 29 tenant commands. The installation is one of Maine's largest employers, with over 4,800 military and civilian personnel. Reserve Navy air units bring many more sailors to the station during the summer annual cruise months. NASB also provides support for other Navy units in Maine, including the Navy ships at Bath, the Navy Security Group at Winter Harbor, the U.S. Naval Radio Station at Cutler, the U.S. Naval Survival School at Rangley, and the Department of Naval Sciences at the Maine Maritime Academy at Castine.

The following sections provide general information about NASB, including its location and setting; a brief history of the installation; its missions over time; a history of munitions related storage; and an introduction to the Former Deep Sea Munitions Disposal Area. Much of the general historic information was obtained from the installation's website (<http://www.nasb.navy.mil>).



Figure 2-1: Recent Aerial Photo of NASB

### 2.1. Location and Setting

NASB sits on approximately 3,200 acres in Brunswick, Cumberland County, Maine and approximately 25 miles northeast of Portland, Maine (see Figure 2-2). The installation is located just south of U.S. Route 1, approximately two miles east of Brunswick's main business district.

The NASB is located five miles inland from the Atlantic Ocean. The Former Deep Sea Disposal Area is located near where Casco Bay meets the Atlantic Ocean, approximately 18 nautical miles (nm) south of the installation and 12 nm east of Cape Elizabeth. The location of the Former Deep Sea Disposal site relative to the NASB is shown on Map 2-1.

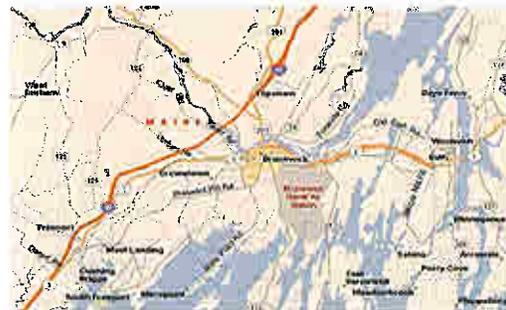


Figure 2-2: NASB Location Map

**Water Area Munitions Study  
Naval Air Station Brunswick, Maine**



**MALCOLM  
PIRNIE**

**Map 2-1  
Area Location Map  
Former Deep Sea Munitions Disposal Site**

**Legend**

-  Installation Boundary
-  Former Deep Sea Munitions Disposal Site

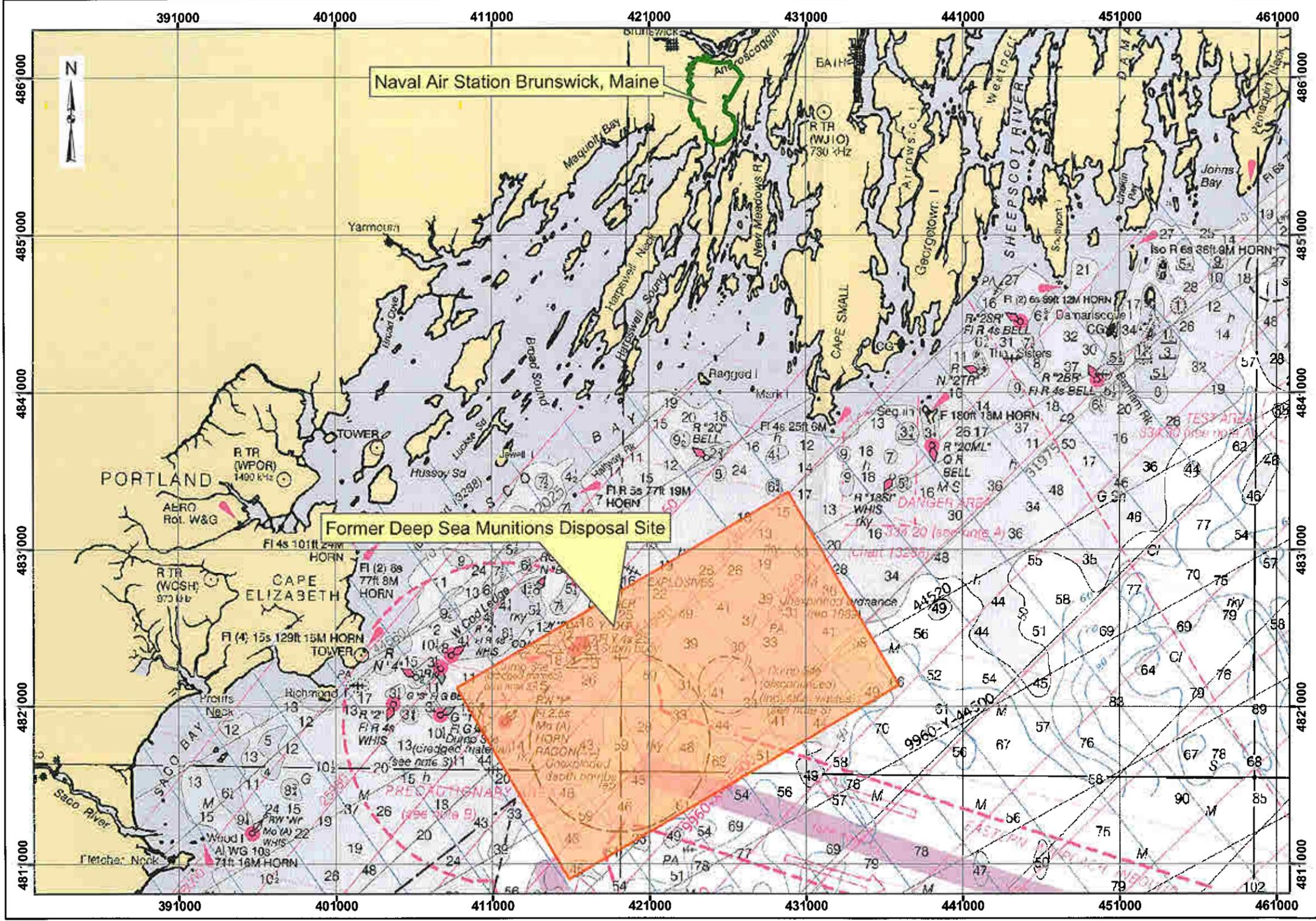
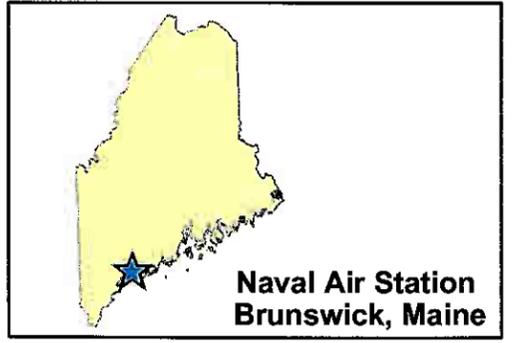
Note: Estimated range boundary location



Data Source: NOAA  
BAY OF FUNDY - CAPE COD ME-NH-MA, 1999  
Copyright 2002 Maptech, Inc.

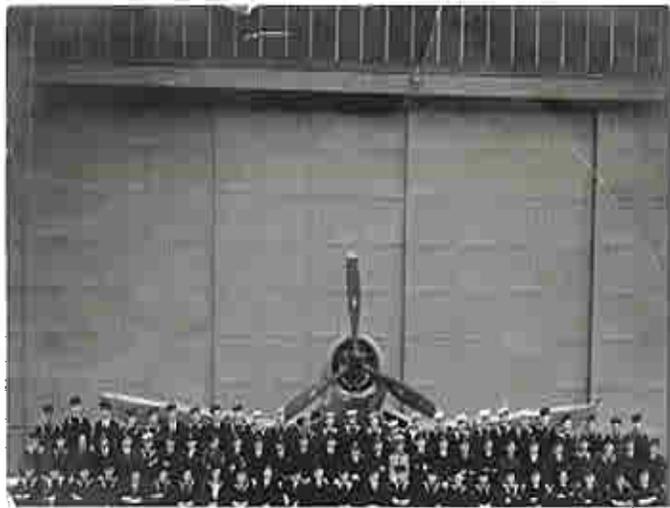
Coordinate System: UTM Zone 19N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
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## 2.2. Installation History

The installation was originally constructed on 1,487 acres of land and was first occupied in March 1943 with the primary mission of training British Naval Command and Royal Canadian Air Force pilots. The station carried out a secondary mission of anti-submarine warfare during the years of World War II. The first U.S. squadron to arrive at the installation was an air scouting squadron.



**Figure 2-3: Historic Photo of an Early Air Squadron**

When the squadron began operations, the station consisted of only a half-mile of runway and had no hangers or operations tower. When the Royal Canadian Air Force crews arrived, construction was still underway on the runways and various other parts of the station. Over the next few years, the station experienced tremendous growth and expansion of available facilities and infrastructure. At the height of its wartime operations, the station was supporting three auxiliary landing fields: one at Sanford, one at Lewiston, and one at Rockland, Maine.

In October 1946, the installation was deactivated, and the land and buildings were leased jointly to the University of Maine and Bowdoin College as annexes to ease the over-crowded conditions caused by the G.I. Bill student influx.

The University of Maine and Bowdoin College terminated their leases in 1949, and the station was taken over by the Brunswick Flying Service. At this time, the buildings that had housed men and implements of war were put to new uses. Hanger one was a skating rink; hanger two and the operations tower housed a civilian flying school; hanger three housed automobiles; ammunition magazines were agriculture mushroom farms; and shrubbery nurseries were constructed along the northern boundaries of the station.

## FINAL WATER AREA MUNITIONS STUDY

Following this period of caretaker status, the station was selected by the Navy as a prime center for development. During the development period, the U.S. Air Force reached an agreement with the Navy authorizing the construction of an Air Force Control and Warning Facility on the station, as a part of the continental circumferential radar screen.

In December 1950, the Navy requested funding from Congress to be used for this master jet project. The installation was re-commissioned in March 1951 as a Naval Air Facility, with the mission of supporting three land-plane patrol squadrons and one fleet aircraft service squadron and with a planned future mission as a master jet base. The station retained the mission of anti-submarine warfare.

The Secretary of Defense submitted a request to Congress for approximately \$20,000,000 in June 1951. This money was to be used for additional barracks, officers' quarters, and enlisted men's clubs; control tower, storage, and communication buildings; and new galleys and mess facilities. The new buildings and facilities would make the station a permanent installation in Brunswick. In December 1951, the Naval Air Facility was officially changed to the designation of Naval Air Station, and the Arctic Survival Training School was established in September 1956 to train members deploying to the Arctic in north country survival.

Planes stationed at the NASB would often conduct munitions training, including practice rocket and bombing training, on nearby Seal Island, which the Navy acquired by condemnation in 1958. Bombing and rocket training continued through the early 1960s along with anti-submarine warfare training. Seal Island was never part of NASB and is now private property. The rocket and bombing areas, including Seal Island, are being addressed under the U.S. Army Corps of Engineers (USACE) FUDS Program.

Units trained at NASB served in action during the Lebanon crises in the fall of 1958, when squadrons of Fleet Air Wing Three provided anti-submarine protection for the Sixth Fleet, then operating in the Mediterranean Sea. Also in 1958, a small detachment of U.S. Marines of the 2nd Marine Division from Camp Lejeune, North Carolina was assigned to NASB. The U.S. Marine detachment became the Marine Barracks of NASB in 1959.

In the late 1990s, the base consolidation efforts caused the demolition of over 40-year old surplus buildings around the installation. For over 40 years, six squadrons (Patrol Squadron 8, 10, 11, 23, 26 and 44) were based at NASB. BRAC process instigated the decommissioning of three squadrons (Patrol Squadron 11, 23, and 44), and reserve squadrons VP-92 and VR-62 moved up from NAS South Weymouth.

### **2.3.Munitions Related Training / Storage / Usage**

Throughout its history, all types of Naval munitions, including aircraft cannon, depth charges, bombs, rockets, hand grenades, torpedoes, sea mines, small arms, and pyrotechnics were stored at NASB. Archival records from 1943 list the explosives magazine storage requirements for NASB as follows:

- 10 high explosive magazines – 20' x 50' each
- 1 incendiary magazine – 20' x 50'
- 3 fuze and detonator magazines – 10' x 10' each
- 2 small arms magazines – 20' x 50' each
- 1 pyrotechnic magazine – 20' x 20'
- 6 inert magazines – 40' x 100' each
- 1 torpedo magazine – 25' x 50'

The magazines were capable of holding thousands of pounds of ordnance and explosives (OE). Over the years, the magazines were relocated due to explosives safety requirements associated with their close proximity to the runways.

Navy policy from the 1940s through the 1960s allowed for the disposal of unserviceable munitions by deep sea dumping. Detailed records of disposal activities were typically not maintained; therefore, the exact amount of MEC dumped at the site may never be known. However, a review of the types of munitions stored at the facility during the time frame the Former Deep Sea Munitions Disposal Area was active may be an indication of the types of munitions that could have been disposed at the area. Table 2-1 below is a list of munitions that were known to have been stored at NASB. The list is based upon archival records from 1943 to 1946 that were available to the data collection team. The list is not considered a complete list of munitions stored at or that are associated with NASB.

**FINAL WATER AREA MUNITIONS STUDY**

<b>Table 2-1: Munitions Types Historically (1943 – 1946) Stored at NASB</b>	
Aircraft Cannon Ammunition	20-mm tracer and practice
Depth Charges	Mk 3 Mk 24 Mk 33 Mk 37 Mk 38 Mk 49 Mk 54
Bombs	Army Navy (AN) – Mk1 AN-Mk12 Mod 2 Mk 17 (325 lbs.) Mk 23 (miniature practice) AN-Mk 35 AN-Mk 41 (325 lbs.) AN-Mk 47 (350 lbs.) AN-Mk 30 AN-Mk 64 Mk 65 (practice) 500 lbs. water filled
Rockets	Mk 11 Mod 0 (2.25-inch) Mk 11 Mod 1 (2.25-inch) Mk 7 (2.25-inch) Mk 2 Mod 3 (2.25-inch) 3.5-inch (specific types not provided)
Hand Grenades	AN-Mk 8 (HC – smoke) Mk 1 Mod 0 smoke grenades
Small Arms	.22-caliber .30-caliber .38-caliber .45-caliber .50-caliber 12-gauge shot gun
Miscellaneous Smoke and Pyrotechnics	Mk 1 smoke pots FS smoke drums Float light – Mk 5 Mod 1 Float light – Mk 6 Mod 2 Distress signal AN-M75 (red)
Signal Aircraft Cartridges	Mk 1 Mod 0 Mk 2 (red and green star) Mk 4 Mk-AN-M30 Mk 3 Mod 3 Mk-AN-37 Mk-AN-M38 Mk-AN-M39 Mk-AN-M40 Mk-AN-M41 Mk-AN-M42
Miscellaneous Fuzes	Mk 131 Mk 219 Mk 224 Mk 234

### 3. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

The following sections provide general information for the Former Deep Sea Munitions Disposal Area, including the local climate and endangered species.

#### 3.1. Climate

Average temperatures range from 20.8 degrees Fahrenheit (°F) in January to 68.6 °F in July, with an annual average of 45.4 °F. Mean daily maximum and minimum temperatures of 78.8 °F in July and 12.4 °F in January, respectively, have been recorded. In January, the mean daily maximum is 30.6 °F. During extreme conditions, a daily maximum of 99 °F in July and a daily minimum of -26 °F in January have been recorded. There are, on average, 13 days of zero or subzero temperatures a year.

The annual average precipitation recorded is 44.34 inches, with monthly average peaks as high as 5.17 inches in the fall and as low as 2.87 inches in the summer. The annual average relative humidity ranges between 65 and 77 percent. Winter precipitation in southern mid-coastal Maine is often in the form of rain or wet snow. Fog occurs frequently along the Maine coast at all times during the year except in the winter. On average, there are 57 days with heavy fog, defined as visibility less than one quarter of a mile. Possible sunshine ranges from 48 percent in November to 64 percent in August; the yearly percent of possible sunshine is 57 percent.

Prevailing winds are from the south from April to September, from the north in November and December, and from the west to northwest for the remainder of the year. The annual average wind speed is approximately 15 knots, with monthly average wind speeds not varying considerably (13 knots in the summer to 18 knots in the spring). Strong winds in the winter, generated by coastal storms, can produce abnormally high wind-driven tides. Regional diurnal and seasonal variations may moderately influence the wind directions and wind speeds.

### 3.2. Endangered and Special Status Species

A review of the Threatened and Endangered Species System on the U.S. Fish & Wildlife Service website (<http://endangered.fws.gov/wildlife.html#Species>) listed the following species for the state of Maine:

- Sea turtle, leatherback (*Dermochelys coriacea*)
- Whale, finback (*Balaenoptera physalus*)
- Whale, humpback (*Megaptera novaeangliae*)
- Whale, right (*Balaena glacialis (incl. australis)*)
- Salmon, Atlantic Gulf of Maine Atlantic Salmon DPS (*Salmo salar*)

No endangered species or special status species have been identified in the waters immediately surrounding the Former Deep Sea Munitions Disposal Area.

## 4. SUMMARY OF DATA COLLECTION EFFORT

Three primary sources of information were researched as part of the data collection effort for the WAMS. The sources of data included:

- 1) Historical archives repositories (off-site);
- 2) Installation data repositories.

These three sources of data are discussed below, along with their relative application to this WAMS.

### 4.1. Historical Archive Repositories (off-site)

The data collection team reviewed archival records located at the National Archives in Suitland Park, Maryland (Archives I), and College Park, Maryland (Archives II). In addition to the Archives I and II data collection effort, the Team contacted the New England District of the National Archives in Boston, Massachusetts. From the discussion with archival specialist at the New England District, it is determined that they had little to no information on munitions related data for NASB. The data collection team researched the following records and record groups (RG) for documents relating to munitions usage at the Former Deep Sea Munitions Disposal Area.

#### Textual Records

RG 71, Bureau of Yards and Docks

- Naval Property Case Files, Boxes 511-519

RG 72, Bureau of Aeronautics: [NA116]

- Entry 62-B, General Correspondence, 1943-1945, Boxes 2937, 2974, 2994, 2998, 3003, 3009, 3050, 3075, 3411
- Entry 62-B, General Correspondence, 1946-1947
- Entry 62-B, Unclassified General Correspondence, 1948-1949, Box 456
- Entry 62-B, Unclassified General Correspondence, 1950, Box 231
- Entry 62-B, Unclassified General Correspondence, 1951, Box 203
- Entry 62-B, Unclassified General Correspondence, 1953, Box 281
- Entry 62-B, Unclassified General Correspondence, 1954, Box 201

## FINAL WATER AREA MUNITIONS STUDY

- Entry 62-B, Unclassified General Correspondence, 1955, Box 200
- Entry 62-B, Unclassified General Correspondence, 1956, Box 190
- Entry 62-B, Unclassified General Correspondence, 1957, Box 196
- Entry 62-B, Unclassified General Correspondence, 1958, Box 151
- Entry 62-B, Unclassified General Correspondence, 1959, Box 142

RG 74, Bureau of Ordnance: [NA116]

- General Correspondence, 1943--Restricted, Box 476
- General Correspondence, 1944--Confidential, Box 507
- General Correspondence, 1944--Restricted, Box 846
- General Correspondence 1945, Box 1216
- General Correspondence 1946, Box 263

### **Cartographic Records**

RG 71, Bureau of Yards and Docks

- Maps for facility 123, codes 1, 2, 3, 15, 16, 32, 34, 42, 44-48
- Series II Index
- Series II Microfilm, Reels 110, 111, 1314

RG 385, Naval Facilities and Engineering Command, 1917-1989

- Architectural and Engineering Plans, Boxes 237-239

### **Aerial Photos**

- Can # ON 006229—IM 10199153
- Can # ON 006230—IM 10199152
- Can # ON 009065—IM 10197919
- Can # ON 017355—IM 15392229
- Can # ON 017439—IM 153922918

The data collection Team reviewed the documents from the NASB Environmental Office; however, there were no records associated with the Former Deep Sea Munitions Disposal Area.

The data collection team also visited the Curtis Memorial Library in Brunswick, Maine. Specific, available information regarding NASB was sought; however, due to increased security regarding DoD installations, most information had been removed from the public files. The team also visited the Pejepscot Historical Society Museum located in Brunswick. The museum did not have any information on munitions related activities associated with NASB. Threatened and endangered species information was obtained from a U.S. Fish & Wildlife Service website (<http://endangered.fws.gov/wildlife.html#Species>).

#### **4.2 Installation data repositories (on-site)**

The data collection team reviewed documents from the NASB Environmental Office; however, there were no records associated with the Former Deep Sea Munitions Disposal Area.

## 5. SITE CHARACTERISTICS

The following sections provide site-specific information about the Former Deep Sea Munitions Disposal Area at NASB including history and site description; munitions characterization; contaminant migration routes; receptors; land use; access controls and restrictions; the conceptual site model; and MC/MEC recommendations.

### 5.1. History and Site Description

The routine disposal of ordnance in deep water is no longer an accepted practice. However, the past practices of disposal of ordnance in deep water were acceptable for ordnance items that were deemed unserviceable. The Bureau of Ordnance published several policy and guidance documents in the 1940s and 1950s regarding procedures for disposing of unserviceable ammunition by sea. The earliest Navy policy document available to the data collection team that referenced deep sea munitions disposal was a Bureau of Ordnance Publication, Ammunition Ashore, OP 5 (Volume 1) dated 10 June 1944. Chapter 29 (Destruction of Ammunition and Explosives) of the document included guidelines and procedures for deep sea disposal of munitions under Article 2902 (Methods of Destruction) and Article 2905 (Procedures for Disposal of Ammunition by Dumping in Deep Water).

Article 2902 states in part:

Ammunition and explosives that are dangerously deteriorated or damaged, obsolete, subject to malfunctions, or are otherwise unserviceable, and which cannot be economically salvaged or safely sold, are normally destroyed. Destruction is accomplished by dumping in deep water, burning, detonating or "bleeding off," as prescribed in this chapter or other applicable instructions of the Bureau of Ordnance. The preferred method of disposal is by dumping at sea.<sup>1</sup>

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<sup>1</sup> *Ammunition Ashore Handling, Stowing and Shipping, OP 5 (Volume 1) dated 9 August 1957.*

## FINAL WATER AREA MUNITIONS STUDY

Article 2905 states in part:

As directed by the Chief of Naval Operations, all disposal operations accomplished by dumping in deep water shall be conducted in areas as specified below:

- Explosives-loaded ammunition and pyrotechnics must be dumped in deep water over 500 fathoms in depth and at least 10 miles from shore.
- Chemicals, exclusive of pyrotechnics, must be dumped in deep water 1,000 fathoms in depth and at least 10 miles from shore.
- Vessels assigned specifically to conduct dumping operations, all instances, shall dump in areas designated by district commandants or sea frontier commanders.<sup>2</sup>

In total, nine archival documents dated from 1944 to 1946 related to munitions disposal activities at the Former Deep Sea Munitions Disposal Area associated with NASB were discovered and reviewed by the study team. Exact Bureau of Ordnance policy guidance from the time frame that the memos were drafted (1944 –1946) was unavailable to the team; however, it is believed that the official policy and guidance from that time frame was very similar to the 1957 guidance presented above. The only exception to note is the required minimum depth. For example, a January 1945 document references a policy document “O.P. 1017 First Revision” instructions as “lowering gently over the side in 100 fathoms of water 10 miles off-shore”.<sup>3</sup> It appears that the Navy increased the guidance depths by 400 fathoms for explosive-loaded ammunition between 1947 and 1957.

The time period that the Former Deep Sea Munitions Disposal Area was active is estimated as December 1944 (date of earliest record) through October 1946 (date installation went into caretaker status). The area may have also been used in the early 1950s, but it is unclear if the Navy would have provided a waiver for continued use of the area once the minimum depth requirements were increased.

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<sup>2</sup> *Ammunition Ashore Handling, Stowing and Shipping, OP 5 (Volume 1) dated 9 August 1957.*

<sup>3</sup> *U.S. Naval Speed Letter from the Chief of the Bureau of Ordnance to the Commanding Officer Naval Air Station Brunswick Maine dated 23 January 1945.*

## 5.2. Munitions Related Materials Associated with the Site

This section describes the munitions or munitions related materials known or suspected to be at the site. This includes both MEC and non-hazardous munitions related scrap (e.g., fragmentation, base plates, inert mortar fins).

The nine archival records discovered and reviewed during the data collection effort indicate that unserviceable munitions were disposed offshore during the early years of installation operation. A summary of the records is provided below.

- Request to dispose of inert aircraft rocket parts, defective sub caliber, and service aircraft rocket ammunition by disposing of the items in 100 fathoms of water or ten miles off shore (dated 16 December 1944).
- Correspondence referencing the deep sea disposal of 24 fuzes from 7.2" rockets (dated 19 January 1945).
- Authorization to dispose of 24 Mk 131 Mod 1 bomb fuzes by deep sea disposal (dated 29 January 1945).
- Record of deep sea disposal of rockets (type and amounts not provided) (dated 2 February 1945).
- Record indicating the disposal of bomb fuzes (Mk 219 Mod 4 – Quantity 8, Mk 224 Mod 1 – Quantity 4, Mk 224 Mod 2 – Quantity 20, and Mk 234 Mod 1 – Quantity 12) (dated 3 February 1945).
- Authorization to dispose of 33 Mk 49 depth bombs and 75 Mk 37 depth bombs (dated 3 April 1945).
- Request to dispose of 3.25" rocket motor Mk 10 with Mk 2 fins (dated 2 June 1945).
- Authorization to dispose of 60 Mk 54 depth bombs (HMX loaded) and 166 Mk 54 (TPX-2 loaded) depth bombs (dated 5 September 1946).
- Reference to 241 325lbs. Mk 17 bombs (TNT filled) and 36 - 325lbs AN-Mk 41 (TNT filled) bombs being shipped from Brunswick to Naval Ammunition Depot, Hingham for deep sea disposal (dated 9 October 1945).

Although only nine records were discovered, it is most likely that significant additional quantities of munitions were actually disposed of at the site.

### 5.3. MEC Presence

The entire site has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspect MEC Areas, and Areas where No Evidence exists to indicate that MEC is known or is suspected to be at the site. The MEC presence is discussed below.

Map 5-2 illustrates the munitions characterization of the Former Deep Sea Munitions Disposal Area and is provided at the end of Section 5.

#### *5.3.1. Known MEC Areas*

The entire area can be considered a known MEC area. The general area is marked with various warning labels on National Oceanic and Atmospheric Administration (NOAA) and other nautical charts.

#### *5.3.2. Suspected MEC Areas*

There are no suspect MEC areas associated with the site.

#### *5.3.3. Areas Not Suspected to Contain MEC*

There were no other areas of concern identified based on the information obtained during the data collection process.

### 5.4. Munitions Constituents

From the munitions referenced in the limited number of archival records that were available, the following lists of high explosive fillers were associated with the munitions known to have been disposed of at the site.

- TNT
- Torpex (TPX)
- HMX

Other types of MC are most likely at the site, including propellants and metals; however, specific additional types could not be identified through the data that was unavailable.

**5.5. Conceptual Site Model**

This Conceptual Site Model (CSM) was developed following guidance documents issued by the USEPA for hazardous waste sites and the U.S. Army Corps of Engineers (USACE) for ordnance and explosives (OE) sites. Guidance documents included the USEPA’s Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental Ordnance and Explosives (OE) Sites, which was final as of February 2003.

The CSM describes the site and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the area; and 3) actual, potentially complete, or incomplete exposure pathways that link them. The CSM is the basis for the risk evaluation, prioritization, and remediation cost estimate.

The CSM is presented in a series of information profiles that presents information about the site. The information profiles are included in Table 5-1 below.

Table 5-1: Conceptual Site Model Information Profiles – Former Deep Sea Munitions Disposal Area		
Profile Type	Information Needs	Preliminary Assessment Findings
Range/Site Profile	Installation Name	Naval Air Station Brunswick
	Installation Location	Brunswick, Maine
	Range/Site Name	Former Deep Sea Munitions Disposal Area
	Range/Site Location	Approximately 18 NM south of the installation and 12 NM east of Cape Elizabeth. The site is located where Casco Bay meets the Atlantic Ocean.
	Range/Site History	Area used in the 1940s and potentially in the early 1950s for the disposal of unserviceable munitions. Following Navy policy and guidance of the time, unserviceable ammunition was routinely disposed of by dumping at sea.

**FINAL WATER AREA MUNITIONS STUDY**

<b>Table 5-1: Conceptual Site Model Information Profiles – Former Deep Sea Munitions Disposal Area</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Range/Site Area and Layout	The area has been approximated as a rectangular area approximately 130 square miles in size.
	Range/Site Structures	Not applicable.
	Range/Site Boundaries	The range is estimated as a rectangle with its center 18 NM south of the installation and 12 NM east of Cape Elizabeth located near where Casco Bay meets the Atlantic Ocean.
	Range/Site Security	No security or access restrictions – open water area.
<b>Munitions/ Release Profile</b>	Munitions Types	Various ordnance including depth bombs, rocket motors and fuzes. Potential for just about any type of munitions stored or used at NASB during the 1940s and the early 1950s.
	Maximum Probability Penetration Depth	Deep sea dump site – maximum depth estimated at 62 fathoms.
	MEC Density	Entire area is considered a known MEC area.
	MEC Scrap/Fragments	Unknown
	Associated Munitions Constituents	MC, including TNT, HMX and TPX, are associated with munitions disposed of at the site, however without a detailed record, specific constituents can not be listed.
	Migration Routes/Release Mechanisms	Area is located in open waters. There is the high potential that the munitions cases have corroded over the years, exposing the explosive fillers and other constituents to the open water. The extent of potential releases is unknown.
<b>Land Use and Exposure Profile</b>	Current Land Use	NA – Deep Water
	Current Human Receptors	Recreational and commercial fishermen and boaters.
	Current Activities (frequency, nature of activity)	Commercial and recreational fishing (including lobster harvesting) and some boating
	Potential Future Use	No foreseen change to current use.
	Potential Future Human Receptors	Fisherman or boaters who may anchor in the area.
	Potential Future Use-Related Activities:	No foreseen change to current use.

**FINAL WATER AREA MUNITIONS STUDY**

Table 5-1: Conceptual Site Model Information Profiles – Former Deep Sea Munitions Disposal Area		
Profile Type	Information Needs	Preliminary Assessment Findings
	Zoning/Land Use Restrictions	None in place. Area is marked on several nautical maps as “Danger Zone”, “Ordnance Dumping Area”, or “Unexploded Depth Bombs”.
	Beneficial Resources	NA
Ecological Profile	Habitat Type	Deep Sea
	Degree of Disturbance	Minimal to none
	Ecological Receptors	NA
	Federal Endangered Species:	<p>Fish and marine mammals in Atlantic Ocean, including lobsters and other crustaceans. In addition to indigenous species, the U.S. Fish and Wildlife listed the following associated with a water environment threatened and endangered species for the State of Maine.</p> <ul style="list-style-type: none"> <li>▪ Sea turtle, leatherback (<u><i>Dermochelys coriacea</i></u>)</li> <li>▪ Whale, finback (<u><i>Balaenoptera physalus</i></u>)</li> <li>▪ Whale, humpback (<u><i>Megaptera novaeangliae</i></u>)</li> <li>▪ Whale, right (<u><i>Balaena glacialis</i></u> (incl. <u><i>Australis</i></u>))</li> <li>▪ Salmon, Atlantic Gulf of Maine Atlantic Salmon DPS (<u><i>Salmo salar</i></u>)</li> </ul>
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	There is the potential that explosive fillers and other MC have been exposed to the open ocean. However, given the amount of water, the concentration levels are expected to be extremely low and may not even be detectable given the limitations of technology.

A key element of the CSM is the exposure pathway analysis. For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access); 3) an activity.

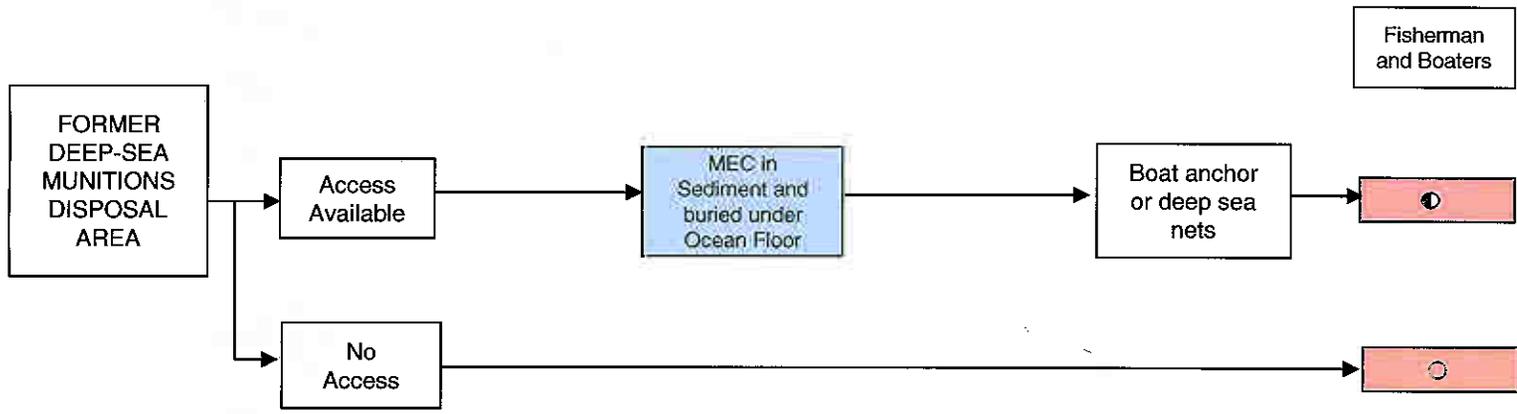
For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium; 3) an exposure route; and 4) receptors. If the point of exposure is not at the same

## FINAL WATER AREA MUNITIONS STUDY

location as the source, the pathway may also include a release mechanism and a transport medium (e.g., air).

The potential interactions between the source and receptors are assessed differently between MEC and MC. For MC, interaction between the source and receptors involves a release mechanism for the MC, an exposure medium that contains the MC, and an exposure route that places the receptor into contact with the contaminated medium. For MEC, interaction between the potential receptors and an MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area.

Source Area	Access	MEC Location/ Release Mechanism	Activity	Receptors
-------------	--------	------------------------------------	----------	-----------



● Complete Pathway  
 ○ Incomplete Pathway  
 ◐ Potentially Complete Pathway

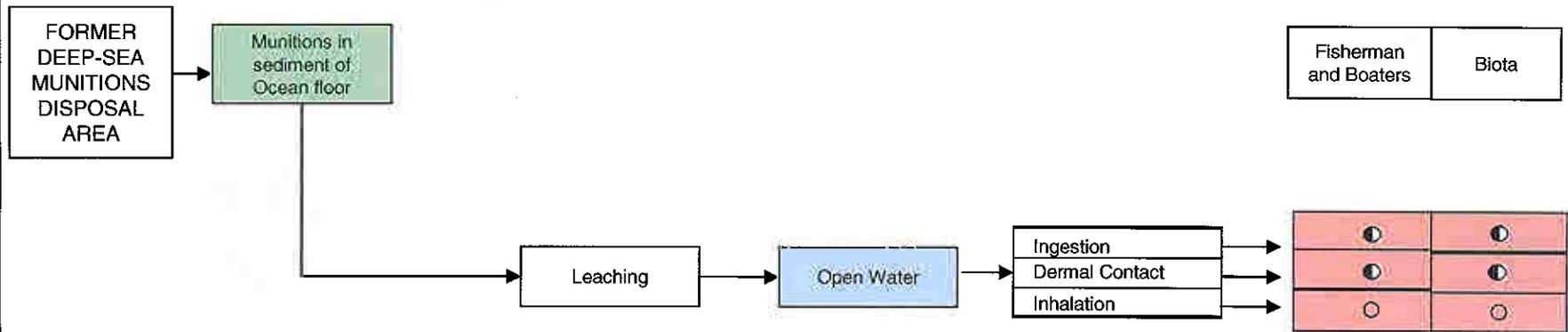


Prepared for: 

MUNITIONS STUDY WATER AREA – FINAL REPORT  
 FORMER DEEP SEA MUNITIONS DISPOSAL AREA  
 MEC EXPOSURE PATHWAY ANALYSIS  
 NAVAL AIR STATION BRUNSWICK, MAINE

**MALCOLM PIRNIE, INC.**  
 FIGURE 5-1 DRAFT  
 April 2005

Source Area	Source Media	Release Mechanism	Exposure Media	Exposure Routes	Receptors
-------------	--------------	-------------------	----------------	-----------------	-----------



● Complete Pathway  
 ○ Incomplete Pathway  
 ◐ Potentially Complete Pathway



Prepared for: 

MUNITIONS STUDY WATER AREA – FINAL REPORT  
 FORMER DEEP SEA MUNITIONS DISPOSAL AREA  
 MC EXPOSURE PATHWAY ANALYSIS  
 NAVAL AIR STATION BRUNSWICK, MAINE

**MALCOLM PIRNIE, INC.**  
 FIGURE 5-2 DRAFT  
 April 2005

## 5.6. Summary

The Navy used the Former Deep Sea Munitions Disposal Area in the 1940s and 1950s as a disposal area for unserviceable ammunition. Deep sea disposal of unserviceable ammunitions was common practice in the 1940s and 1950s, as documented in Navy policy and guidance of that time frame. The exact amount of munitions dumped at the location is unknown, but could be several thousands of pounds given the amount of ammunition stored at NASB in the 1940s and 1950s.

The extent of the area is estimated as a 130-square mile rectangle with the center located approximately 18 NM south of the installation and 12 NM east of Cape Elizabeth. The maximum depth of the area is 66 fathoms. The area is marked on numerous NOAA and commercial charts as a "Danger Zone", "Ordnance Dumping Area", or "Unexploded Depth Bombs", so it appears that the presence of MEC in the area is well known.

The waters around the area are used by recreational and commercial fishermen and boaters. Various high explosive fillers can be associated with the types of munitions disposed of at the site, including TNT, TPX, and HMX. There is the potential that explosive fillers and other MC have been exposed to the open ocean over the past 50 or more years that the items have been submerged in the waters of the Atlantic Ocean.

**Water Area Munitions Study  
Naval Air Station Brunswick, Maine**



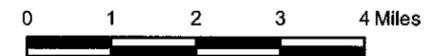
**MALCOLM  
PIRNIE**

Map 5-1  
Range/Site Details  
Former Deep Sea Munitions Disposal Site

**Legend**

- Installation Boundary
- Former Deep Sea Munitions Disposal Site
- Disposal Activity

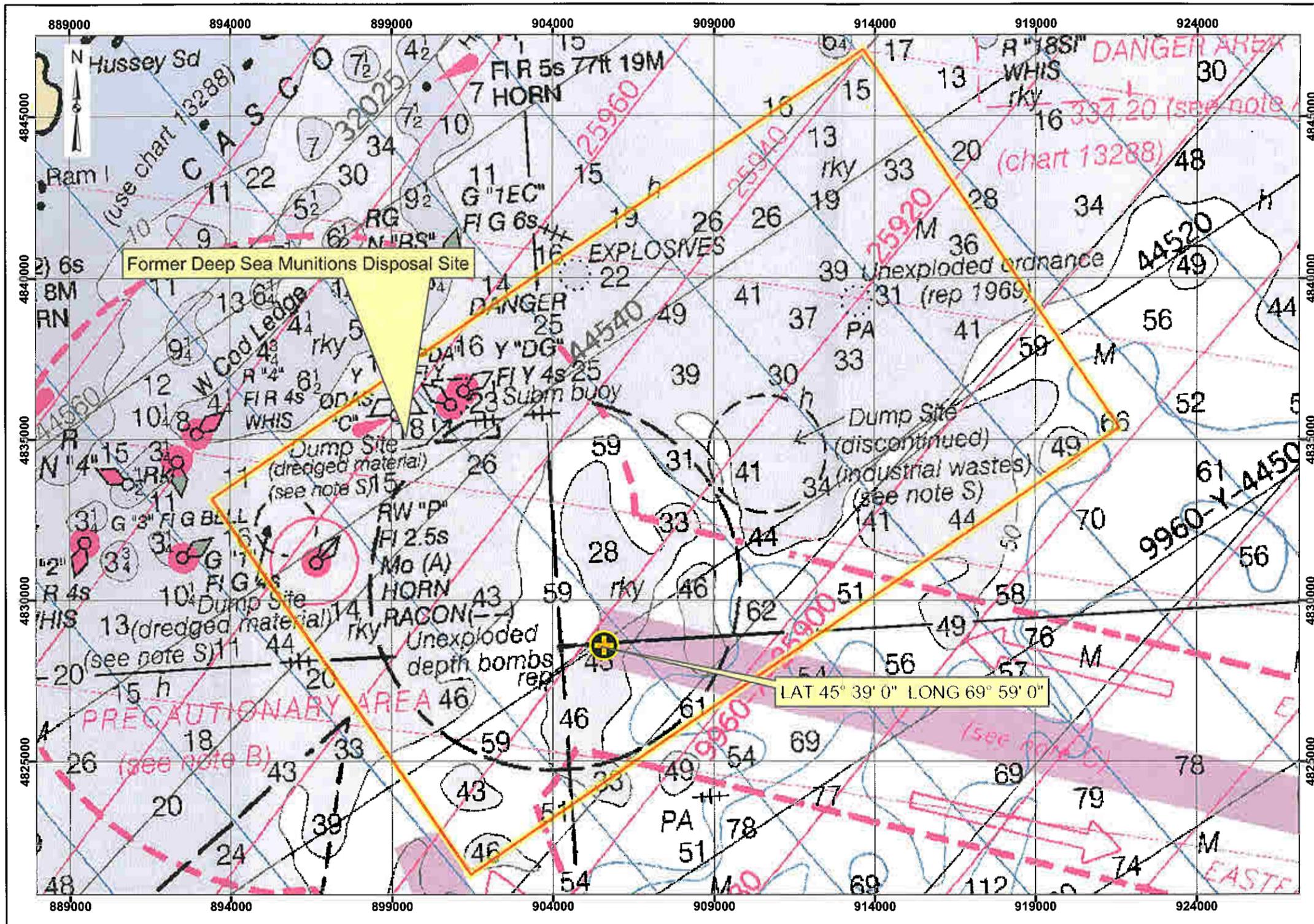
Notes: I) Location of disposal activity referenced in Navy memorandum from 1945  
II) Estimated range boundary location

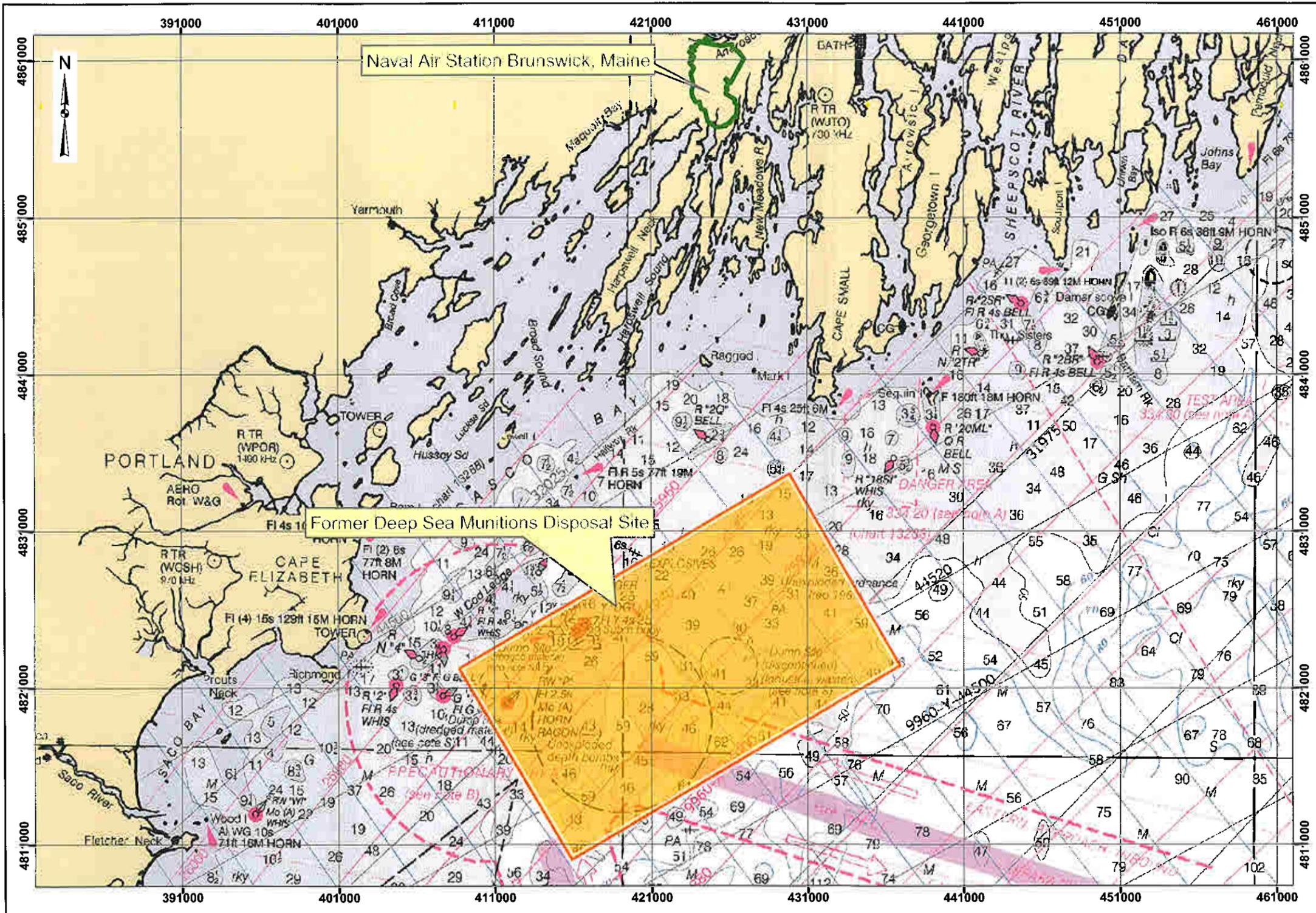


Data Source: NOAA  
BAY OF FUNDY - CAPE COD ME-NH-MA, 1999  
Copyright 2002 Maptech, Inc.

Coordinate System: UTM Zone 19N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Water Area Munitions Study  
Date: April 2005





**Water Area Munitions Study  
Naval Air Station Brunswick, Maine**



**Map 5-2  
Munitions Characterization  
Former Deep Sea Munitions Disposal Site**

**Legend**

-  Installation Boundary
-  Former Deep Sea Munitions Disposal Site
- MEC Presence\***
  -  Known
  -  Suspect

Note: Estimated range boundary location

\*MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: NOAA  
BAY OF FUNDY - CAPE COD ME-NH-MA, 1999  
Copyright 2002 Maptech, Inc.

Coordinate System: UTM Zone 19N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Water Area Munitions Study  
Date: April 2005

## Appendix A: References

## FINAL WATER AREA MUNITIONS STUDY

### Reports

- 1) *Bureau of Aeronautics, U.S. Naval Aeronautical Shore Facilities Programming Guide NA/VAER 00-100-504, March 1958.*
- 2) *History of the U.S. Naval Air Station Brunswick, Maine. 1959.*
- 3) *Integrated Natural Resources Management Plan, NavPhase I RCRA Facilities Investigation (RFI) Work Plan for SWMU 25, SWMU 28, SWMU 29, SWMU 40, Naval Weapons Station Charleston, South Carolina, Southern Division, Naval Facilities Engineering Command, April 2002*
- 4) *Interface Business News. December 15, 2002 to January 14, 2002.*
- 5) *NASB Environmental Department, Soil Boring Logs and/or Well Construction Data and Monitoring Sampling Results for well MW-NASB-078.*
- 6) *The Patroller. Volume 33, Number 49. December 23, 1999.*
- 7) *U.S. Army Corps of Engineers, 03 February 2003. Conceptual Site Models for Ordnance and Explosives (OE) and Hazardous, Toxic, and Radioactive Waste (HTRW) Projects (Engineering Manual 1110-1-1200.*
- 8) *U.S. Department of Agriculture, Soil Conservation Service. Soil Survey for Cumberland County. 1974.*
- 9) *U.S. Environmental Protection Agency, 1989. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/0004).*

## **Appendix B: Project Source Data – General**

# Interview Record

**Installation/Range or Site:** Portsmouth Naval Shipyard – Small Arms Range

**Date/Time:** 08/26/03 12:30

**Person Conducting the Interview/Title/Organization:** Ken Kaiser/Terri Akbas, Malcolm Pirnie, Inc.

**Being Interviewed/Title/Organization:** Mr. James Dolph, Base Historian

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):** Mr. Dolph is the Base Historian at Portsmouth Naval Shipyard

---

## **Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

- First Naval District dumping ground – all aviation ordnance, secret ordnance
  - Mr. Dolph gave us a map illustrating the location of the “dumping grounds”
- Dangerous Ammo Dump area – specific for Portsmouth for “dangerous ammo”
  - Mr. Dolph gave us a map illustrating the location of the “dangerous ammo” disposal area
- Gun Park and Shot Park – used to store cannons and cannon balls with gunpowder stored in Bldgs. 31-34
- Fort Devons and Pease AFB – official ranges for Portsmouth training
- Fort Washington
  - fired practice/target practice
  - American Revolution to Civil War

- Cannon balls
- Fort Washington is gone – now an archeological site - a reservoir was built over it
- Small Arms Range
  - 1964-1988 (approximate dates of use)
  - Ammunition Depot (Bldgs. 31, 32, 33, and 34) – in use until 1964
  - All magazines removed in 1980s
- Magazines
  - Marine barracks had their own magazines (2) for small arms – closed in 1974
  - Bldg. 205 – dynamite magazine – closed
- Prison
  - 1916 map – shooting range – indoor range
  - photo showing marines in open field with guns

**MALCOLM  
PIRNIE**

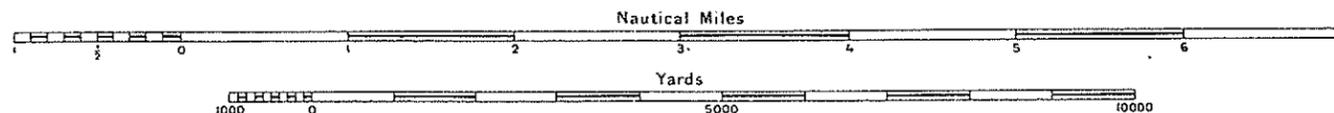


UNITED STATES - EAST COAST  
MAINE

MONHEGAN ISLAND TO CAPE ELIZABETH

Scale  $\frac{1}{80000}$

SOUNDINGS IN FEET  
AT MEAN LOW WATER



44° 00'

55'

TIDES (referred to mean low water)	Muscongus	Boothbay Harbor	Bath	Small Pt. Hbr.	Portland
Mean high water	9.0 ft.	8.8 ft.	6.4 ft.	8.8 ft.	8.9 ft.
Mean sea level	4.5 ft.	4.4 ft.	3.2 ft.	4.4 ft.	4.4 ft.
Lowest tide to be expected	-3.5 ft.	-3.5 ft.	-3.5 ft.	-3.5 ft.	-3.5 ft.

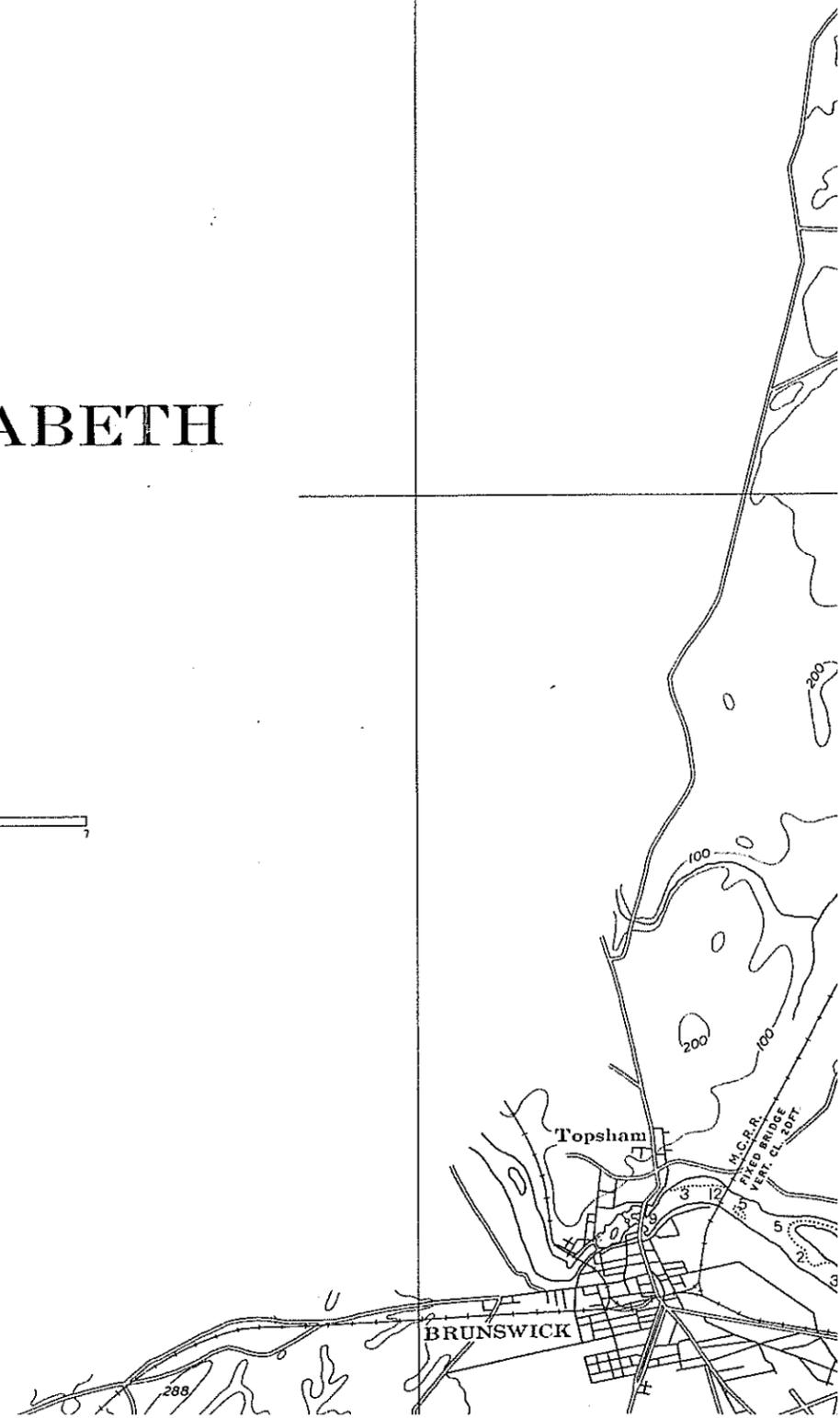
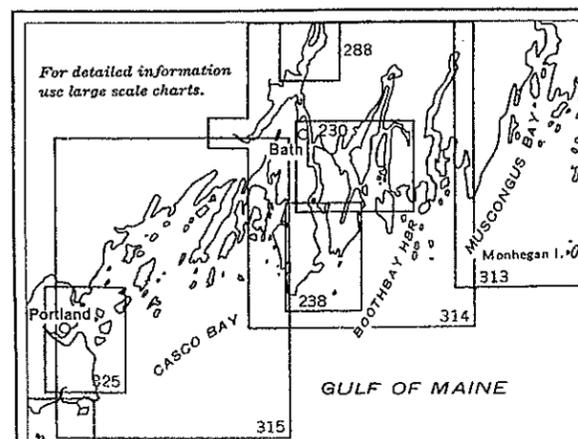
Aug. 1948

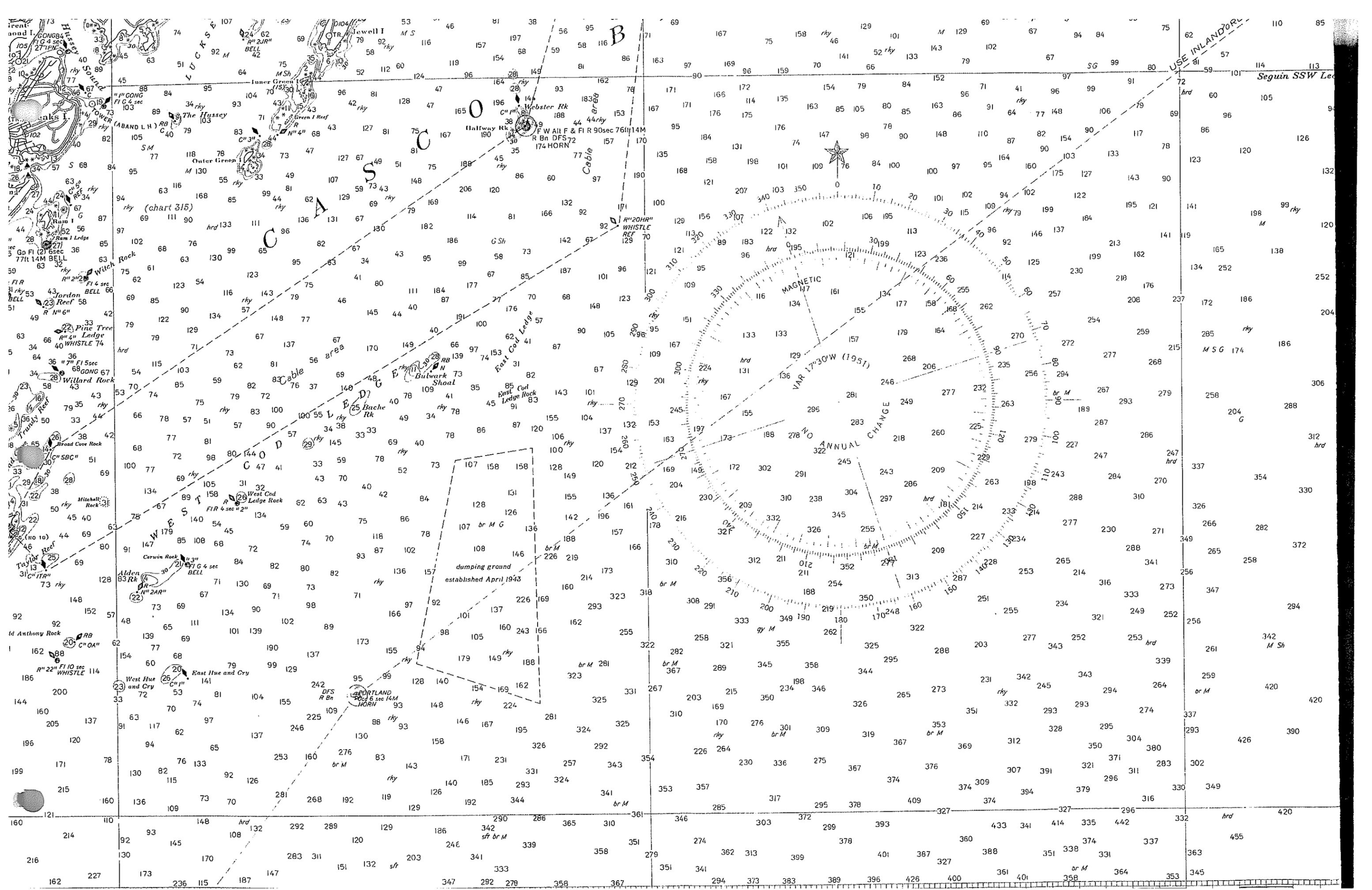
ABBREVIATIONS (For complete list of Symbols and Abbreviations, see C. & G. S. Chart No. 1):

Lights: F. fixed, Fl. flashing, Qk. quick, I. Qk. interrupted quick, S-L. short-long, Occ. occulting, Alt. alternating, Gp. group, W. white, R. red, G. green, M. nautical miles, min. minutes, sec. seconds; SEC. sector; OBSC. obscured; WHIS. whistle; DIA. diaphone; AERO. aeronautical light; D. destroyed, to be reestablished.

Buoys: C. can, N. nun, S. spar, B. black, R. red, W. white, Y. yellow, REF. reflector; T.B. temporary buoy.

Lights are white unless otherwise indicated.





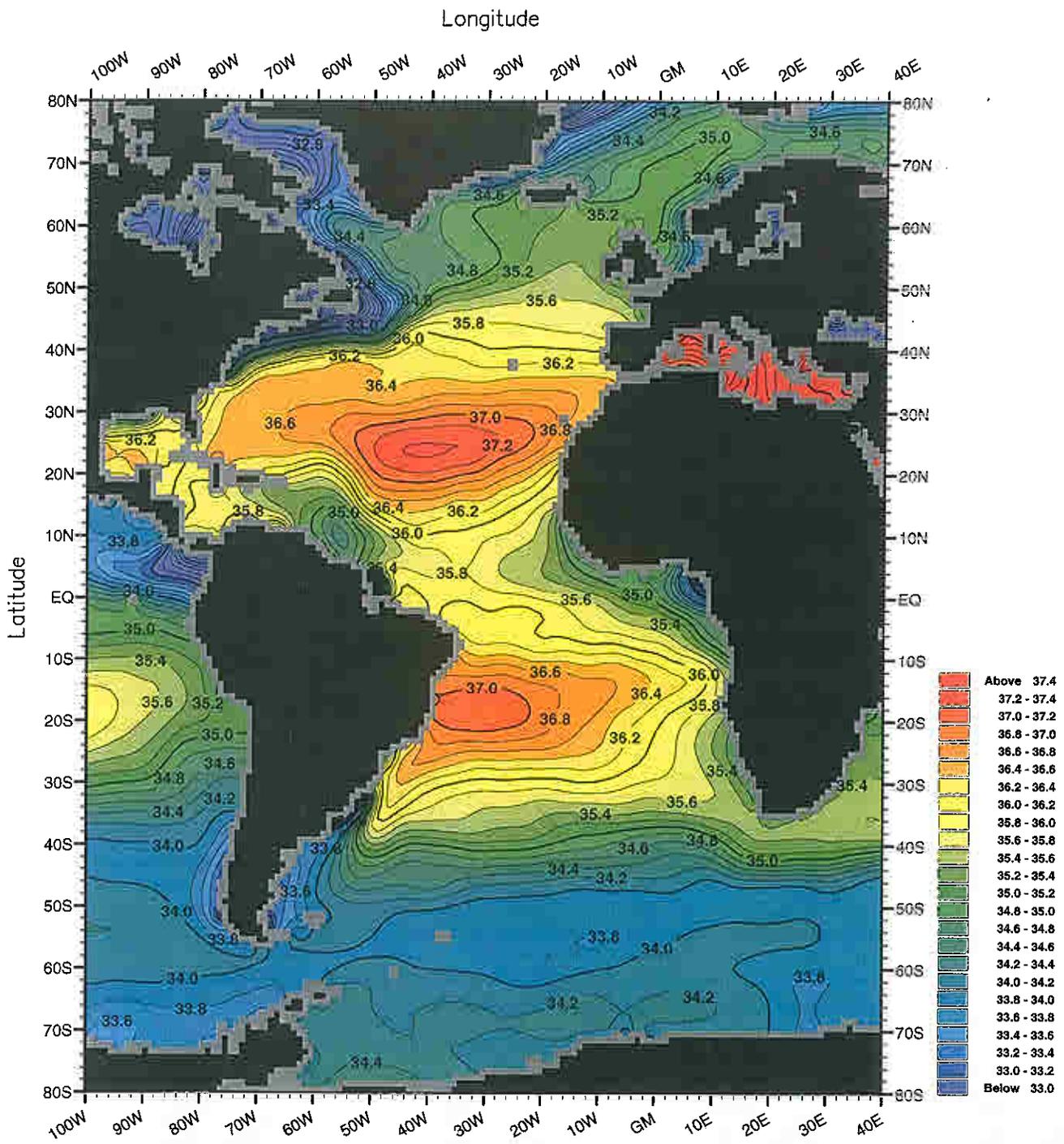


Fig. A2-2. Annual mean salinity (PSS) at 10 m. depth.

Minimum Value= 35.2

Maximum Value= 40.36

Contour Interval: 0.20

## **Appendix C: Project Source Data – Site Specific**

U. S. NAVAL AIR STATION  
BRUNSWICK, MAINE

RESTRICTED

16 December 1944

To: Chief of the Bureau of Ordnance.

*Na 116*

Subj: Defective Rocket Ammunition, Service, Sub Caliber and  
Component Inert Parts, Disposition of.

*7112*

Ref: (a) NAS Brunswick ltr. to BuOrd NA116 (RL:lg) over F41  
Serial 02274 dated 9 November 1944.

*Na 116 (11144-00816)*

1. Reference (a) requested information as to disposition desired by  
the Bureau of Ordnance of component inert Aircraft Rocket parts. Infor-  
mation requested in reference (a) has not been received.

*7112*

**122244 00681**

2. In addition to inert aircraft rocket parts this station has a  
small quantity of defective sub caliber and service aircraft rocket  
ammunition. Information is requested as to the disposition desired  
by the Bureau of Ordnance. It is understood that if such ammunition  
is shipped to the nearest Naval Ammunition Depot, it will be disposed  
of by lowering gently over the side in 100 fathoms of water or ten  
miles off shore. If such disposition is to be made, it is suggested  
that this station be authorized to dispose of defective aircraft rocket  
ammunition in this fashion and thus save packing and shipping expense.

3. Enclosure (1) submitted herewith is a report on all defective  
aircraft rockets now on hand. Enclosure (2) submitted herewith, covers  
issuing of these defective rounds so that they will no longer be  
considered as part of ammunition inventory at this station. All defec-  
tive rockets will be held at this station awaiting disposition instruc-  
tions from the Bureau of Ordnance.

  
E. M. ELLIS  
Commander, USN  
Commanding Officer

CC: ComFair, Quonset

Encl. (EW)

- (1) Two copies of NAVORD 147 on Defective Aircraft Rocket Ammunition.
- (2) Two copies of NAVORD 1059 covering issue of defective Aircraft Rocket Ammunition.

BM 380

BMQF WNFO V BMBC NR 42

U

FROM NAS BRUNSWICK ME 022055

R

BUORD

D

INFO COMFAIR QUONSET PT R I

*mw2 f*

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REYR TWX 021516 NAS BRUNSWICK HAS FACILITIES FOR DUMPING IN DEEP  
WATER X ROCKETS WILL BE DISPOSED OF AS DIRECTED X

BT 022055

TOT 022059 ES

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BUORD  
NAVY

1945 FEB 2 21 55

ADM

RECEIVED

U. S. NAVAL AIR STATION  
BRUNSWICK, MAINE

NA116(RL:sr)  
F41-10  
3596

NA116  
MN2

3 February 1945

To: Chief of the Bureau of Ordnance

020845 00744

Subj: Aircraft Bomb Fuzes, Navy Type - Disposal of.

Ref: (a) NavOrd OCL AV 28-44

1. In accordance with reference (a), aircraft bomb fuzes listed in enclosure (1) herewith were disposed of in deep water on 25 January 1945 at 43° 30' N Lat., 69° 59' W Long.

2. Aircraft bomb fuzes listed in enclosure (1) were disposed of because they had been in ready condition out of moisture proof containers for a period of longer than three weeks. Subject fuzes were turned in to this station by CASU 22.

  
E.M. ELLIS  
Commander, USN  
Commanding Officer

Enc. (HW) *J*  
(1) List of Aircraft Bomb Fuzes Disposed of

ENCLOSURE (1)

LIST OF AIRCRAFT BOMB FUZES DISPOSED OF

<u>Item</u>	<u>Quantity</u>	<u>Lot Number</u>
Mk. 219 Mod 4	2	#210 12.50
	2	#237
	2	#307
	2	#272
Mk. 224 Mod 1	1	#160 32.00
	2	#21B
	1	#12D
Mk. 224 Mod 2	5	#65D 32.00
	1	#36
	2	#43
	1	#35
	4	#64
	1	#65
	1	#63
	1	#53
	4	#68
Mk. 234 Mod 1	4	#87F
	8	#84F 28.75

020 845 00744

NA 116

MN2

19 January 1945

To: Commanding Officer  
Naval Ammunition Depot  
Hingham, Mass.

012545 06313

Subj: Ammunition, request for

1. This letter confirms telephone request of 18 January 1945. It is requested that one hundred (100) 500 lb. water filled bombs be shipped to this station as soon as possible.
2. It is further requested that 24 Mk 131 Mod 1 bomb fuzes be shipped to this station. These fuzes are to replace 24 fuzes which were turned in to this station by USCG vessel CG-83487. Inspection of the fuzes turned in revealed considerable salt water corrosion around the stem, collar, safety pin, and body of the fuze. Immediately prior to being turned in, these fuzes had been assembled for a considerable period of time in 7.2" rockets (mousetraps) in ready ammunition boxes on the deck of the Coast Guard vessel.
3. Information is also requested as to how the fuzes turned in shall be disposed of. The containers in which the fuzes were turned in are not suitable for shipping fuzes. This station can, however, dispose of these fuzes by lowering gently over the side in 100 fathoms of water or ten miles off shore.

E. M. ELLIS  
Commander, USN  
Commanding Officer

Copy to: BuOrd

RQ 74, BuOrd



B (Info)  
NALL6

2 JUN 1945

C

Ad From:  
To:

The Chief of the Bureau of Ordnance,  
The Commanding Officer,  
U.S. Naval Air Station,  
Brunswick, Maine.

Subject:

5125 Rocket Motor Mark 10 with Rocket Target  
Fins Mark 2 - disposition of.

Re Reference:

(a) NAS Brunswick ltr. NALL6 (RL:ds) 370  
5126 dated 25 May 1945.  
(b) BuOrd ltr. WTL/373 (Pr5c-1) dated 20  
April 1945.

Fi

1. As suggested in paragraph 3 of reference (a)  
it is requested that the motor referred to be dumped overboard  
in deep water (over 150 fathoms deep and at least ten (10)  
miles from shore) after removal of the wooden fins. Any other  
motors found on shore or floating in the area should be dis-  
posed of similarly. If Naval Air Station, Brunswick or Com-  
mandant, FIRST Naval District is able to determine the activity  
responsible for this situation, it is requested that the Bureau  
of Ordnance be advised.

Mn 2

2. The information given in paragraph 2 of refer-  
ence (a) does not show the complete ammunition lot number. If  
complete ammunition lot number, in accordance with reference  
(b) was shown, it would be possible to identify the motor.

Pr

3. Partial ammunition lot number shown in reference  
(a) reads "HAW-44-RMCS". To be complete the lot number for  
this motor should read, "RMCS-?-HAW-44". The number of the  
lot should be shown in place of the question mark.

G. F. HUSSEY, JR.

P. F. Johnston  
By direction

KBA/gf

Copy to:

ComOrd (Attn: District Ordnance Officer)

052845 1433

prepared 6-1-45 (63750)

16-2071

FILE OR SERIAL NO. NA 116

DATE 29 JANUARY 1945

SPEEDLETTER

TO:

The Commanding Officer  
Naval Air Station  
Brunswick, Maine

*A*  
*x 76-1(10)*

PURPOSE OF SPEEDLETTER:  
To combine advantages of despatches with economy of transmission by mail.

Do not handle through Communication Offices.

Despatch phraseology may be used.

Use size No. 9 window envelopes when appropriate and available.

If used for classified matter handle as prescribed in U. S. Navy Regs., Arts. 75½ and 76.

Upon receipt EXPEDITE HANDLING and DELIVERY as much as possible.

REFER YOUR LETTER NA116(RL:st) 378 - 3372 DATED 19 JANUARY 1945.  
YOU ARE AUTHORIZED TO DISPOSE OF 24 FUZES MARK 131 MOD 1  
TURNED IN BY VESSEL CG 83487 BY RENDERING FUZES SAFE IN  
ACCORDANCE WITH INSTRUCTIONS IN O.P. 1017 FIRST REVISION  
AND LOWERING GENTLY OVER THE SIDE IN 100 FATHOMS OF WATER  
10 MILES OFF SHORE. 24 REPLACEMENT FUZES ARE BEING SHIPPED  
ON AMSO 503364.

012546 00313

COPIES TO

SIGNATURE AND TITLE

G. F. HUSSEY, JR.

A. J. MacDonald

By direction

SENDER'S MAILING ADDRESS: (Including symbol or identity of originating office.)

(Mn2f)

The Chief of the Bureau of Ordnance  
Navy Department  
Washington 25, D.C.

ATTENTION ADDRESSEE: Address reply exactly as indicated on right. →

SRR/st

B  
 (Pr6d-5)  
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 To:  
 Re  
 Subject:  
 Reference:  
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 Pr6d-5

NA 116



The Chief of the Bureau of Ordnance,  
 Commanding Officer,  
 U. S. Naval Air Station,  
 Brunswick, Maine.

Obsolete Depth Bombs, Survey and disposition of.

- (a) BuOrd ltr NA116(Pr6d-5) dated 21 September 1945.
- (b) O.P. 1515 (through Change 4) dated 11 June 1945.
- (c) BuOrd ltr NT1-1/578(Pr6d-5) to NAD Hingham dated 30 June 1945.

1. Reference (a) requested that the following bombs be retained in stowage pending Bureau decision on reclaiming the TNT:

Quantity	Description
241	325-Lb Mark 17 and Mods (TNT) (See Note 1)
36	325-Lb AN-Mark 41 (TNT) (See Note 1)

Note 1: Listed as restricted in reference (b) but declared obsolete at the end of the war.

2. A Bureau of Ordnance Shipment Order will be issued for shipment of the subject bombs to Naval Ammunition Depot, Hingham, for disposal by "dumping overboard in deep water." A copy only of the survey should be forwarded to the Bureau of Ordnance.

3. By copy of this letter the Naval Ammunition Depot, Hingham, is requested to carry out the specified disposition in accordance with the instructions outlined in reference (c).

G. F. HUSSEY, JR.

CC: NAL, Hingham, Massachusetts. Mell A. Peterson  
By direction  
 Pr6d-5(REE)  
 Mnlb Mn2d Prep. 10/8/45 Ext. 61645

(Mn26) 11/11/45

8 APR 1945

C

Ad

# RESTRICTED

From: The Chief of the Bureau of Ordnance.  
 To: The Commanding Officer,  
 U. S. Naval Air Station,  
 Brunswick, Maine.

031345 1473

Re Subject: Excess Aircraft Depth Bombs -  
 disposition of.

Reference: (a) NAS Brunswick Restricted ltr.  
 NAL16(RL:JC)/278 of 9 Mar. 1945.

Fi 1. Reference (a) requested disposition instructions for 33 Mark 49 depth bombs and 76 Mark 37 depth bombs on hand.

Mina. May 4/3/45  
 Mr. [Signature] 2. These bombs have been declared obsolete and it is hereby authorized that they be disposed of by dumping in water at least 100 fathoms deep and 10 miles off shore. Disposal by dropping these bombs unfused from aircraft is authorized, but at least 500 feet of altitude, as prescribed by COMINCH for this size bomb, shall be observed. If such disposal is not practicable, it is requested that this Bureau be so informed in order that other means may be determined.

Pr 3. It is to be noted that these bombs have been reduced in classification from RESTRICTED to NONCLASSIFIED.

G. F. HUSSEY, JR.

E. M. Crouch  
By direction

W:lkms  
 Copy to:  
 NAD Hingham, Mass.

Nn1  
 Nn2g  
 Pr6d  
 Ad1b

Prep. 3/17/45 Rewrit. 3/27/45 Ext. 2591

111-1

SEE 1946

X F41-6  
X NA-116

- May be sent (1) air mail and/or special delivery, (2) with enclosure, (3) in nonmetal container, (4) in window envelope.
- Provision made for inserting "From" above "To" if activity's correspondence forward as separate.
- Available upon request from Publications Division, Administration Office, Navy Department, Washington 25, D. C. in packs of 25 sets each set composed of 1 white, 1 yellow, 1 pink, 1 green.
- Additional pack of 25 available in white (NAVEFORM 110, Form 11-40), and, if needed, in pink (NAVEFORM 110B) and green (NAV-EXFORM 110C).

TO: THE COMMANDING OFFICER  
NAVAL ACQUISITION DEPOT  
BINGHAM, MASSACHUSETTS

INDICATE HERE IF CLASSIFIED

UN LTR WTL-1/578-1 (08)(RB) DATED 27 AUGUST 1946 REPORTED RECEIPT OF  
6. AIRCRAFT DEPTH BOMBS MARK 54 HBX LOADED AND 166 AIRCRAFT DEPTH BOMBS  
MARK 54 IPX-2 LOADED FROM NAS BRUNSWICK, MAINE ON BOBO 267971 FOR DISPOSAL  
BY DUMPING OVERBOARD IN DEEP WATER IN THE AREA DESIGNATED BY THE DISTRICT  
COMMANDANT (OVER 500 FATHOMS DEEP AND MORE THAN 10 MILES FROM SHORE); X  
IT IS REQUESTED THAT THE 60 AIRCRAFT DEPTH BOMBS MARK 54 HBX LOADED BE  
RETAINED FOR STOCK AND ISSUE AT NAID BINGHAM X BY COPY OF THIS SPLITS  
INFORMATION IS REQUESTED FROM NAS BRUNSWICK, MAINE REGARDING THE REASONS  
FOR SURVEYING THE 60 AIRCRAFT DEPTH BOMBS MARK 54 HBX LOADED X

COPIES TO

NAS, BRUNSWICK, MAINE

Mds  
Mn2a  
Pr6b

Prepared 9/5/46  
Y-61647

SIGNATURE AND TITLE

G. F. HUSKEY, JR.

SENDER'S MAILING ADDRESS (INCLUDE OFFICE SYMBOL, IF APPLICABLE)

THE CHIEF OF THE BUREAU OF ORDNANCE  
NAVY DEPARTMENT  
WASHINGTON 25, D. C.

IF OTHER (Pr6b)  
Additional copies should be addressed as here shown, to insure  
prompt and true delivery.

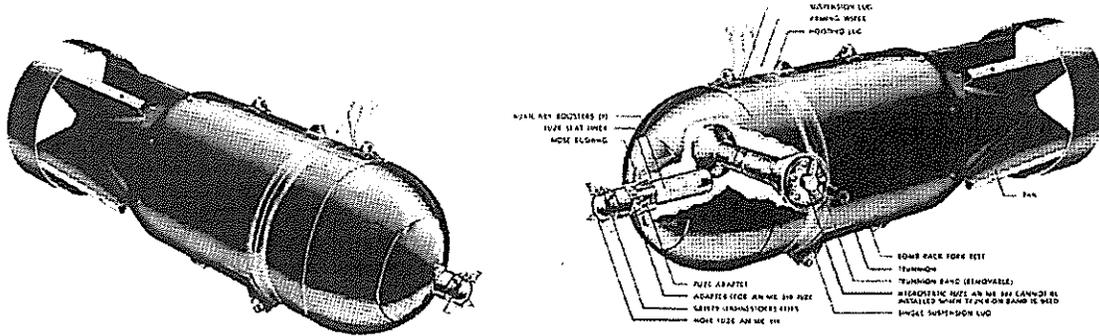
083046 000

6 SEP 1946

## Appendix D: Ordnance Technical Data Sheets

# Ordnance Technical Data Sheet

## U.S. BOMB, 325-350-LB, DEPTH BOMB, MK 17



<b>Nomenclature:</b>	MK 17 Depth Bomb
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	Obsolete
<b>Filler:</b>	TNT*
<b>Filler weight:</b>	101.61 kg (224 lbs)
<b>Item weight:</b>	161 kg (354 lbs)
<b>Diameter:</b>	381mm (15 in)
<b>Length:</b>	1.33 m (4.36 ft)
<b>Maximum Range:</b>	N/A
<b>Fragmentation Distance:</b>	5,542 Feet
<b>Fuze:</b>	Nose: AN-M103, AN-M103 A1, AN-Mk 219, AN-MK 221, and AN-MK 239 Aftward ship: AN-MK 224, or AN-MK 234

**Usage:** This is a fin stabilized, high explosive depth bomb.

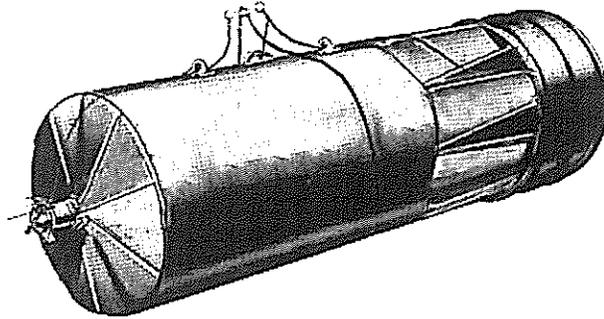
**Description:** TNT-loaded bombs have weight and Mark number stenciled in yellow; Torpex loaded bombs have these items stenciled in blue. These depth bombs are made with round noses welded to a cylindrical steel tube.

\*TNT (2, 4, 6-trinitrotolucne) is a constituent of such explosives as amatol, pentolite, tetrytol, tritonal, picratol, and Comp B. In a refined form, it is one of the most stable high explosives. In the pure state, it is crystalline and nearly white, resembling a light brown sugar.

**Reference:** ORDATA Online, OP 1664.

# Ordnance Technical Data Sheet

## U.S. BOMB, 650-LB, DEPTH BOMB, MK 49



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<b>Nomenclature:</b>	MK49 Depth Bomb
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	Obsolete
<b>Filler:</b>	Torpex*
<b>Filler weight:</b>	214.10 kg (472 lbs)
<b>Item weight:</b>	308.90 kg (681 lbs)
<b>Diameter:</b>	449.58 mm (17.7 in)
<b>Length:</b>	1.49 m (4.89 ft)
<b>Maximum Range:</b>	N/A
<b>Fragmentation Distance:</b>	6,137 Feet
<b>Fuze:</b>	Nose: AN-M103, AN-M103A1, and AN-Mk 219 Athwart ship: An-Mk 224, or An-Mk 234 Tail: Mk 229, Mk 229 Mod 3 and AN-Mk 230

**Usage:** This is an air dropped, high explosive depth bomb.

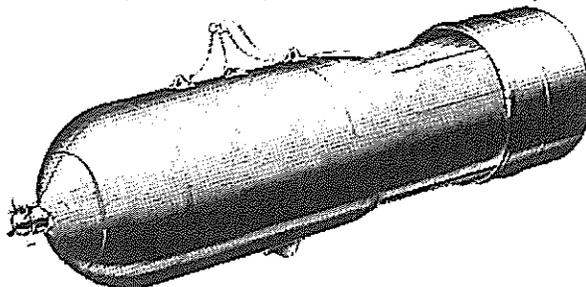
**Description:** TNT-loaded bombs have Mark numbers and weight stenciled in yellow. Torpex-loaded bombs have markings in blue. The body is constructed in three pieces, the flat nose and tailpiece being welded onto the sheet-steel center tube.

\*Torpex also known as TPX; German — Trialene, Trialine, Tetranol. It has a mixture containing RDX, TNT, and aluminum powder. It is solid and has a consistency of mortar, the color is silvery white or slate gray. Used as a main charge explosive which produces more blast effect than any other standard main charge explosive. Used in mines, in torpedo warheads, and in depth bombs. Also employed by the Germans as filler in their large armor piercing and high explosive bombs.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. BOMB, 650-LB, DEPTH BOMB, MK 37



---

<b>Nomenclature:</b>	MK37 Depth Bomb
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	Obsolete
<b>Filler:</b>	TNT*
<b>Filler weight:</b>	210.47 kg (464 lbs)
<b>Item weight:</b>	298.92 kg (659 lbs)
<b>Diameter:</b>	449.58 mm (17.7 in)
<b>Length:</b>	Not Available
<b>Maximum Range:</b>	N/A
<b>Fragmentation Distance:</b>	6,137 Feet
<b>Fuze:</b>	Nose: AN-M103, AN-Mk219, Mk221, and Mk 239 Athwart ship: AN-MK 224, and AN-MK 239 Tail: MK 229, MK 229 Mod 3, and AN-Mk 230

**Usage:** This is a fin stabilized, high explosive depth bomb.

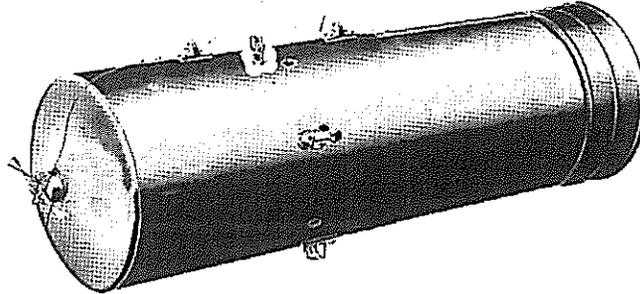
**Description:** The bombs are painted olive drab or gray over all, with an 11-inch yellow disc between the two suspension lugs. They may be light gray over all. The suspension lugs are reinforced with a steel strip. A flat-nose attachment, in the shape of a bucket and fitting down under the nose of the bomb, can be used to improve underwater trajectory. The vacant spaces are then filled with plaster of paris. These attachments increase the weight by 72 pounds. These bombs are manufactured with a hemispherical nose reinforced with a steel disc.

\* TNT (2, 4, 6-trinitrotoluene) is a constituent of such explosives as amatol, pentolite, tetrytol, tritonal, picratol, and Comp B. In a refined form, it is one of the most stable high explosives. In the pure state, it is crystalline and nearly white, resembling a light brown sugar. Used in other explosives such as RDX, PETN, Amatol, and EDNA. Can be used as a booster or as a bursting charge for high explosive shells and bombs.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. BOMB, 325-350-LB, DEPTH BOMB, MK 54/MK 54 Mod 1



---

<b>Nomenclature:</b>	MK54/MK 54 Mod 1 Depth Bomb
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	Obsolete
<b>Filler:</b>	HBX/Torpex*
<b>Filler weight:</b>	113.14 kg (249.43 lbs)
<b>Item weight:</b>	160.57 kg (354 lbs)
<b>Diameter:</b>	350.52 mm (13.8 in)
<b>Length:</b>	1.33 m (4.36 ft)
<b>Maximum Range:</b>	N/A
<b>Fragmentation Distance:</b>	5,296 Feet
<b>Fuze:</b>	Nose: AN-M103, AN-M103 A1, and AN-Mk 219 Tail: AN-MK 230 Mods 4,5, and 6, or MK 231

**Usage:** This is an air dropped, high explosive depth bomb.

**Description:** Olive drab over all. "Mk 53.-325 lb. depth bomb", "Mk 54 Mod 1, 350 lb. depth bomb" stenciled on the respective bomb bodies in yellow if the filling is HBX, or Mk 54 in blue if the filling is Torpex. The cylindrical welded sheet-steel body has a flat nose.

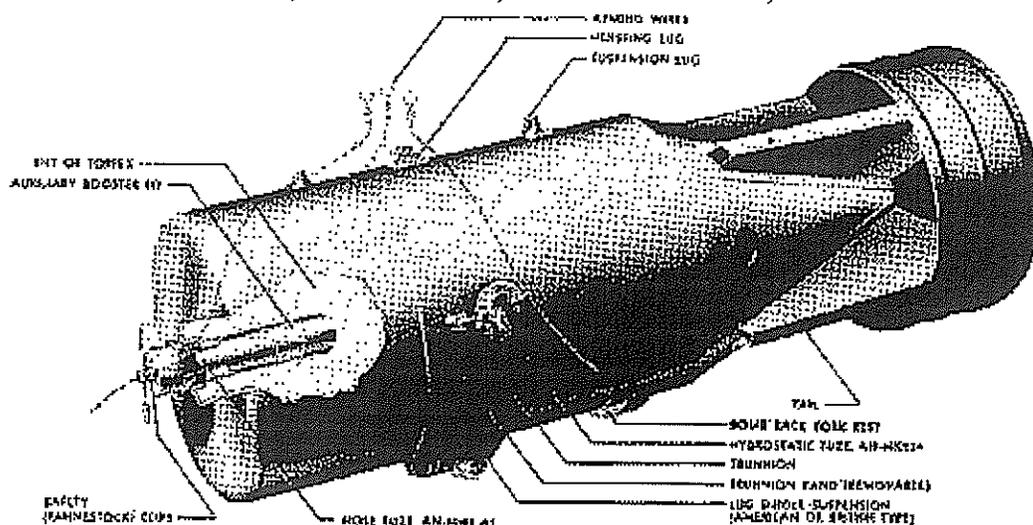
\*HBX (High Blast Explosive). High explosive composition containing RDX, TNT, Aluminum and a wax desensitizer. It was developed during WWII as a desensitized modification of Torpex explosives. HBX is an aluminized (powdered aluminum) explosive having the same order of sensitivity as composition B. HBX may produce pressure within a casing due to gassing. It is used as a bursting charge in mines, depth bombs, depth charges, and torpedoes.

\*Torpex also known as TPX; German — Trialene, Trialine, Tetranol. It has a mixture containing RDX, TNT, and aluminum powder. It is solid and has a consistency of mortar, the color is silvery white or slate gray. Used as a main charge explosive which produces more blast effect than any other standard main charge explosive. Used in mines, in torpedo warheads, and in depth bombs. Also employed by the Germans as filler in their large armor piercing and high explosive bombs.

**Reference:** ORDATA Online, OP 1664.

# Ordnance Technical Data Sheet

## U.S. BOMB, 325-350-LB, DEPTH BOMB, AN-MK 41



<b>Nomenclature:</b>	MK 41 Depth Bomb
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	Obsolete
<b>Filler:</b>	TNT*
<b>Filler weight:</b>	101.61 kg (224 lbs)
<b>Item weight:</b>	161.03 kg (355 lbs)
<b>Diameter:</b>	381mm (15 in)
<b>Length:</b>	1.27 m (4.16 ft)
<b>Maximum Range:</b>	N/A
<b>Fragmentation Distance:</b>	5,542 Feet
<b>Fuze:</b>	Nose: AN-M103, AN-M103 A1, AN-Mk 219, AN-MK 221, and AN-MK 239 Aftward ship: AN-MK 224, or AN-MK 234

**Usage:** This is a fin stabilized, high explosive depth bomb.

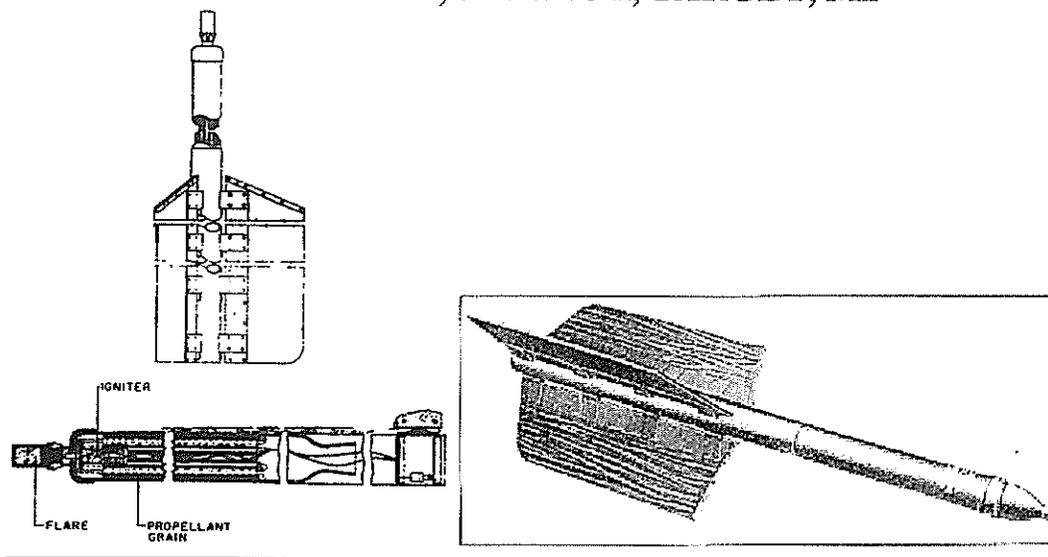
**Description:** TNT-loaded bombs have weight and Mark number stenciled in yellow; Torpex loaded bombs have these items stenciled in blue. These bombs are constructed with a flat nose, there being a slight taper from the walls to the nose. The body is in three pieces. The sides are tubular with a transverse fuze pocket tube welded in place 15 inches aft the nose. The body is made of steel.

\*TNT (2, 4, 6-trinitrotolucne) is a constituent of such explosives as amatol, pentolite, tetrytol, tritonal, picratol, and Comp B. In a refined form, it is one of the most stable high explosives. In the pure state, it is crystalline and nearly white, resembling a light brown sugar.

**Reference:** ORDATA Online, OP 1664.

# Ordnance Technical Data Sheet

## U.S. ROCKET, 3.25-INCH, TARGET, M2



<b>Nomenclature:</b>	Target, M2, 3.25 in
<b>Ordnance Family:</b>	Rockets
<b>DODIC:</b>	Obsolete
<b>Filler:</b>	Propellant (G-12)
<b>Filler weight:</b>	1.45 kg (3.197 lbs)
<b>Item weight:</b>	17.01 kg (37.5 lbs)
<b>Diameter:</b>	82.55 mm (3.25 in)
<b>Length:</b>	1.5 m (4.921 ft)
<b>Maximum Range:</b>	Not provided
<b>Fragmentation Distance:</b>	533 Feet
<b>Fuze:</b>	Not provided

**Usage:** This is a high-speed target for firing practice with automatic A.A. weapons.

**Description:** The target rocket is a thin-walled metal cylinder with an ogival head and three large equally spaced plywood fins at the tail. The propellant has grains five inches long and 7/8-inch in diameter, with a 5/16-inch axial hole. An electric squib ignites it. A flare is added to the 3.25-inch Target Rocket M2 for antiaircraft target practice at night, the resulting projectile is designated as the M2A1. The flare burns for 30 seconds from the beginning of flight. M2A2: This design has a flat nose, to which is threaded a yellow flare for both day and night tracking. It also has a different system for igniter contact, the lead wires pass in turn through the nozzle and an inner fiber closing cup and connect to a household-type service plug, which is held by an outer fiber-board closing cup. There are 18 inches of igniter cable coiled between the closing cups, to allow ample lead for connecting to the launcher.

**Reference:** ORDATA Online.