US Army Corps
of Engineers
HUNTSVILLE ENGINEERING
AND SUPPORT CENTER

Defense Environmental Restoration Program
For
Formerly Used Defense Sites
Ordnance and Explosives
Chemical Warfare Materials

ARCHIVE SEARCH REPORT

Camp Elliot

San Diego, CA

Project Number – J09CA006703

FINAL - 30 SEPTEMBER 2004

Prepared by
US Army Corps of Engineers
ST. LOUIS DISTRICT

J09CA006703_01.02_0500_a

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:
CEHNC-OE-CX (200-1c)

30 September 2004

MEMORANDUM FOR Commander, US Army Engineer District, Saint Louis (CEMVS-PM-M/ Mr. Mike Dace), 1222 Spruce Street, Saint Louis, MO 63103-2833

SUBJECT: Results of the Technical Advisory Group (TAG) Review of Archives Search Reports (ASRs) and Fact Sheets for Defense Environmental Restoration Program-Formerly Used Defense Sites (DERP-FUDS)

1. The following ASRs and Fact Sheets have been finalized:

PROJECT NUMBER:	SITE NAME:
J09CA006701/02/03/04	Camp Elliott
J09CA015301	El Centro Bombing Target Site (Ogilby)
J09CA014401	Bombing Target Imperial Dunes
J08UT100104	Wendover Air Force Auxiliary Field – ADDENDUM
J09CA728001	Fresno Army Air Force Ground Training Center
J09CA004801	Iron Mountain/Kilbeck Hills
J09CA704401	Border Field State Park
J09CA728901	Drakes Bay Skip and Dive Bombing Range / Camp Hydle
J09CA015601	East Borego Bombing Target
J09CA002602	Santa Rosa Army Airfield (ADDENDUM)
K06NW050101	Walker AFB, Roswell S-10
K06NM037301	Clovis AFB Nara Visa PBR No. 1
J09NV111801	Pyramid Lake Torpedo and Bombing Range
J09NV109301	Aerial Gunnery Range No. 4
D01MA021801	Fort Standish
C002NY001604	Fort Tilden
J08UT095101	Salt Lake City Army Air Base Gunnery
F10ID012201	Pocatella Precision Bombing Range #2
F10ID012101	Pocatella Ground Gunnery Range
F10ID011901	Pocatello Moving Target Range
F10ID013401	Swan Falls Precision Bombing Range #4
F10ID011301	Precision Bombing Range #2 (Marsing)
F10ID014001	Mountain Home Air Force Range #1
J09CA112003	Corona Annex
D01MA018304	Camp Myles Standish – ADDENDUM
A04MS028201	Yazoo Bombing Range

2. Recommended strategy for future actions to be taken by the Project Manager is included in the enclosed fact sheets. Supporting data for TAG decisions are also included with the fact sheets.

3. Fact sheets, supporting data and corrected pages, due to prior reviews, are to be distributed with the subject ASRs.

4. Subject ASRs are recommended to be final when enclosed fact sheets, supporting data and corrected pages are included as a part of the project package.

5. If you have any questions concerning this action, please call me at 256-895-1797, DSN 760-1797, or facsimile 256-895-1798.

FOR THE DIRECTOR OF ORDNANCE AND EXPLOSIVES DIRECTORATE:

26 Encls
as

DANNY R. MARDIS
Archives Search Report Manager
for Ordnance and Explosives Team

ARCHIVE SEARCH REPORT
TABLE OF CONTENTS

APPENDICES

REPORT PLATES

EXECUTIVE SUMMARY

Camp Elliott is located in San Diego, CA approximately twelve miles north of San Diego, CA. In May 1917, the U.S. Government leased 8,000 acres for the establishment of Camp Kearny. By July, additional acreage of adjacent land, bringing the total to 12,721 acres, was leased for practice and drill maneuvers. In May 1941, a declaration of taking granted immediate possession of 19,298.25 acres. Additional acquisitions increased the training area to approximately 32,000 acres. Located on what was then known as Camp Holcomb, this land was designated Camp Elliott on 14 June 1940. Camp Elliott contained three permanent subsidiary camps, four bivouac areas and forty-one combat or firing ranges. In early 1944, the Marines began leaving Camp Elliott for Camp Pendleton. The Marine Base Depot and the tank training area at Jacques Farm remained at Camp Elliott after the Navy officially took command of the camp on 26 June 1944. The Navy used Elliott as a training and distribution center for the remainder of the war. In 1949, Congress appropriated funds to develop MCAS, Miramar as a Master Naval Jet Air Station and the Navy began major construction and rehabilitation of the runways. On 1 April 1952, the site was officially designated Naval Air Station, Miramar. The Army had jurisdiction between 1946 and 1947. The Navy reported approximately 15,000 acres excess to the General Services Administration (GSA) in 1961. The remaining acreage is DoD owned and known as Marine Corps Air Station (MCAS), Miramar.

This FUDS property is broken down into four project areas: Project 01 – Tierrasanta, Project 02 – Mission Trails, Project 03 – East Elliott, and Project 04 – Areas D, G, and H. Project areas 01, 02, and 03 are located adjacent to the southern boundary of MCAS Miramar; and Project area 04 is located adjacent to the northern boundary.

Ordnance and explosive (OE) related features by Project Area follows:

- Project 01 – Demolition, Camouflage, Moving Vehicle & Tank, Small Arms, Artillery, Howitzer, Moving Target, Mortar, Anti-Aircraft, Towed Target
- Project 02 – Artillery, Howitzer, Moving Target, Mortar, Anti-Aircraft, Towed Target, Small Arms
- Project 03 – Artillery, Anti-Tank, Mortar, Towed Target, Tank
- Project 04 – Bomb Disposal Area, Anti-Aircraft, Tank Course, Anti-Tank, Small Arms

This Archives Search Report (ASR) is for Project No. **J09CA006703 – Camp Elliott / East Elliot**. The report contains documentation for Project Nos. J09CA006701 - Tierra Santa, J09CA006702 – Mission Trails, J09CA006703 – East Elliot and J09CA006704 – Areas G, H and D.

ACKNOWLEDGEMENTS

The following individuals prepared the Archive Search Report or are involved in the process:

US Army Corps of Engineers, **St. Louis District**
Engineering Division - Ordnance and Technical Services Branch (CEMVS-ED-P)
1222 Spruce Street
St. Louis, MO 63103-2833

Individual	Telephone Number	Position
Michael Dace	314-331-8036	ED-P, Chief of Ordnance and Technical Service Branch
Rochelle Hance	314-331-8784	ED-P, Engineer/ASR Project Manager
David Tajkowski	314-331-8841	ED-P, Historian
Don Fendler	314-331-8119	ED-P, Civil Engineer
Alan Foreman	314-331-8114	ED-S, CADD Specialist
Danny McMurphy	314-331-8389	ED-S, Aerial Photogrammetry
Teri Allen	314-331-8084	PM-EA, Biologist (Natural Resources)
Jessica Bush	314-331-8446	ED-G, Civil Engineer (Geology, Soils and Groundwater)
Lloyd Coakley	314-331-8356	ED-HPW, Civil Engineer (Climate and Hydrology)

Other elements of the US Army Corps of Engineers provided programmatic and review oversight of the report:

US Army Engineering and Support Center Huntsville
Center of Expertise and Design Center of Ordnance and Explosives, (CEHNC-ED-SY-O)
P. O. Box 1600
Huntsville, AL 35807-4301

Individual	Telephone Number	Position
Brad McCowan	256-895-1174	ASR Project Manager

US Army Corps of Engineers – Los Angeles District
ATTN: CESPL-PM-M
911 Wilshire Blvd; 15023
Los Angeles, CA 90017

Individual	Telephone Number	Position
Ms. Tawny Tran	213-452-3991	DERP FUDS Program Manager
Lloyd Godard		

1.0 INTRODUCTION

1.1 AUTHORITY

In 1986, Congress established the Defense Environmental Restoration Program at 10 U.S. C. 2701 et.seq. This program directed the Secretary of Defense to "carry out a program of environmental restoration at facilities under the jurisdiction of the secretary."

In March, 1990, the EPA issued a revised National Contingency Plan. Under 40 C.F.R. 300.120, EPA designated DoD to be the removal response authority for incidents involving DoD military weapons and munitions under the jurisdiction, custody and control of DoD.

Since the beginning of this program, the U.S. Army Corps of Engineers has been the agency responsible for environmental restoration at Formerly-Used Defense Sites (FUDS). Since 1990, the U.S. Army Engineering and Support Center, Huntsville, has been the Center of Expertise (CX) and Design Center for Ordnance and Explosives.

1.2 SUBJECT

Camp Elliott, FUDS Property Number **J09CA0067,** was located approximately twelve miles northeast of downtown San Diego. It was a former United States Marine Corps training facility in the 1940s, used by the United States Navy in the 1950s, and occupied 30,000 to 32,000 acres of large rugged and varied terrain that was ideal for preparing troops for overseas combat training. Approximately 15,000 acres were surplused in the 1960's and 1970's while the remaining is DoD owned and known as Marine Corps Air Station (MCAS), Miramar.

This FUDS property is broken down into four project areas: Project 01 – Tierrasanta, Project 02 – Mission Trails, Project 03 – East Elliott, and Project 04 – Areas D, G, and H. Project areas 01, 02, and 03 are located adjacent to the southern boundary of MCAS Miramar; and Project area 04 is located adjacent to the northern boundary.

This Archives Search Report (ASR) is for Project No. **J09CA006703 – Camp Elliot / East Elliot**. The report contains documentation for Project Nos. J09CA006701 - Tierra Santa, J09CA006702 – Mission Trails, J09CA006703 – East Elliot and J09CA006704 – Areas G, H and D.

1.3 PURPOSE

The ASR compiles information obtained through historical research at various archives and records holding facilities. The archives search process is primarily a textual,

cartographic and photographic research and analysis effort. It also makes use of site visits and interviews to gather information concerning the site. It does not include sampling or quantitative field assessment techniques to gather data. The search directs efforts towards determining possible use or disposal of OE and Chemical Warfare Material (CWM) on the former military establishment. The research places particular emphasis on establishing the types, quantities and areas of use and disposal. This process obtains information for use in developing recommendations for further action at the former Camp Elliott.

Currently, the U. S. Army Corps of Engineers Safety Office defines OE and CWM as (Corps of Engineers Safety Office (CESO), 2000):

Ordnance and Explosives (OE):

". . . anything related to munitions designed to cause damage to personnel or material through explosive force, incendiary action or toxic effects. OE is: bombs and warheads, missiles; artillery, mortar and rocket ammunition, small arms ammunition; antipersonnel and antitank mines; demolition charges; high explosives and propellants; depleted uranium rounds; military chemical warfare materials as defined [below]; and all similar and related items or components, explosive in nature or otherwise designed to cause damage to personnel or material (e.g., fuze, boosters/propellants or soils/media contaminated with explosives if the concentration is sufficient to be reactive.) . . .Unexploded Ordnance (UXO) is an item of explosive ordnance which has failed to function as designed or has been abandoned, discarded or improperly disposed of and is still capable of functioning, causing damage to personnel or material. . . "

Chemical Agent:

"A chemical substance that is intended for use in military operations to kill, seriously injure, or incapacitate a person through its physiological effects. Excluded from consideration are industrial chemicals, riot control agents, chemical herbicides, smoke, and incendiary materiels."

Chemical Warfare Material (CWM):

"An item configured as a munition containing a chemical substance that is intended to kill, [seriously injure], or incapacitate a person through physiological effects. Also includes V- and G- series nerve agent, H-series series blister agent, and lewisite in other than munition configurations. Due to their prevalence and military unique application, chemical agent identifications sets (CAIS) are also considered CWM. CWM does not include: riot control agents, chemical herbicides, smoke and flame producing items, or soil, water, debris or other media contaminated with chemical agent. CWM also falls under the definition of Ordnance and Explosives…"

As stated above, CWM items excludes pyrotechnics (incendiaries, flares, signals, simulators, screening/burning smokes) and riot control agents (vomiting, tear), which were developed and managed by the Army's Chemical Warfare Service (CWS) but are still considered OE. These items historically were material managed by the CWS, along with the chemical agents and weaponized industrial chemicals (e.g. Hydrogen Cyanide AC; Cyanogen Chloride, CK; Phosgene, CG) that are currently defined as CWM.

1.4 SCOPE

The entire site was considered in assessing the potential for ordnance and explosives. This report presents the following:

- A brief history of Camp Elliott
- Description and characteristics of the immediate surrounding area
- A review of related site investigations
- An aerial photography and map analysis of the site
- Real estate information, past and present
- Description of the OE and/or CWM identified with the site

These factors represent the basis for the evaluation of potential OE and CWM contamination and associated risks at Camp Elliott FUDS.

2.0 PREVIOUS SITE INVESTIGATIONS

2.1 CORPS OF ENGINEERS DOCUMENTS

2.1.1 Inventory Project Reports (INPR)

The INPR prepared in 1991, which is listed below for each of the four project areas, states that Camp Elliott consisted of approximately 30,500 acres, which were acquired between 1941 and 1942. The Marine Corps used the land between 1941 and 1944 for a training center. Once the Marines left, the Department of the Navy used the area as a Naval Training and Distribution Center and later as a retraining Command. Uses of the land included tank and small arms training. The Army had jurisdiction between 1946 and 1947. The Navy reported approximately 15,000 acres excess to the General Services Administration (GSA) in 1961. Included in this INPR, Projects No. J09CA006703 (Project 03 – East Elliott) and No. J09CA006704 (Project 04 – Areas G, H, and D) as a whole were assigned a risk assessment code (RAC) of 1, Imminent Hazard. The RAC resulted from a Hazard Severity rating of category II (critical) and a Hazard Probability rating of level A (frequent). The Hazard Severity was based on the presence of conventional ordnance including medium/large caliber (20 mm and larger), rockets, explosive guided missiles, and pyrotechnics including military flares. The Hazard Probability rating was based on the contamination being located on the surface or within three feet of the surface and less than 1,250 feet from the nearest building/road. Further, there are between 101 and 250 buildings, including educational, childcare, residential, hospitals, hotels, commercial, and shopping centers within a two-mile radius. In addition there are no site barriers or security systems and the site conditions are expected to change in the future.

Project 01 – Tierrasanta:

U.S. Army Corps of Engineers, Los Angeles District.

1985 Findings and Determination of Eligibility for DERP-FUDS Project Number J09CA006701, Tierrasanta (Camp Elliott), San Diego, CA, dated 17 September 1985.

The community of Tierrasanta, which is part of the city of San Diego, CA, was developed on property that was formerly used for Marine Corps Training. Camp Elliot was obtained by the Navy in 1941, was comprised of approximately 32,000 acres, and was used between 1941 and 1954. The INPR states the terrain is heavily contaminated with unexploded ordnance. The property was disposed of between 1960 and 1963. In 1985, the community had grown to about 30,000 people. Attached to the Findings of Fact and Project Summary Sheet are several memorandums and newspaper articles regarding the UXO problem in the community of Tierrasanta.

1991 Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, Tierrasanta (Camp Elliott), San Diego, CA, Project No. J09CA006701, dated 27 August 1991.

The property for the Tierrasanta residential community, consisting of 1,800 acres net, was purchased on 15 October 1968. Much of this community sits on top of land that was used by DoD as tank and artillery ranges. The terrain is heavily contaminated with ordnance; however at the time this INPR was prepared, and ordnance sweep was underway. On 10 December 1983, two youths were killed and three injured when a 37mm High Explosive (HE) projectile exploded.

Project 02 – Mission Trails Regional Park:

U.S. Army Corps of Engineers, Los Angeles District.

1991 Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, Mission Trails Regional Park (Camp Elliott), San Diego, CA, Project No. J09CA006702, dated 27 August 1991.

Mission Trails Regional Park (2100 acres) was conveyed to the City of San Diego by quitclaim deed on 10 January 1964. This deed restricted the use to historic monument/public recreational purposes for 20 years. The following is stated in the Project Summary Sheet, "The terrain is heavily contaminated with ordnance."

U.S. Army Corps of Engineers, Los Angeles District.

1989 Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, Mission Trails Regional Park (Camp Elliott), San Diego, CA, Project No. J09CA006702.

A visual site inspection of Project 02 Area, consisting of approximately 2100 acres, was conducted in March 1988. At the time of this INPR, the area was in its original state except for improvements with easements; and the City of San Diego has acquired most of the land and was in the process of acquiring additional acreage. The City plans to make a park and recreation area. The site is easily accessible to joggers, motorcycles, and 4-wheel drive vehicles. A map of the project area identifies an area of "highest contamination"; which was determined following an initial document review and site inspection. A visual surface sweep of Tierrasanta and Mission Trails, which was conducted in October and November 1973, uncovered 93 ordnance related items. The city of San Diego Fire Department records indicate that 8 OE items (7-75mm AP and 1-105mm HE) were found near Fortuna Mountain in 1984/1985. Included in this document are 27 pages of almost 400 OE-related items (artillery, rockets, fuses, mortars, rifle grenades, grenades) found by the City of San Diego, Engineering and Development Department between January and April 1984 and between July and August 1985. The undated INPR recommends an ordnance removal project.

Project 03 – East Elliott:

U.S. Army Corps of Engineers, Los Angeles District.
1991 Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, East Elliott (Camp Elliott), San Diego, CA, Project No. J09CA006703, dated 27 August 1991.

The East Elliot area (approximately 3,200 acres) was reported excess to the General Service Administration by the Navy in 1961 and disposed of by quitclaim deeds to private parties between 1973 and 1974. San Diego County operates a landfill within the East Elliott area. Fortuna Mountain, adjacent to East Elliott's southeast corner was used as a backstop for weapons ranges used by the U.S. Marine Corp. A Bunker that was located near the top of Fortuna Mountain was removed around mid 1981. This Bunker appeared to have been fired upon. The following was stated in the project summary sheet, "It is likely that stray rounds topped Fortuna Mountain." In May 1991 two 75 mm HE (high explosive) rounds were removed from the East Elliott area by the San Diego fire department.

Project 04 – Areas G, H, and D:

U.S. Army Corps of Engineers, Los Angeles District.
1991 Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, Areas G, H, and D (Camp Elliott), San Diego, CA, Project No. J09CA006704, dated 27 August 1991.

Areas G (approximately 2,900 acres), H (approximately 400 acres), and D (approximately 1,800 acres) were lands within the former boundaries of Camp Elliott. Ordnance contamination is unlikely in these areas since this property was not in the line of estimated firing positions and does not include known former impact areas. No strays have been found to date. The following was stated in the project summary sheet, "However, this area still does raise some concern since the Camp was a training center for troops."

2.1.2 Archive Search Reports (ASR)

U.S. Army Corps of Engineers, Rock Island District.
1996c "Archives Search Report (Draft - Findings Volume (1996c) and
1996d Conclusion and Recommendations Volume (1996d)), Defense Environmental Restoration Program, Base Realignment and Closure," prepared for Naval Air Station, Miramar, San Diego, California, dated May 1996. (On file at USACE, Rock Island District, CEMVR-ED-DO).

1996a 1996b "Archives Search Report (Final - Findings Volume (1996a) and Conclusions and Recommendations Volume), for Naval Air Station Miramar, San Diego, California," prepared for Naval Air Station, Miramar, Staff Civil Engineer Department, San Diego, CA, dated November 1996. (On File at USACE, Rock Island District, CEMVR-ED-DO).

The above reports were reviewed during the preparation of the ASR and Range Identification and Preliminary Range Assessment for Marine Corps Air Station, Miramar. Information in these reports not found from original sources was incorporated into the reports prepared for the U.S. Marine Corps.

U.S. Army Corps of Engineers, St. Louis District

2001a 2001b "Archives Search Report (Final (2001a)) and Range Identification and Preliminary Range Assessment (Final (2001b)), for Marine Corps Air Station Miramar, San Diego, California," prepared for Headquarters, United States Marine Corps, dated December 2001. (On File at USACE, St. Louis District, CEMVS-ED-P).

An ASR and Range Identification and Preliminary Range Assessment for Marine Corps Air Station, Miramar was prepared for the USMC a few years ago. The information in these Marine Corps (MC) reports, which is pertinent to Camp Elliott FUDS, is included in this ASR. Therefore, a summary of the two MC reports is not provided here.

2.1.3 Contractor Prepared Documents

The U.S. Army Corps of Engineers had additional reports (i.e., EE/CA's and UXO Removal Reports) prepared by contractor agencies. In addition to those reports highlighted below, many more are located on the Project Information Retrieval System (PIRS) at https://mvrpirs.mvr.usace.army.mil):

Dames and Moore.

1991 "Final EA Ordnance Cleanup, Mission Trails Regional Park," prepared for U.S. Army Corps of Engineers, Huntsville, dated September 1991. (Located on the Project Information Retrieval System (PIRS) at https://mvrpirs.mvr.usace.army.mil).

The objective of this study was to evaluate the potential environmental impacts due to proposed ordnance remedial alternatives in the 2,100-acre Mission Trails project area. Five remedial alternatives were contemplated, and impacts on eleven issues (i.e., biology, cultural, land use, public safety, etc.) were evaluated. Property owners include the City of San Diego, San Diego State University, and the San Diego Unified School District. Mission Trails Regional Park consists of dirt trails used by hikers, joggers, and mountain bicyclists. Many areas are inaccessible due to the rugged terrain and thick

vegetation. The report goes on to state that USACE determined, based on their sampling conducted in 1990, the areas east of Fortuna Mountain do not contain ordnance and are to be excluded from ordnance removal activities. The final boundary of areas to be swept is to be determined during the design of the clearance operations.

DJG, Inc., Williamsburg, VA; Dynamic Systems, Inc., Reston, VA; UXB International, Inc., Fairfax, VA.

1987 Report of Ordnance Contamination, Risk Assessment, and Clearance Alternative Analysis on the Former Camp Elliott, dated September 1987. (On file at USACE, Rock Island District, CEMVR-ED-DO).

1988 Final Engineering Report and Environmental Impact Statement, submitted to U.S. Army Engineer District, Huntsville, AL, dated April 27, 1988. (On file at USACE, St. Louis District, CEMVS-ED-P).

This feasibility study determined the extent and magnitude of ordnance contamination in the Tierrasanta project area, and determined and evaluated remedial action alternatives to address the UXO and related debris contamination. The project area, which consists of approximately 3,500 acres total, includes 1,897 acres of remaining open space, which was divided into Sub-Areas A through F. Based on analysis of records, previous clearance operations, and a statistical survey of randomly selected sites, the team determined that ordnance contamination ranged from 0.28 to 29.3 items per acre on the surface and 3.0 to 90.7 items per acre sub-surface; approximately 87% of the ordnance contamination lies within 6 inches of the surface, 94% lies within 12 inches of the surface; and approximately 1% of the ordnance contamination constitutes a potentially explosive hazard. Based on records reviewed for this report, two potential firing positions were located. One in the northwest quadrant of the intersection formed by the second San Diego aqueduct and Murphy Canyon; and one in the vicinity of the proposed Regency Hill (La Mirage) development. These two firing sites indicate that the principal impact areas were centered north of Tierrasanta Blvd and east of Santo Road. The ordnance survey conducted between 12 November and 12 December 1986 was implemented by UXB International, Inc. A total of 185 surface and subsurface grids were surveyed. Of these grids, 184 were randomly selected and 1 one-acre grid was surveyed within a 5-acre area that had recently burned. A total of 1,343 ordnance-related items were found on the surface; and 521 ordnance-related items were found sub-surface in Sub-Areas A, B, C, E, and F (Sub-Area D was not surveyed). The ordnance-related items found range from assorted small arms up to 105mm projectiles.

Rare, threatened, endangered, and sensitive species and habitats of concern, which are potentially affected by the proposed ordnance removal project are identified in this document.

Environmental Chemical Corporation.

1995a Final Ordnance Report, Tierrasanta, California, dated February 1995. (On file at USACE, St. Louis District, CEMVS-ED-P).

1995b Final Ordnance Report, Tierrasanta, California, Appendix (1) Site Specific Information, dated February 1995. (On file at USACE, St. Louis District, CEMVS-ED-P).

Environmental Chemical Corporation (ECC) performed an ordnance clearance on the Tierrasanta project area between November 1990 and May 1994. During this time, 1,904.24 acres were swept, 171,559.9 pounds of ferrous debris, 28,491.7 pounds of ordnance scrap, 3,991 hazardous small arms, and 1,066 hazardous items larger than small arms were located and removed. Detailed information (grid layout, items found in each grid, grids swept and not swept, etc.) is included in Appendix 1.

Human Factors Applications, Incorporated.

1999 "Draft Removal Report, Volume 1, Ordnance and Explosives (OE) Removal Action, East Elliott, San Diego, California," prepared for U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, dated March 10, 1999. (Located on the Project Information Retrieval System (PIRS) at https://mvrpirs.mvr.usace.army.mil).

Human Factors Application, Inc. (HFA) was issued a task order by the U.S. Army Engineering and Support Center, Huntsville for an Ordnance and Explosives (OE) Removal Action. The Scope of Work (SOW) was to perform surface and subsurface (to a depth of three feet) OE clearance of approximately 70 acres adjacent to the northern boundary of the Little Sycamore Canyon (San Diego County) landfill, a surface clearance of 600 acres of trails and open space in section 4 north of West Hills High School, and provide UXO support during the earth moving operations for the landfill expansion project. The surface clearance included the removal of partially exposed OE items. A total of 48 explosive ordnance items were located and destroyed and 1348.5 pounds of OE scrap was recovered, inspected, and disposed. Based on the results of the removal activities, it was determined that a Certificate of Clearance could be issued for 53.3 acres around the north section of the current landfill and approximately 900 acres of trails and open space. However, areas within the 900 acres containing brush and heavy vegetation were not cleared. HFA recommended additional sub-surface removal activities be conducted in Section 4 based on the amount of OE found in the area, and the amount of subsurface hits encountered.

Montgomery Watson.

1995 "Draft Archives Search Report, Former Camp Elliott (East Elliott), Engineering Evaluation/Cost Analysis (EE/CA), San Diego, California," prepared for U.S. Army Corps of Engineers, Huntsville Divison, Huntsville, Alabama, dated January 1995.

Montgomery Watson prepared an ASR as part of the East Elliott EE/CA. East Elliott consists of 3,200 acres, the southeastern most corner of former Camp Elliott, which was quitclaimed between 1973 and 1974. East Elliott is bounded on the north by MCAS, Miramar; on the east by the City of Santee, CA and Sycamore Canyon; on the west by MCAS Miramar, State Highway 52, and Mission Trails Regional Park; and on the south by the City of Santee and unincorporated portions of San Diego County. Access to East Elliott is partially restricted by fencing. Included is a chronological historical summary of Camp Elliott. The Little Sycamore Landfill began operation in East Elliott in 1964. In June 1984, the U.S. Army 70th EOD conducted an ordnance survey of 170 acres in the southeast portion of East Elliott. This survey found moderate to heavy ordnance contamination mostly from high explosive shells on the ridges. Sampling of 11 grids was conducted in April 1994. Four of the eleven grids contained ordnance scrap (loose fragments and one fuze component). Research conducted for this report revealed that not all artillery firing by USMC took place at Camp Elliott; but was also conducted at USMC Camp Dunlap, Niland, CA in 1943. In 1944, the USMC relocated to Camp Pendleton, and Camp Elliott reverted to USN use. Following WWII through 1953, Camp Elliott was used as a USN Training and Redistribution Center where no live-fire weapons training was reportedly conducted. Interviews conducted for this report provided the following information: (1) firing of tank machine guns (coaxial with larger guns) up Sycamore Canyon, (2) tank training was conducted in the creek (San Diego River?) below Jacques Farm where some live firing of 37mm took place parallel to the creekbed (NE direction?), (3) simulated training exercises with 155mm howitzers in Rattlesnake Gulch, and (4) live-fire artillery exercise with 105mm (into Fortuna Mountain?). Loose fragmentation from 75mm HE and 37mm rounds was found during a site inspection in November 1994. A summary of items found between 1978 and 1994 is included.

1999 "Final Engineering Evaluation/Cost Analysis (EE/CA), Formerly Used Defense Site, Camp Elliott (East Elliott), San Diego, California," prepared for U.S. Army Engineering and Support Center, Huntsville, AL, dated August 1999. (Located on the Project Information Retrieval System (PIRS) at https://mvrpirs.mvr.usace.army.mil).

The purpose of this report was to characterize the site, assess potential risks, identify removal action alternatives, evaluate these alternatives based on specified criteria, and propose the selected alternative. East Elliott is currently undeveloped except for a 170-acre Class III landfill. There is unrestricted access along the southern boundary of the

project area. UXO has been found in several locations in the 1980's and 1990's; and EOD teams conducted investigations in 1984 and 1994. OE found during these investigations consisted mainly of 37mm and 75mm HE shell fragments. The 1984 survey found, "moderate to heavy" contamination within the 170-acre survey area. The 1994 visual and geophysical investigation involved the inspection of 11 grids. The results of this investigation revealed that 4 of the 11 grids, which contained OE, were located in the southeast portion of East Elliott within or near the 1984 survey area. Loose fragments from 37mm and 75mm HE rounds were found in the area that was surveyed in 1984 and 1994 during site visits in 1994 and 1995. An OE investigation was conducted by CMS Environmental, Inc. (CMS) between September and December 1996. This consisted of surface clearing 89 survey grids, which were later swept using a magnetometer. UXO encountered consisted of 4-75mm HE projectiles. The largest concentration of OE was found in the southeast quadrant. All but one of the 75mm projectiles found were pointing westward, indicating that they were likely fired from the southeast corner of East Elliott. A total of 758 pounds of OE and scrap were removed and disposed of. 27 identifiable OE items, which consisted of various 37mm and 75mm rounds, various fuses, and an M57 WP 81mm Mortar, were encountered. Due to the large concentration of OE in the eastern portion of the site, a Time Critical Removal Action was conducted in this area in late 1998 and early 1999 (see HFA 1999).

U.S. Army Topographic Engineering Center

2004 "Former Camp Elliott, California, Examination of Historical Photography – Selected Sites, Final Report," dated May 2004. Prepared for the U.S. Army Corps of Engineers, Huntsville Engineering and Support Center, AL.

Historical aerial photos dated between 1939 and 2002 of the former Camp Elliott were examined. Photos of the project 01 area from the 1940's revealed several areas of ground scars and vehicle/tank tracks, abandoned ranges or training areas, and trenches. Photos from 1953 reveal ground scars and a berm in the location of the former Convair (test) Range. Photos of the project 03 area from 1953 show a circular shaped pit. Structures, berms, and vehicle/tank tracks are identified on 1944 aerial photos in the southeast corner of project 03 area. Pits, ground scars, and trenches are identified on 1940's and 1950's photos of Area D (a portion of project 04). A circular shaped pit is seen on a 1958 photo of Area G (a portion of project 04). Photos dated 1966 of Area G reveal several buildings and possible bunkers.

2.2 OTHER REPORTS

The Navy and Marine Corps prepared additional reports in accordance with the Installation Restoration Program (IRP), DERP and CERCLA. Investigations that the archive search team reviewed while preparing the draft ASR and Range Identification and Preliminary Range Assessment Reports for the USMC in 1998 include the following:

SCS Engineers, Inc.

1984 "Initial Assessment Study of Naval Air Station Miramar, San Diego, California," prepared for Navy Assessment and Control of Installation Pollutants (NACIP) Department, Port Hueneme, California, dated September 1984. (On file at USACE, St. Louis District, CEMVS-ED-P).

ASLA & Associates, Incorporated.

1985 "Master Plan, Naval Air Station Miramar, San Diego, California," for Department of the Navy, Western Division, Naval Facilities Engineering Command, San Bruno, California, dated 1985. (On file at USACE, Rock Island District, CEMVR-ED-DO).

Gillispie Delorenzo, ASLA & Associates, Incorporated.

1985 "Naval Air Station Miramar, San Diego, California Master Plan," dated 1985. Prepared for Engineering Services for Master Plan Update and Basic Facility Requirements for Naval Air Station, Miramar, San Diego, CA. (On file at USACE, St. Louis District, CEMVS-ED-P).

Montgomery Watson.

1996a "Environmental Impact Statement, Realignment of NAS, Miramar, Preliminary Final Submittal," prepared for Department of the Navy, Commander, Marine Corps Air Bases, Western Area, dated January 1996. (On file at USACE, Rock Island District, CEMVR-ED-DO).

1996b "Environmental Impact Statement, Realignment of NAS, Miramar, Final Submittal," prepared for Department of the Navy, Commander, Marine Corps Air Bases, Western Area, dated February 1996. (On file at USACE, St. Louis District, CEMVS-ED-P).

Kawasaki, Theilacker, Ueno and Associates (KTU & A).

1997a "MCAS East Miramar Housing, Phase Two: Site Feasibility Report, Family Housing Site Alternative Study," prepared for Southwest Division, Naval Facilities Engineering Command & COMCABWEST/ MCAS, Miramar BRAC, dated May 1997. (On file at USACE, St. Louis District, CEMVS-ED-P).

1997b "1997 Master Plan, MCAS, Miramar, Existing Conditions Report," prepared for Commander, Marine Corps Air Bases, Western Area, Southwest Division, Naval Facilities Engineering Command, dated October 1997. (On file at USACE, St. Louis District, CEMVS-ED-P).

Dames & Moore, Inc.

1997a "45% Submittal, MCAS, Miramar Rifle/Pistol Range Relocation Study," prepared for Commander, Marine Corps Air Bases, Western Area, dated February 20, 1997. (On file at USACE, St. Louis District, CEMVS-ED-P).

1997b "45% Submittal, Miramar Trap and Skeet Club, Site Relocation Study, Marine Corps Air Station, Miramar," prepared for Commander, Marine Corps Air Bases, Western Area, dated October 17, 1997. (On file at USACE, St. Louis District, CEMVS-ED-P).

1997c "Preliminary Draft Submittal, Integrated Natural Resources Management Plan for Marine Corps Air Station, Miramar," prepared for Commander, Marine Corps Air Bases, Western Area, dated November 1997. (On file at USACE, St. Louis District, CEMVS-ED-P).

3.0 SITE DESCRIPTION

3.1 EXISTING LAND USE

3.1.1 LOCATION

Camp Elliott consisted of approximately 32,000 acres in San Diego County, California (CA) (see PLATE NO. 1 – VICINITY MAP and PLATE NO. 2 – PROPERTY / PROJECT BOUNDARIES). The FUDS property, approximately 15,000 acres, lies approximately twelve miles northeast of downtown San Diego, CA.

3.1.2 PRIOR LAND USE

Prior to military control, the land consisted of a small farming community.

During World War I, Camp Kearny, an Army Infantry Training Center, was established on 8,000 acres in this area. In addition, approximately 5,000 acres of land adjacent to Kearny were leased for practice and drill maneuvers.

East Miramar (east of Hwy 163) was acquired in 1941 as a part of the approximately 32,0000-acre Marine Corps training base named Camp Elliott. The Navy used the property after the Marine Corps moved to Camp Pendleton until the 1960s when a portion of this land was disposed of.

3.1.3 CURRENT LAND USE AND OWNERSHIP

The FUDS property is divided into four project areas: Tierrasanta, Mission Trails, East Elliott, and Areas D, G, and H.

Project 01, Tierrasanta, approximately 4,600 acres, has unrestricted public access and no known land use restrictions. The current use of this area consists mainly of single-family residential housing and schools (San Diego Unified School District). Some of the area remains undeveloped and is owned by the City of San Diego.

Project 02, Mission Trails, which is comprised of 2,100 acres and owned by the City of San Diego, is mainly a regional park with a lot of undeveloped open space. Public Access is restricted; meaning that the public does have some access to the area and that access may involve some surface disturbance (i.e., surface recreation). When the property was surplused on 10 January 1964, the quitclaim deed restricted the use of this site to historic monument/public recreational purposes for 20 years.

Located within Project 03 boundaries of East Elliott (approximately 3200 acres) is a Class III landfill in the center, and a small residential area (City of Santee) located in

the southeast corner. The remaining area is undeveloped. As of 1999, owners include the Cities of San Diego and Santee, numerous private individuals, several land development firms, two school districts, and a public utility company (Montgomery Watson 1999). There are no known land use restrictions; and public access is unrestricted.

Located within Area D, approximately 1,800 acres, is land used by California Western University and University of California as campuses, and by the Navy for housing. Private parties own Area G, which consists of approximately 2,900 acres. Area H consists of approximately 400 undeveloped acres owned by the County of San Diego. There are no known land use restrictions and public access is unrestricted. A few roads traverse these areas.

PLATE 3, titled, "LAND USE AND OWNERSHIP" depicts the Land Usage/Ownership of the FUDS portions of former Camp Elliott, which was gathered from numerous sources (previous studies, 2002 aerial photos, etc.) during the preparation of the ASR.

3.2 CLIMATIC DATA

Information from a weather service station located at Marine Corps Air Station, Miramar California (adjacent to the site) provided the closest climatological data. Data recorded at this office is shown in TABLE 3.2.1.

Camp Elliott is located north of the city of San Diego, in the southwest corner of southern California. The prevailing winds and weather are tempered by the Pacific Ocean, which result in cooler summers and warmer winters in comparison to other places along the same general latitude. Temperatures of freezing or below have rarely occurred at the station since the record began in 1871; but hot weather, 90 degrees or above, is more frequent.

Dry easterly winds sometimes blow in the vicinity for several days at a time, bringing temperatures in the 90s and at times even in the 100s in the eastern sections of the city and outlying suburbs. At the National Weather Service station itself, however, there have been relatively few days on which 100 degrees or higher was reached.

As these hot winds are predominant in the fall, highest temperatures occur in the months of September and October. Records show that over 60 percent of the days with 90 degrees or higher have occurred in these two months. High temperatures are almost invariably accompanied by very low relative humidity, which often drop below 20 percent and occasionally below 10 percent.

A marked feature of the climate is the wide variation in temperature within short distances. In nearby valleys daytimes are much warmer in summer and nights

noticeably cooler in winter, and freezing occurs much more frequently than in the city. Although records show unusually small daily temperature ranges, only about 15 degrees between the highest and lowest readings, a few miles inland these ranges increase to 30 degrees or more.

Strong winds and gales associated with Pacific, or tropical storms, are infrequent due to the latitude. The seasonal rainfall is about 10 inches in the city, but increases with elevation and distance from the coast. In the mountains to the north and east the average is between 20 and 40 inches, depending on slope and elevation. Most of the precipitation falls in winter, except in the mountains where there is an occasional thunderstorm. Eighty-five percent of the rainfall occurs from November through March, but wide variations take place in monthly and seasonal totals. Infrequent measurable amounts of hail occur in San Diego, but snow is practically unknown. In each occurrence of snowfall only a trace was recorded officially, but in some locations amounts up to or slightly exceeding a half-inch fell, and remained on the ground for an hour or more.

Considerable fog occurs along the coast, but the amount decreases with distance inland. A dominant characteristic of spring and summer is the nighttime and early morning cloudiness. Low clouds form regularly and frequently extend inland over the coastal valleys and foothills, but they usually dissipate during the morning and the afternoons are generally clear. The fall and winter months are usually the foggiest. Thunderstorms are rare, averaging about three a year in the city. Visibilities are good as a rule. The sunshine is plentiful for a marine location, with a marked increase toward the interior (Federal Climate Complex 2000).

Table 3.2.1 - Climatological Data For MCAS Miramar, CA

Month	Temperature		Precipitation	Wind	
	Mean Minimum (^{o}F)	Mean Maximum (^{o}F)	Mean (inches)	Mean Speed (knots)	Prevailing Direction
January	48	66	2.3	3	E
February	49	67	1.7	3	E
March	50	67	2.1	3	E
April	53	71	0.9	6	WNW
May	56	72	0.3	5	W
June	59	76	0.1	6	WNW
July	63	80	NIL	5	WNW
August	65	82	0.1	5	WNW
September	63	81	0.2	6	NW
October	57	76	0.4	3	E

Table 3.2.1 - Climatological Data For MCAS Miramar, CA					
Month	Temperature		Precipitation	Wind	
	Mean Minimum (^{o}F)	Mean Maximum (^{o}F)	Mean (inches)	Mean Speed (knots)	Prevailing Direction
November	51	71	1.2	3	E
December	54	87	1.5	3	E
Mean	55	73	10.8	4	E

3.3 TOPOGRAPHY

Based on United States Geological Survey (USGS) quadrangles (La Mesa, Poway, San Vicente Reservoir, and El Cajon), the Camp Elliott FUDS property consists mainly of hills and rugged terrain.

3.4 GEOLOGY AND SOILS

3.4.1 GEOLOGY/PHYSIOGRAPHY

The former Camp Elliott site is located in the Peninsular Ranges section of the Lower California physiographic province. This province is characterized by a dissected, westward-sloping, granite upland. The Peninsular Ranges are mostly in Mexico; only the northern end of the ranges reaches into California. The province has distinct northwest grain expressed by its larger mountains, to the east of the site, and its longer valleys.

The province is underlain by large homogenous batholiths. These batholiths are igneous intrusive bodies, which cooled slowly and deeply, allowing the molten material to crystallize into coarse-grained rock. The batholiths are accompanied by many dikes, narrow sheet-like igneous bodies which intruded into cracks in the rock.

Younger rocks found in the province are largely sedimentary, partly marine, and partly terrestrial, and range in age from late Cretaceous to Pleistocene. Marine rocks are exposed mostly in the Santa Ana Mountains, farther to the north of the site (Sharp 1976).

The topography of the site is typical of the Peninsular Ranges. The slopes of the mountain sides are steep to undulating. Elevations range from just over 1000 feet above mean sea level, in the north, to about 500 feet above msl in the southwest.

3.4.2 SOILS

In the simplest terms, the soils of the former Camp Elliott can be generally described as clay/sand with stone and gravel.

The soils formed in old mixed cobbly and gravelly alluvium. In a representative profile the surface layer is yellowish-brown and light-brown, medium acid and strongly acid gravelly silty sandy clay about 15 inches thick. The subsoil is yellowish-red and red, very strongly acid gravelly heavy silty sandy clay. Below this, to a depth of 30 inches, is an iron-silica cemented hardpan, which is not uniform or continuous. In some areas, the soil is cobbly throughout.

There is little or no potential for frost development in the soil at the Camp Elliott site.

3.5 HYDROLOGY

3.5.1 SURFACE WATER

The southern portion of the former Camp Elliott lies approximately twelve miles north of downtown San Diego, CA and the northern portion of the site lies adjacent to the south side of the City of Poway, CA. Several portions of the site are in a hilly area with elevations ranging from around 1,000 feet at the highest points to around 700 feet in the bottom of the numerous canyons that dissect the hills. Drainage from the southern portion of the site adjacent to the City of San Diego primarily flows into the San Diego River either directly or via small canyons that extend into the hills through the site. Drainage from the northern portions of the site south of the City of Poway drain into Beeler Canyon and into Carroll Canyon. All drainage ways flow through the City of San Diego and eventually into the Pacific Ocean. Gage data for the San Diego River downstream of the site is provided in TABLE 3.5.1. Also provided in TABLE 3.5.2 is gage data for Beeler Creek downstream of the northern portion of the site located near Poway, California (USGS, n.d.c).

TABLE 3.5.1					
San Diego River at Fashion Valley San Diego County, California Hydrologic Unit Code 18070304 Latitude 32°45'54", Longitude 117°10'04" NAD27 Drainage area = 429 square miles Gage datum 20 feet above sea level NGVD29					
Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s
1983	128	1984	32.5	1985	26.3
1986	40.0	1987	26.8	1988	23.8
1989	6.78	1990	13.8	1991	51.7
1992	39.0	1993	118	1994	21.7
1995	83.7	1996	20.9	1997	21.9
1998	91.0	1999	13.6	2000	15.6

TABLE 3.5.2					
Beeler Creek/Canyon at Pomerado Road near Poway, CA San Diego County, California Hydrologic Unit Code 18070304 Latitude 32°56'23", Longitude 117°03'57" NAD27 Drainage area 5.46 square miles					
Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s
1977	.006	1978	5.76	1979	2.72
1980	4.31	1981	.24	1982	1.39
1983	3.55	1984	.051	1985	.23
1986	1.17	1987	.027	1988	.087

3.5.2 GROUND WATER

The former Camp Elliott site is underlain by a regionally small, principal aquifer system, part of the Coastal Basins aquifer system. The Coastal Basin aquifers occupy a number of basins in coastal areas form northern to southern California. These basins are in structural depressions formed by folding and faulting. All of the basins are filled with marine and alluvial sediments, and all are drained by streams, that contain water, at least part of the year. The permeable material in these basins consists of unconsolidated continental deposits, primarily sand and gravel.

Typically, ground water can be found within 150 feet of the surface in these basins. The aquifer generally produces water of good quality for most agricultural uses. It is unknown if the site has groundwater contamination from the residue of munitions.

Ground water in the basins is under unconfined to confined conditions, and two or more vertically sequential aquifers can be present in a basin, separated by confining units that consist of fine-grained sediments. In nearly all basins that contain more than one aquifer, the aquifers are hydraulically connected to some degree.

Due to the large populations using these relatively small aquifers, surface water needs to be used as a domestic water source for many people. Surface water, in many instances, has to be transported from distant sources to meet demand (Planert and Williams 1995).

3.6 NATURAL RESOURCES

Lists of reptiles, amphibians, mammals, and birds photographed, captured and or sighted within the Tierrasanta project area; and a list of sensitive (recognized by either Federal or California State authorities as being endangered, threatened, or are presently being considered for protected status) plant species located in the Tierrasanta project area are included in the "Final Ordnance Report, Tierrasanta, California," dated February 1995 (Environmental Chemical Corporation 1995).

A document dated January 1995 lists two sensitive bird species potentially present in the East Elliott project area. These are the Least Bell's virio and the California Gnatcatcher (Montgomery Watson 1995).

Lists of rare, threatened, endangered, and sensitive species and habitats of concern which are potentially affected by the proposed ordnance removal project (which was conducted between 1990 and 1994) in Tierrasanta (project area 1) are identified in the 1988 Environmental Impact Statement (DJG et. al. 1988).

Numerous other documents previously prepared, most of which are located on the Project Information Retrieval System (PIRS) at https://mvrpirs.mvr.usace.army.mil, also provide summaries of sensitive species and habitats in the different project areas.

The information provided in the table below for this site has been compiled from the U.S. Fish and Wildlife Service and the California Department of Fish and Game's Natural Diversity Database.

The U.S. Fish and Wildlife Service indicated that the following federally listed, proposed, candidate, species of concern, and critical habitats may occur within the project area. The California Department of Fish and Game has indicated that the following state listed,

proposed, candidate, and species of concern native plants, wildlife, and ecosystems of special concern may occur within the Poway, San Vincente Reservoir, and La Mesa Quads section of San Diego County.

COMMON NAME	SCIENTIFIC NAME	GROUP	FEDERAL STATUS	STATE STATUS
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	Mammal		LE
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	Mammal		LE
San Diego black-tailed jackrabbit	*Lepus californicus bennettii*	Mammal		LE
San Diego desert woodrat	*Neotoma lepida intermedia*	Mammal		LE
Pocketed free-tailed bat	*Nyctinomops femorasaccus*	Mammal		LE
Cooper's hawk	*Accipiter cooperii*	Bird		LE
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	Bird		LE
Burrowing owl	*Athene cunicularia*	Bird	SC	
Yellow warbler	*Dendroica petechia brewsteri*	Bird		LE
White-tailed kite	*Elanus leucurus*	Bird	SC	
Prairie falcon	*Falco mexicanus*	Bird		LE
Coastal California gnatcatcher	*Polioptila californica californica*	Bird	T	
Coastal cactus wren	*Campylorhynchus brunneicapillus couesi*	Bird		LE
Least bell's vireo	*Vireo bellii pusillus*	Bird	E / CH	E
Coastal western whiptail	*Aspidoscelis tigris stejnegeri*	Reptile		LE
Orange-throated whiptail	*Cnemidophorus hyperythrus*	Reptile		LE
Coronado skink	*Eumeces skiltonianus interparietalis*	Reptile		LE
Northern red-diamond rattlesnake	*Crotalus exsul*	Reptile		LE
San Diego horned lizard	*Phrynosoma coronatum blainville*	Reptile		LE
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	Reptile		LE
Two-striped garter snake	*Thamnophis hammondii*	Reptile		LE
Arroyo toad	*Bufo californicus*	Amphibian	E	
Western spadefoot toad	*Scaphiopus hammondii*	Amphibian	SC	
San Diego fairy shrimp	*Branchinecta sandiegonensis*	Crustacean	E/CH/PCH	
Riverside fairy shrimp	*Streptocephalus woottoni*	Crustacean	E	
Orcutt's spineflower	*Chorizanthe orcuttiana*	Plant	E	E
Long-spined spineflower	*Chorizanthe polygonoides* var. *longispina*	Plant		LE
San Diego button-celery[3]	*Eryngium aristulatum* var. *parishii*	Plant	E	
Campbell's liverwort	*Geothallus tuberosus*	Plant		LE
Spreading navarretia[3]	*Navarretia fossalis*	Plant	T	
California Orcutt grass[3]	*Orcuttia californica*	Plant	E	
Coastal triquetrella	*Triquetrella californica*	Plant		LE
San Diego thorn-mint	*Acanthomintha ilicifolia*	Plant	T	E
California adolphia	*Adolphia californica*	Plant		LE
San Diego ambrosia	*Ambrosia pumila*	Plant	E	

COMMON NAME	SCIENTIFIC NAME	GROUP	FEDERAL STATUS	STATE STATUS
Del Mar manzanita	*Arctostaphylos glandulosa* ssp. *crassifolia*	Plant	E	
Encinitas baccharis (Encinitis false willow)	*Baccharis vanessae*	Plant	T	E
Orcutt's brodiaea	*Brodiaea orcuttii*	Plant		LE
Lakeside ceanothus	*Ceanothus cyaneus*	Plant		LE
Wart-stemmed ceanothus	*Ceanothus verrucosus*	Plant		LE
Delicate clarkia	*Clarkia delicata*	Plant		LE
Summer holly	*Comarostaphylis diversifolia* ssp. *diversifolia*	Plant		LE
San Diego button-celery	*Eryngium aristulatum* var. *parishii*	Plant	E	E
Variegated dudleya	*Dudleya variegata*	Plant		LE
San Diego barrel cactus	*Ferocactus viridescens*	Plant		LE
Mission Canyon bluecup	*Githopsis diffusa* ssp. *filicaulis*	Plant		LE
Ramona horkelia	*Horkelia truncata*	Plant		LE
San Diego marsh-elder	*Iva hayesiana*	Plant		LE
Heart-leaved pitcher sage	*Lepechinia cardiophylla*	Plant		LE
Felt-leaved monardella	*Monardella hypoleuca* ssp. *lanata*	Plant		LE
Willowy monardella	*Monardella linoides* ssp. *viminea*	Plant	E	E
San Diego goldenstar	*Muilla clevelandii*	Plant		LE
Little mousetail	*Myosurus minimus* ssp. *apus*	Plant	SC	
Spreading navarretia	*Navarretia fossalis*	Plant	T	
Prostrate navarretia	*Navarretia prostrata*	Plant	SC	
California Orcutt grass	*Orcuttia californica*	Plant	E	E
San Diego mesa mint	*Pogogyne abramsii*	Plant	E	E
Otay mesa mint	*Pogogyne nudiuscula*	Plant	E	E
Nuttall's scrub oak	*Quercus dumosa*	Plant		LE
San Miguel savory	*Satureja chandleri*	Plant		LE
Rayless ragwort	*Senecio aphanactis*	Plant		LE
Purple stemodia	*Stemodia durantifolia*	Plant		LE
Oil neststraw	*Stylocline citroleum*	Plant	SC	
Parry's tetracoccus	*Tetracoccus dioicus*	Plant		LE
Southern coast live oak riparian forest		Habitat		LE
Southern cottonwood willow riparian forest		Habitat		LE
Southern riparian forest		Habitat		LE
Southern riparian scrub		Habitat		LE
Southern sycamore alder riparian woodland		Habitat		LE
San Diego mesa hardpan vernal pool		Habitat		LE
Valley needlegrass grassland		Habitat		LE

Federal Status: E – Endangered, T – Threatened, P – Proposed, SC – Species of Special Concern, CH – Critical Habitat, PCH – Proposed Critical Habitat
State Status: E – Endangered, T – Threatened, SC – Species of Special Concern, LE – California Department of Fish and Game Listed Element

Federally endangered and threatened species are protected by Federal law and must be considered prior to project development. If it is determined that the proposed project may affect a federally listed or proposed species or critical habitat, the lead Federal Agency should initiate consultation (or conference for proposed species) with the U.S. Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.). Informal consultation may be used to exchange information and resolve conflicts with respect to listed species prior to a written request for formal consultation. Federal agencies are required to confer with the U.S. Fish and Wildlife Service, pursuant to section 7(a)(4) of the Act, when an agency action is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10(a)).

Candidate species are those species presently under review by the U.S. Fish and Wildlife Service for consideration for federal listing. Candidate species should be considered in the planning process in the event that they become listed or proposed for listing prior to project completion. Preparation of a biological assessment, as described in section 7(c) of the Act, is not required for candidate species. However, if early evaluation of the project indicates that it is likely to affect a candidate species, technical assistance should be requested from the U.S. Fish and Wildlife Service

No additional information on the occurrence of rare or endangered species or natural communities is known at this time. This does not mean that other State or Federally listed species may not be present within the areas of interest. An on-site inspection by a biologist familiar with the project site and with the species listed is recommended to verify the presence, absence, or location of listed species or natural communities, and to definitively assess the potential for direct, indirect, and cumulative effects likely to result if remedial action is recommended as part of the final ASR.

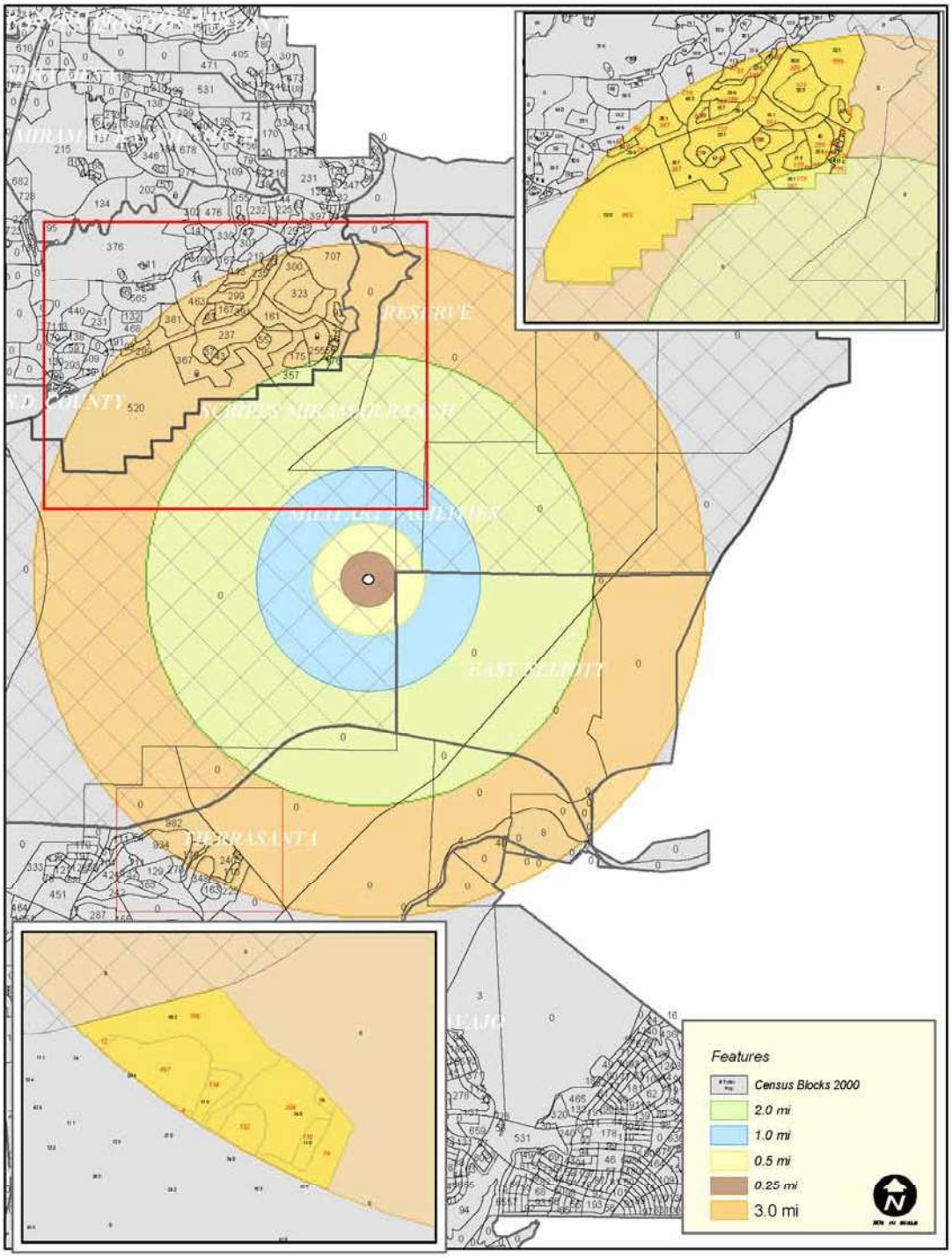
3.7 HISTORICAL AND CULTURAL RESOURCES AND DEMOGRAPHICS

3.7.1 HISTORICAL AND CULTURAL RESOURCES

The South Coastal Information Center (SCIC), located at San Diego State University, was contacted regarding culturally significant archaeological and/or historical sites located within the boundaries of FUDS property Camp Elliott, CA. SCIC's historical files do show recorded prehistoric or historic site locations within the Camp Elliott project boundaries. Their records indicate that sixty-two cultural resource surveys have been conducted; and that 171 prehistoric or historic archaeology sites have been recorded within the project area. The specific location of these remains is protected information and therefore not available for publication. Therefore, SCIC requests to be contacted if ground penetrating work is to be conducted in the area so that the actual data regarding the sites found can be provided (South Coastal Information Center, 2003).

3.7.2 DEMOGRAPHICS

The following map and table provide population counts within a 0.25, 0.5, 1.0, 2.0, and 3.0 mile radius with a center point located at Lat 32° 52' 24.54" N and Long 117° 03' 28.43" W; which is the approximate center of the four project areas.



High school graduates, percent of persons age 25+, 2000	82.6%	76.8%
Bachelor's degree or higher, pct of persons age 25+, 2000	29.5%	26.6%
Persons with a disability, age 5+, 2000	448,590	5,923,361
Mean travel time to work, workers age 16+ (minutes), 2000	25.3	27.7
Housing units, 2000	1,040,149	12,214,549
Homeownership rate, 2000	55.4%	56.9%
Housing units in multi-unit structures, percent, 2000	35.1%	31.4%
Median value of owner-occupied housing units, 2000	$227,200	$211,500
Households, 2000	994,677	11,502,870
Persons per household, 2000	2.73	2.87
Median household money income, 1999	$47,067	$47,493
Per capita money income, 1999	$22,926	$22,711
Persons below poverty, percent, 1999	12.4%	14.2%
Business QuickFacts	**San Diego County**	**California**
Private nonfarm establishments, 1999	65,905	784,935
Private nonfarm employment, 1999	1,015,773	12,356,363
Private nonfarm employment, percent change 1990-1999	17.1%	9.2%
Nonemployer establishments, 1999	170,252	2,050,809
Manufacturers shipments, 1997 ($1000)	22,233,599	379,612,443
Retail sales, 1997 ($1000)	22,215,341	263,118,346
Retail sales per capita, 1997	$8,161	$8,167
Minority-owned firms, percent of total, 1997	23.2%	28.8%
Women-owned firms, percent of total, 1997	28.5%	27.3%
Housing units authorized by building permits, 2000	15,592	145,575
Federal funds and grants, 2001 ($1000)	19,825,206	188,516,866
Local government employment - full-time equivalent, 1997	91,393	1,194,169
Geography QuickFacts	**San Diego County**	**California**
Land area, 2000 (square miles)	4,200	155,959
Persons per square mile, 2000	670.0	217.2
Metropolitan Area	San Diego, CA MSA	

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.

FN: Footnote on this item for this area in place of data
NA: Not available
D: Suppressed to avoid disclosure of confidential information
X: Not applicable
S: Suppressed; does not meet publication standards
Z: Value greater than zero but less than half unit of measure shown
F: Fewer than 100 firms

Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments

4.0 HISTORICAL SITE SUMMARY

4.1 CHRONOLOGICAL SITE SUMMARY

Camp Elliott was located in southern California approximately twelve miles north of downtown San Diego in San Diego County. Camp Elliot and the surrounding area have a very complex military history dating back to World War I, with many changes in names, ownership, military activities, and missions (Coletta 1985; Shettle 1997). This section chronologically describes the various military activities on the site that became Camp Elliott.

4.1.1 Camp Kearny - National Guard Camp (1917-1920)

On 23 May 1917, the U.S. Government leased 8,000 acres for the establishment of Camp Kearny. By 18 July 1917, additional acreage of adjacent land, bringing the total to 12,721 acres, was leased for practice and drill maneuvers. However, one document regarding data on Camp Kearny states that the total area, including artillery and machine gun ranges, was 13,720 acres. On 18 July the U.S. Army established Camp Kearny as the National Guard's 40th Infantry Division training area. Troops began arriving in September 1917. The 40th Division remained at Camp Kearny until August 1918 when it moved to its port of embarkation. At that time the 16th Division was organized at Camp Kearny and reached a total strength of 12,000 by November. Other infantry divisions training there included the 91st, 96th, and 102nd. During World War I, a total of 62,349 men received training at Camp Kearny. Between January and June 1918, an officer's training school was operated at the camp. After World War I, on 31 October 1920, the Army camp was officially discontinued (Hinds 1986; Kinman 1920; n.a. n.d.a; SCS Engineers, Inc. 1984).

4.1.2 Camp Kearny - Naval Auxiliary Air Station (1943-1946)

Although the Army did not establish a permanent airfield at Camp Kearny, the parade ground was used for military aircraft in 1918, and between the wars, the government retained the property as an airfield for military and civilian use. During 1929 and 1930, the facility was known as Airtech Field which was operated by the San Diego Air Service Corp. The Navy placed a mooring mast and received lighter-than-air ships during the early 1930's. During this period, another portion of the site was used as an aircraft target bombing area (Hinds 1986; Shettle 1997).

In 1936, part of the parade ground was given asphalt covering to be used only as an emergency landing strip. After the start of World War II, a portion of the First Marine Aircraft Wing was moved to Camp Kearny, which at that time was designated as an outlying field of Naval Air Station, San Diego. The existing runways were insufficient in length and width. Therefore, at the request of Naval Air Station, San Diego and Fleet

Air Commands, additional runways were built in late 1940 and early 1941. However, these were still inadequate for the increased extensive training necessary at that time. The Navy completed new construction in January 1943 and commissioned the site Naval Auxiliary Air Station (NAAS), Camp Kearny on 20 February 1943. The NAAS's primary mission was multi-engine aircraft training. On 8 April 1946 NAAS, Camp Kearny and the adjacent Marine Corps Air Depot (MCAD), Miramar, were disestablished and combined to form Marine Corps Air Station (MCAS), Miramar, effective 1 May 1946 (Hinds 1986; MCAS, Miramar 1946).

4.1.3 Marine Corps Air Depot (1943-1946)

The U.S. Marine Corps (USMC) established Marine Corps Aviation Base, Kearny Mesa on 1 March 1943. Six months later, on 2 September 1943, it was redesignated Marine Corps Air Depot (MCAD), Miramar. MCAD, Miramar was bordered on the south by NAAS, Camp Kearny. To the east, the Marine Corps Women's Reserve Battalion was constructed and made part of the air depot. The air depot was constructed to supply additional quarters and warehousing for 5,000 men and necessary supplies for the Navy and Marines at North Island. It also served as the West Coast processing depot for the embarkation of Marine squadrons to the South Pacific as well as home base for other squadrons. After World War II, the depot served as a separation center, separating more than 25,000 men (Hinds 1986; MCAS, Miramar 1946; NAS, Miramar Command Historian's Office 1995; Shettle, 1997).

On 1 May 1946, MCAD, Miramar was deactivated, combined with NAAS, Camp Kearny, and designated Marine Corps Air Station (MCAS), Miramar. The station's mission at that time was to provide support for the deployment of Fleet Marine Force Aviation units, provide support for deployment of Navy multi-engine fleet aircraft, and function as the Bureau of Aeronautics Pacific Coast vehicle pool (Hinds 1986; MCAS, Miramar 1946; NAS, Miramar, Command Historian's Office 1995).

In June 1947, all Marine air units at MCAS, Miramar moved to MCAS, El Toro. The Miramar station was redesignated Naval Auxiliary Air Station (NAAS), Miramar on 30 June 1947 and placed on reduced operational status. The mission of NAAS, Miramar was to support regular operations of the Medium Land Patrol Squadrons, one Photographic Patrol Squadron, and the Bureau of Aeronautics vehicle pool (Coletta 1985; Hinds 1986; NAS, Miramar Command Historian's Office 1995; U.S. NAAS, Miramar 1947).

4.1.4 Camp Elliott (1934-1944)

Beginning in the early 1930's, the USMC began to periodically lease land in the Camp Kearney area in order to conduct weapons training and troop maneuvers. These leases were generally for a period of a few weeks at a time as training required. In 1937, for

example, the 6th Marines left San Diego for Shanghai. As a result there were no other units in the area needing to use the range facilities, so they were dismantled. Documentation states that the land was used for artillery firing, machine gun practice, maneuver exercises, camp sites, and mobilization area. The weapons used on the Combat Range included rifles, automatic rifles, .30 caliber ground machine guns, .30 and .50 caliber Anti-Aircraft machine guns, .50 caliber and 37mm Anti-Tank guns, 81mm mortars, 4.2-inch chemical mortars, 75mm pack howitzers, and 75mm guns. In 1938, a yearly lease of the property was authorized in 1938, but on 7 September 1939, recommendations were made to the Commanding General, Fleet Marine Force to acquire approximately 19,000 acres to be used as a Combat Training Area on a permanent basis. Less than two years later, on 7 May 1941, a declaration of taking granted immediate possession of 19,298.25 acres. Additional acquisitions increased the training area to approximately 32,000 acres. Located on what was then known as Camp Holcomb, approximately twelve miles northeast of San Diego, this land was designated Camp Elliott on 14 June 1940. This large rugged and varied terrain was ideal for preparing troops for overseas combat training. The camp contained three permanent subsidiary camps, four bivouac areas and forty-one combat or firing ranges. The camp proper occupied 2500 acres on the west central border. In 1943, Camp Elliott housed between 12,000 and 15,000 permanent and transient personnel and approximately 500 members of the USMC Women's Reserve (Commandant, Eleventh Naval District 1941; Commanding General, Fleet Marine Force 1937b, 1939, 1940b; Fleet Marine Force 1940; Jones 1943; Major General Commandant 1934, 1938; Depot Quartermaster 1938).

Five separate commands were quartered at Camp Elliott: 1) Headquarters, Fleet Marine Force, San Diego Area; 2) Fleet Marine Force Training Center; 3) Troop Training Unit, Amphibious Training Command, Pacific Fleet; 4) Marine Barracks; and 5) Base Depot. Organized in April 1942, the Fleet Marine Force Training Center was the largest and most complex with the principle mission of training individual replacements for combat units overseas. Officially created on 29 March 1942, the training center consisted of nearly thirty schools in modern infantry tactics and other subjects. In late 1942, Camp Pendleton became the site for group tactical training, and Camp Elliott focused on teaching individual skills and training replacements. The students were generally recent graduates of boot camp, learning a military specialty. The schools included:

- School for Rifleman and Automatic Rifleman: An eight-week course that featured subjects ranging from military courtesy to jungle warfare and used many different types of weapons, mostly small arms.
- Mortar School: An eight-week course on the use and maintenance of 60 and 81mm mortars.
- Machine Gun School: An eight-week course on all aspects of the machine gun, including fields of fire, anti-tank, and anti-aircraft practice.
- Parachute School: A ten-week course at Camp Elliott while its permanent home,

Camp Gillespie, was being built.

- Combat Intelligence School: An eight-week course, mostly classroom training, in intelligence gathering.
- Chemical Warfare School: Two-week course for officers and NCOs on all aspects of chemical warfare items and tactics.
- Japanese Language School: Originally, a thirteen-week course and later expanded to a six-month program that taught students the Japanese language for the interrogation of prisoners and translation of captured documents.
- Tank School: Twelve week course in the maintenance and tactics of medium and light tanks.
- Motor Transport School: Twelve-week program that graduated mechanic specialists.
- Field Medical School: Trained naval personnel in the hospital and medical corps in the operations of a field hospital.
- Quartermaster School: Trained administrative personnel.
- Shoe and Textile Repair School
- Sniper and Scout School: Five-week school in the art of sniping, self-reliance, and jungle living.
- School of Individual Combat: Two-week program that featured extended field combat conditions; it was a required course for all infantrymen.
- Anti-Tank School: Eight-week training program in all anti-tank weapons.
- Munitions School: Taught procedures for receipt, handling and issuing of ammunition
- Armorers School: Trained personnel in the maintenance procedures for all small arms weapons.
- Officer Candidates School
- Cooks and Bakers School

(Holzman 1995; Jones 1943).

Three subsidiary camps at Camp Elliott commanded by the training center were Jacques Farm, Green's Farm and Linda Vista.

Jacques Farm Camp was headquarters for the Tank School activated there in August 1942, and in February 1943 it was organized as a battalion. Located three miles south of the main camp, Jacques Farm Camp was self-sufficient with "canvas quarters," mess, recreational facilities, and complete maintenance facilities for tanks and other mobile equipment. The Tank Battalion at Jacques Farm Camp was the only school for tankmen conducted by the Marine Corps. Tank commanders, drivers, gunners, and radio operators learned all phases of tank operation and crews of specialists learned maintenance for both light and medium tanks. The marines were taught only the infantry skills that applied directly to tank crews. Between August 1942 and August 1943, 3500 officers and men graduated from the Tank School at Jacques Farm Camp

and assigned to duty with various tank units in the United States and overseas (Jones 1943).

Green's Farm, five miles northeast of the main camp, was located in the heart of Camp Elliott's most rugged country. Activated at Green's Farm in January 1943, the Scout and Sniper School's mission was teaching Marines the technique of scouting and sniping; of developing self-reliance and combat initiative; and instructing them in jungle living. It also included practical experience in living under combat conditions. Between January and August 1943, 275 men graduated from the school and were assigned duty as scouts and snipers when they joined a combat unit (Jones 1943).
Linda Vista, one-half mile north of the main camp and east of the NAAS, was the first home of the Fleet Marine Force Training Center. Established in 1942, it began with a total strength of only 66 officers and men occupying tents. The Training Center was tasked to turn out infantry battalions, which later became the 22d Marines. In addition, several replacement detachments and cadres of artillery, anti-tank weapons and aviation engineer units were organized, trained and dispatched from the Training Center. In October 1942 the Training Center moved to their permanent location in the main part of Camp Elliott. (Jones 1943; n.a. n.d.a).

In early 1944, the Marines began leaving Camp Elliott for Camp Pendleton. The Marine Base Depot and the tank training area at Jacques Farm remained at Camp Elliott after the Navy officially took command of the camp on 26 June 1944. The Navy used Elliott as a training and distribution center for the remainder of the war (Hinds 1986; n.a. n.d.a).

4.1.5 Post World War II

In 1949, Congress appropriated funds to develop MCAS, Miramar as a Master Naval Jet Air Station and the Navy began major construction and rehabilitation of the runways. On 1 April 1952, the site was officially designated Naval Air Station, Miramar. The station continued to expand and nearly double in size with the acquisition of approximately 7,500 acres of Camp Elliott properties in 1961. In that same year Miramar became the support base and home station for all West Coast fighter squadrons and became unofficially known as "Fightertown" (Coletta 1985; Miramar Jet Journal 1965; NAS, Miramar Command Historian's Office 1995; Shettle 1997).

Following the Korean War, two separate, yet closely related, facilities existed in the form of Naval Air Station (NAS), Miramar and Camp Elliott. The Air Force used part of Camp Elliott for research and testing, and NAS, Miramar established their magazines in the eastern portion. The Navy Supply Center used the camp's former warehouse area and the Marine Corps Reserve Training Center used part of Camp Elliott for tank training and maneuvers (Hinds 1986).

In 1960 the military no longer needed Camp Elliott and transferred 7,709 acres, including the main Camp Elliott, Camp Linda Vista and Green's Farm Camp to NAS, Miramar. The Women's Reserve camp site had already been incorporated into the Air Station. They also transferred 3029 acres in 1960 and 2,691 acres in 1961 (the Sycamore Canyon Test Site) to the Air Force. The Air Force then transferred it to the National Aeronautics and Space Administration (NASA) in 1966. The test site was used primarily in the development of the Atlas and Centaur Missile propulsion systems manufactured by General Dynamics. Declared excess in 1969, this site was reported to General Services Administration who transferred it back to the Navy on 6 December 1972. The area was then incorporated into NAS, Miramar who assumed responsibility of the property in 1977 (Hinds 1986; KTU & A 1997b; Office of the Los Angeles District Engineer 1963).

There are discrepancies regarding the amount of acreage that was surplused and when it was surplused. Several documents state that 13,277 acres were declared surplus to General Services Administration (GSA) in either 1960 or 1961 (USACE, Los Angeles District 1985; 1989). Other documents state that approximately 15,000 acres were reported to GSA in 1961 (Montgomery Watson 1995; USACE, Los Angeles District 1991; US Army Topographic Engineering Center 2004). Between 1962 and 1974, the United States Government sold most of the surplus land to a number of real estate developers and private parties.

By 1995, NAS, Miramar was the Navy's largest Master Jet Base and home to the Pacific Fleet's fighter and airborne early-warning squadrons. Thirteen deployable squadrons, including the VFC-13 Reserve Adversary Squadron, the Navy Fighter Weapons School (TOPGUN), Carrier Airborne Early Warning Weapons School (CAEWWS), and two USMC F/A-18 squadrons were operating from the base's flight line (NAS, Miramar Command Historian's Office 1995).

Major changes occurred at NAS, Miramar due to the Base Realignment and Closure Commission. The F-14 squadrons moved to Oceana, Virginia and the Navy Fighter Weapons School (TOPGUN) transferred to Fallon, Nevada. The Marines took command of NAS, Miramar on 1 October 1997. The operations at El Toro, MCAS and Tustin, MCAS, have consolidated and moved to MCAS, Miramar. Extensive planning and construction are underway to develop this station into a training facility (Shettle 1997).

4.2 HISTORIC MILITARY MUNITIONS USAGE

4.2.1 SUMMARY OF OE ACTIVITIES

4.2.1.1 Camp Kearny (1917-1920)

Camp Kearny's ranges were near the parade ground and adapted for both infantry and artillery training in known distance practice, field firing and service firing. In the known distance firing for infantry there were 200 short-range targets, 34 mid-range targets, and 5 long-range targets. There was one 1000-inch machine gun range and a combat firing range with targets at 500 yards, 600 yards, and 1200 yards for small arms and machine guns northeast of the camp proper. Numerous pistol ranges were located in the nearby canyons. All of these ranges are located within the current MCAS, Miramar property boundaries. An artillery range southeast of the parade ground was suitable for all kinds of artillery firing and accommodated service firing a brigade of field artillery (Blasland 1918; Fortieth Division Engineer 1918; Kinman 1920).

A map dated 1919 shows the boundary of Camp Kearny cantonment area and Maneuver Area. However, the artillery impact area designated on other maps is not within these boundaries. A document dated 1922 states that that the U.S. Army used and occupied 4,518 acres within Sections 13, 14, 15, 22, 23, 24, 25, 26, and 27, Township 15S, Range 2W between September 8, 1917 and November 5, 1921. This property, apparently damaged by shellfire, was included in a claim, filed by landowners, against the government in 1922 (Construction General 1919; Headquarters, Ninth Corps Area 1922). The artillery impact area, which is within the boundaries of MCAS Miramar, was located within these sections of land; however, the safety danger zone for an artillery range during this time period would most likely have extended onto what is now known as East Elliott (project 03 area).

4.2.1.2 Camp Elliott - World War II

In 1934 the Marine Corps leased 19,298 acres east of Camp Kearny for training primarily in the use of artillery, anti-aircraft, and machine gun firing practice. By 1943, the range facilities included 25 ranges for qualification, familiarization, and field firing of every weapon used by Marines from a .22 caliber rifle to a 155mm field artillery piece, as well as all types of demolitions, mines, and explosives. Some of these ranges, however, had been used by the Marine Corps since 1934. There were also five training areas used for individual combat training and tank maneuvers, four bayonet courses, a bayonet assault course, two obstacle courses, a grenade court, a moving target anti-tank range, debarkation course and a combat reaction course, all laid out within a 40.8 mile perimeter (Jones 1943).

In 1939, the combat units of the Fleet Marine Force used this area, referred to as Camp Holcomb, for training with Rifles, Caliber .30 ground and Anti-Aircraft machine guns, Caliber .50 Anti-Aircraft machine guns and anti-tank guns, 37mm anti-tank guns, 81-mm mortars, 4.2-inch chemical mortars, and 75-mm pack howitzers and guns (Marine Corps Base, San Diego 1939).

This area was designated Camp Elliott on 14 June 1940. Locations of ranges, their primary purposes, danger zones and impact areas are identified on a July 1940 "Camp Elliott Combat Area" map, an August 1941 "Terrain Map of Camp Elliott Reservation", and an October 1941 "Range Map, U.S. Marine Corps Combat Range, Camp Elliott, California" (Headquarter, U.S. Marine Corps 1941a, 1941b; U.S. Marine Corps, 2nd Marine Division 1941a, 1941b; U.S. Marine Corps, 2nd Engineer Battalion, F.M.F. 1940, 1941). There is no description of the ranges identified on the July 1940 map. However, the map was attached to a document with subject, "Artillery and Anti-Aircraft Ranges."

Based on records reviewed, interviews, locations of found ordnance items, and field surveys conducted between 1973 and 1988, two potential artillery firing positions (not identified on any historical maps) were located. One was located on Jacques Farm (the location of the Camp Elliott Tank School). The second firing point was located on MCAS Miramar property. It is believed that firing was conducted at targets located on or west of Fortuna Mountain (DJG, Inc, et. al. 1987, 1988).

An OE investigation was conducted in East Elliott by CMS Environmental, Inc. (CMS) between September and December 1996. This consisted of surface clearing 89 survey grids, which were later swept using a magnetometer. The largest concentration of OE was found in the southeast quadrant. All but one of the 75mm projectiles found were pointing westward, indicating that they were likely fired from the southeast corner of East Elliott (Montgomery Watson 1999). Aerial photos of the southeastern corner of East Elliott, which are provided in a May 2004 reference document titled, "Former Camp Elliott, California, Examination of Historical Photography – Selected Sites, Final Report," show structures, berms, and vehicle/tank tracks (US Army Topographic Engineering Center 2004). Additional 1944 aerial photos analyzed for the preparation of this report (see PLATE 6) show tank tracks in the southeastern corner of East Elliott. This "tank range" is not identified on any historical maps reviewed for this report.

RANGE	PRIMARY PURPOSE	FUDS PROJECT # / MCAS MIRAMAR
"Terrain Map of Camp Elliott Reservation"		
A	Rifle Marksmanship	MCAS Miramar
B	.22 Caliber Anti-Aircraft (To be installed when rifles available)	Project 04
C	37-MM Anti-Tank Guns, .30 and .50 Caliber Machine Guns	Project 04
D	.30 Caliber Machine Guns, Maneuver, Combat and Marksmanship	Project 04
E	Tank Course and Combat Firing	Project 04
F-1	.30 Caliber Anti-Aircraft (When site obtained)	MCAS Miramar
F-2	.30 and .50 Caliber Anti-Aircraft Firing	Project 01, Project 02, Project 03
G	60 and 81mm Mortars and .45 and .30 Calibers	MCAS Miramar
H-1	Moving Vehicle and Tank, .30 Caliber	Project 01
H-2	Moving Vehicle and Tank, .30 Caliber	Project 01
I	Anti-Tank Rifle and Machine and Anti-Tank Guns, and Howitzers to include; 75mm Guns. Pending installation of Electrical Moving Targets use as Maneuver, Musketry, and Combat, .30 and .50 Caliber, 37mm 60mm and 81mm Mortars	Project 03
J	Maneuver, Musketry and Combat, .30 Caliber, 60 and 81mm Mortars	Project 01, Project 02
K	Maneuver, Musketry and Combat, .30 Caliber, 60 and 81mm Mortars	Project 01, Project 02
L	Maneuver, Musketry and Combat, 30 Caliber	Project 01, Project 02
M	Moving Target, .30 and .50 Caliber, 37mm and 75mm Howitzers and Guns	Project 01, Project 02
N	Artillery	Project 01, Project 02
O	Miniature Moving Target, .22 Caliber	Project 01
P	Camouflage	Project 01
Q	Demolition	Project 01
R	1000 Inch, .30 Caliber	MCAS Miramar
S	1000 Inch, .22 Caliber	MCAS Miramar
T	Electrically Operated Pistol Marksmanship (When Completed)	MCAS Miramar
U	Maneuver, Combat and Musketry, .45, .30, and .50 Calibers, 60 and 81mm Mortars, and 37mm Guns	Project 03

RANGE	PRIMARY PURPOSE	FUDS PROJECT # / MCAS MIRAMAR
	(When Obtained)	
V	Maneuver, Combat and Musketry, .45, .30, and .50 Calibers, 60 and 81mm Mortars, and 37mm Guns (When Obtained)	Project 03
W	.22, .45, and .30 Calibers	Project 01
X	.22, .45, and .30 Calibers	Project 01
Y	.22, .45, and .30 Calibers	Project 04
Z	Maneuver, Combat and Musketry, .45, .30 and .50 Caliber, 60 and 81mm Mortars, and 37mm Guns	MCAS Miramar
"Range Map, U.S. Marine Corps Combat Range, Camp Elliott, California"		
AREA B	Bayonet and Grenade Course	MCAS Miramar
D	Demolitions	Project 01
E1	1000 Inch Landscape	MCAS Miramar
E2-3	1000 Inch MG and Rifle	MCAS Miramar
F	1000 Yd MG Qualification	MCAS Miramar
G	.22 caliber Miniature AA	Project 01, Project 02
H1	1000 Yd MG Qualification	Project 04
H2	Rifle and MG Combat	Project 04
I	AA Towed Target	Project 03, Project 04
J	Musketry Combat	Project 01, Project 02
K	Rifle and MG Combat	Project 01, Project 02
L1	.50 caliber AA Towed Target	Project 01, Project 02
L2	.30 caliber AA Towed Target	Project 01, Project 02
M	Anti-Tank	Project 01, Project 02
- - - -	Proposed Anti-Tank	Project 01

Several of the ranges listed above were located on current MCAS Miramar property. Many of the ranges extend from one FUDS Project Area to another and/or from MCAS Miramar property onto FUDS. See PLATE NO. 9 – MILITARY MUNITIONS RESPONSE AREAS for the locations of those ranges on FUDS property. Firing was generally conducted from the southwest to the northeast, from Project 01 area over Project 02, and into Project 03. The Range Letters on one map do not necessarily correspond to the same Range Letters on the other two maps. After comparing the three maps, it was determined that Ranges G, I, and L1 shown on the October 1941 map are different than any of the ranges shown on the August 1941 map. It is not known if the "Proposed Anti-Tank" range was ever constructed in the location shown on the map.

An October 1941 document describes the Anti-Tank Range M as "an ingenious system of targets moving on sleds towed by a gasoline motor and through cables" (Headquarters, U.S. Marine Corps 1941).

On document from 1943 describes an experiment conducted at Camp Elliott's Anti-Aircraft Range. Six Marine tanks were placed on the range firing line. Army M-2 rockets were fired at the tanks to simulate a plane in a dive-bombing run. As opposed to a towed target sleeve, the rocket would appear suddenly with a trajectory like that of a dive-bombing aircraft. The M-2 rocket's size and speed did not make it an ideal target, but the Marine Corps planned to continue these similar tests with other rockets in order to make this standard training for USMC tank crews (Commanding Officer, Tank Battalion, Camp Elliott 1943).

Marines training at Jacques Farm Tank School, which was located within project 01 area, studied weaponry and fired 37-mm and 75-mm guns, .30 caliber and .50 caliber machine guns, .30 caliber rifles, carbines, Thompson and Reising sub-machine guns; .45 caliber pistols; and hand grenades during the gunnery course.

The Scout and Sniper School at Green's Farm, located on property still owned by DoD, involved training in the use of hand grenades, explosives and demolitions, the Browning Automatic Rifle (B.A.R.), U.S. Carbine and Reising Sub-Machine Guns (Jones 1943).

4.2.1.3 Post World War II

Several small arms ranges were located throughout the installation since the closing of Camp Elliott. These included pistol ranges, skeet ranges, a bore sight range, and a shotgun range (Department of the Navy, Western Division 1973a, 1973b, 1975; Public Works Officer 1946; U.S.G.S. 1953).

Currently, the San Diego Sheriff's Department leases property on Miramar for a training area and a small arms range, and San Diego County has been leasing property from the government since 1977 for a Skeet Range.

4.2.1.4 Aerial Bombing Targets

The following paragraphs discuss several different areas that were used for bombing practice, and one danger area that may have been used for bombing practice. None of these areas are within the Camp Elliott FUDS project boundaries.

4.2.1.4.1 MCAS Miramar Property and Previously Identified FUDS

A bomb target was identified on a historical Quadrangle Sheet dated 1940 (U.S.G.S. 1940). In 1941, recommendations to the Navy included that they extend the runway and acquire additional land north of the field for the relocation of the Dive Bombing Target at Miramar (U.S. Naval Air Station San Diego 1941). However, in June 1942, the Air Traffic Control Board recommended that a danger area be established over Miramar Bombing Target, located at Latitude 32°53'07", Longitude 117°08'02" (Interdepartmental Air Traffic Control Board 1942). These coordinates appear to be in the same location as the bomb target on the Quad Sheet dated 1940.

A list of required facilities on the Naval Training and Distribution Center, Camp Elliott property included Bombing Target No. 31, located approximately 8.2 miles northeast of Runway 24-6. All air activities in the San Diego area used this target, however, NAAS Miramar maintained it (U.S. NAAS Miramar 1950). Seven months later, in November, a fire was reported in Target Area 31 due to the firing of rockets from an aircraft. Target Area 31 was originally designated a water bomb area. The brush fire report stated the "Bombing, rocket firing, or other use of live ammunition within the Camp Elliott boundaries be prohibited. It is suggested that arrangements be effected for conducting rocket and bombing practice runs at a nonhazardous, isolated location, similar to that in connection with N.A.A.S., El Centro" (District Fire Officers 1950).

Bombing practice was also conducted at: (1) Rosedale (latitude 32°50'02", longitude 117°11'04"), FUDS numbers J09CA7231 and J09CA1045 (Linda Vista Mesa Field Bomb); and (2) Ramona (latitude 33°02'00", longitude 116°55'30"), FUDS number J09CA1069 (Interdepartmental Air Traffic Control Board 1942, 1944).

A "Navy Bombing Range," located north of the current boundaries of MCAS, Miramar, was identified on an undated USGS map (U.S.G.S. n.d.a). A target at Linda Vista Mesa Field, in the location of the "Navy Bombing Range," was also identified on a USGS Quadrangle dated 1940 (U.S.G.S. 1940). A compilation of Naval Air Targets included Miramar No. 31 at location N32°54' 54", W117°07'19" with concentric circles at 50', 100', and 200' radii. Its stated use was for "dive and glide bombing controlled practice and miniature bombs" (Office of the Chief of Naval Operations n.d.). The "Navy Bombing Range," Linda Vista Field target, and Miramar 31 are all in the same vicinity. Therefore, it is believed that these historical documents are referring to the same bombing target. This area was also known as Outlying Landing Field (OLF) Miramar. An ASR on the Linda Vista Valley Aux Landing Field (J09CA7236) completed by CEMVS in 2001 covers this bombing target and auxiliary field. See PLATE NO. 2 – PROPERTY / PROJECT BOUNDARIES.

4.2.1.4.2 Potential FUDS

Included in a listing of Bombing Targets in Southern California was Miramar BT at location N 32°54'06", W 117°07'04". The type of bombing run had not been determined at this time since plans to avoid conflict with traffic on Camp Kearny Field were needed (Eleventh Naval District 1944). This location above fell between the "Navy Bombing Range" and Camp Kearny Field; and no remnants of a bombing target were seen in this area on any aerial photos. Therefore, it is assumed the target was moved north to N 32°54'54", W 117°07'19" due to traffic at Camp Kearny Field, and location N 32°54'06", W 117°07'04" was never used for a target.

A 1945 Air Traffic Control Board document recommends the 5-mile radius danger area centered at Latitude 32° 47' 45" N, Longitude 117° 07' 00" W (located just west of the southwestern boundary of Project 01 area) used by Camp Kearney be removed from all aeronautical charts. Apparently the danger area was in effect prior to the establishment of the Board (Interdepartmental Air Traffic Control Board 1945b). It is unknown why this danger area was established. See PLATE NO. 2 for location.

4.2.1.5 Ammunition Storage

4.2.1.5.1 MCAS Miramar Property

Six ordnance magazines were located within Camp Kearny's main cantonment northeast of the parade ground on a historical map dated 1918. These included Building No. 101 (Powder Magazine), Building Nos. 102, 104, 106, and 108 (Ordnance Magazines), and Building 170 (Bullet Proof Magazine). However, a memorandum dated 1920 regarding data on Camp Kearny states that seven concrete Ordnance magazines were constructed (Construction General 1918; Kinman 1920).

Ordnance storage buildings, Buildings 154 through 159, 192, and 193, were located at the southwest end of the West Kearny Landing Field. Buildings 154 and 155 stored high explosives; Building 156 contained fuses and detonators; Building 157 was an inert storehouse; Buildings 158 and 159 contained small arms and pyrotechnics, respectively; Building 192 was a jet takeoff unit magazine, and Building 193 stored rocket motors. The Final Project Cost Report, dated 17 March 1943, describes the five small and two large magazine's construction as reinforced concrete and ready for use on 1 April 1942 (Bureau of Yards and Docks 1943; Public Works Officer 1944d, 1946).

Included in a building listing and layout of the Auxiliary Air Station, Miramar in 1947 was Building 253, Small Arms Magazine (Public Works Officer 1947a).

Located on the Naval Air Station, Miramar in the 1970s were five Ready Magazines, Buildings 527 through 530 and 404. South of these was a Small Arms/Pyrotechnics Magazine (Department of the Navy, Western Division 1972b, 1978a).

Engineering Plans, dated April 1965, give construction of fencing details for three magazine groups in the eastern portion of NAS, Miramar. Group 1 contained magazines K-237 through K-239, Group 2 contained magazines K-240 through K-246, and Group 3 contained magazines K-247 through K-249 (Department of the Navy, Southwest Division 1965a).

4.2.1.5.2 FUDS Property

A Small Arms Magazine, Building No. 523, was located less than a mile south of the cantonment area of Jacques Farm Camp (Public Works Officer 1944b). The actual location of this building is denoted on a map dated June 30, 1945 (Naval Operating Base, San Diego, California 1945). This building was also detected on aerial photos dated 1944 (see PLATE 4).

4.2.2 SUMMARY OF CWM ACTIVITIES

In 1919, the Chief Gas Officer at Camp Kearny requested information from the Director, Chemical Warfare Service as to where empty chlorine cylinders should be shipped. His predecessor had invoiced these cylinders to him and he had no record showing from where they had been shipped. These chlorine cylinders were probably used in the Gas House, Building 1264, located on the south side of Camp Kearny Cantonment, which is on current MCAS Miramar property (Chief Gas Officer 1919; Construction General 1918).

A 1939 Board of Inspection Report lists technical training being conducted on the Combat Range, Camp Kearny. Technical training included defense against chemical agents (Board of Inspection 1939). The actual location of this technical training within this large area known as the Combat Range, which is not located on the FUDS portions of the former Camp Elliott, is unknown.

A pencil notation on a map of Camp Kearny Artillery and Combat Range, dated June 1937, shows an "Impact Area 75-mm and 81-mm chemicals" (WP and FS). This impact area is located on land later referred to as East Miramar. However, the date of the notation on the map is not known (Second Engineer Company, F.M.F. 1937). This impact area is not located on Camp Elliott FUDS; however, the safety fan does extend off MCAS Miramar property.

The Chemical Warfare School was activated 21 June 1943, with the mission of training men for supplementary service as Unit Gas Officers and Unit Gas NCO's. Attention was devoted to the history of chemical warfare, chemical agents and their identification, the gas mask and other protective devices, military chemistry, gas projectors, and gas grenades. The men were subjected to surprise gas attacks, given daily sniff tests to teach them instant identification of various war gasses, and taken through a heavy concentration of gas in the gas chamber. The gas masks were tested in tear gas and chlorine chambers before leaving for overseas use. Exploding chemical landmines and demolition charges were also demonstrated (Jones 1943). There is no record of a gas chamber being located on Camp Elliott FUDS; however, the location where chemical land mines were exploded and demolition charges set off is unknown.

A 1941 historical document stated that between 1935 (when the Second Chemical Company was organized) and February 1941 (the date of the document), "not more than 340 rounds have been fired in each mortar." Of Lot No. 2748-4, Type E48, FS filled 4.2-inch chemical mortars fired at Camp Elliott, 90 rounds were fired with 39% being duds. The Commanding Officer at Camp Elliott questioned the high dud rate of the mortars, as relatively few duds occurred in previous lots of FS shells fired. The Bureau of Ordnance, U. S. Navy replied this lot of shells was an experimental lot of ammunition designed to reduce cost and had been replaced by a standardized type designated as E38R2 (Second Chemical Co. 2d Marine Division 1941).

Following an inspection at Camp Elliott, it was recommended that all forms of gas defense training be vigorously carried on, even though gas masks were lacking. The report also stated that two sets of decontamination gear; Vesicant Detector Paint and Crayon; and Gas Protective Ointment, M-4, had been furnished to Camp Elliott. Chlorinated Lime and Decontaminating Agent, Non-Corrosive (quantity sufficient for training purposes) would be furnished and protective clothing should be procured from Marine Corps sources (Commandant, Eleventh Naval District 1943).

Three Gas Chambers were included in a listing of assigned building numbers at Camp Elliott. These buildings, Numbers 77, 81, and 89 are shown on a 1941 Camp Elliott Map. They were not located within the Camp Elliott FUDS project areas. On a later map, 30 June 1943, Building 81 is labeled Brig & Head (Bureau of Yards and Docks 1941; Naval Operating Base, San Diego, CA 1941, 1943a).

A Chemical Warfare Area at 8th Street, near Patrol Road, is identified on two Maps of Auxiliary Air Station, Miramar, dated 30 June 1947 and 30 June 1949. No documentation was found describing the activities that took place there. On a 30 June 1951 Map of Auxiliary Air Station, Miramar, this area is denoted as "Surplus Property Yard" (Public Works Officer 1947a, 1949, 1951a). This area is not within Camp Elliott FUDS.

After ten years of extensive USACE excavation, no CWM has ever been found on the FUDS portions of the former Camp Elliott (TAG Review 2004).

4.2.3 CERTIFICATES OF CLEARANCE

The following clearance areas are shown on PLATE NO. 10 – OE CLEARANCE AREAS.

4.2.3.1 Project 01 – Tierrasanta

Prior to 1980 three clearance efforts were conducted (see Table 4-1): (1) U.S. Navy in 1964; (2) U.S. Marine Corps in 1965; and (3) U.S. Army, Ft. MacArthur in 1973. Details of the first two were not located. However, the clearance in 1973 included most of Tierrasanta and all of Mission Trails. This sweep was conducted 16 October through 30 November 1973 and encompassed approximately 5,160 acres. A total of 93 ordnance-related items were found. The Army also determined that "the western slope of Fortuna Mountain; areas around Villa Dominique, Villa Vista and eastern Tierrasanta Norte (proposed); and El Dorado Hills Canyon contained some of the highest contamination" (DJG et. al. 1988).

Following the death of two children in 1983 as a result of an ordnance explosion near the community of Tierrasanta, the Commander, Naval Base San Diego, voluntarily undertook an operation to remove unexpended ordnance from the open area adjacent to the residential area. Between 16 January and 27 April 1984, U.S. Navy and Marine Corps personnel conducted a visual sweep of 326 acres and an electronic sweep of 13.4 acres (see Table 4-1). A list of items found on the surface includes: 155mm Mk1, Mortars (81mm M56, 60mm M83), 75mm (M61 APC, MK1, M72 AP, M41A1 HE, M48), 57mm M307, 37mm M51, 2.36in M6A3 anti-tank rocket, flares (M11A3 illum, M48 para, M49 illum), Mk1 illum grenade, M8 prac mine, fuzes (M1907m impact, M38 BD, M46 PD, M54, M56, M66A1), misc small arms. Subsurface: 81mm M43A1 Practice mortar, 75mm M61 APC HE, 60mm M83 illum mortar, 37mm M51 APC, and M45 PD fuze. Items turned into EOD: 90mm M58 AP, 75mm M41A1 HE, 75mm MK1, 20mm Mk11 loading dummy, 1.1in Mk1 Mod 25 projectile HE. The conclusion was that the area was cleared as carefully and completely as humanly possible, but some ordnance most likely remained undiscovered. As erosion continues and vegetation changes, ordnance will continue to be exposed. The document continues to state that the most effective means of preventing another accident is an ordnance education and awareness campaign for children and adults (Commander, Naval Base San Diego 1984).

TABLE 4-1
SUMMARY OF ORDNANCE CLEARANCE OPERATIONS IN TIERRASANTA

Year	1964***	1965***	1973	1984	1985	1986	1990-1994
Type of Operation			Clearance	Clearance	Clearance	Clearance	Clearance
Organization	Navy	Marine Corps	Army (Ft. MacArthur)	Navy (EODMU3)	Navy (EODMU3)	DJG, Inc. (UXB)	ECC, Inc.
			SURFACE				
# Ordnance-Related Items found on Surface			93	147*	158	1,343	5,057**
# of Acres Searched			5,160	326	322.4	185	1,904.24**
General Location			All of Mission Trails and Most of Tierrasanta	Sub-Areas C, E, F	Sub-Areas C, E, F	Sub-Areas A, B, C, E, F	Sub-Areas A, B, C, E, F
			SUB-SURFACE				
# Ordnance-Related Items found Sub-Surface			No Sub-Surface Search	31*	56	521	
# of Acres Searched				5.4 reported	None Reported	20	
General Location				Roads and Trails in C, E, F	Roads and Trails in C, E, F	Sub-Areas A, B, C, E, F	Sub-Areas A, B, C, E, F

* Historical document (Commander, Naval Base San Diego 1984) states that 202 ordnance items were recovered, of which 41 were HE and 161 were inert or expended

** Clearance activities were not separated between surface and sub-surface. Therefore, numbers provided are for both.

*** Details of these clearance efforts were not located.

References: Commander, Naval Base San Diego 1984; DJG, et. al. 1988; Environmental Chemical Corporation 1995a, 1995b.

The ordnance survey for the Feasibility Study of Remedial Action Alternatives for Tierrasanta was conducted by UXB International, Inc. between 12 November and 12 December 1986 (see Table 4-1). The ordnance-related items found range from assorted small arms up to 105mm projectiles (DJG et. al. 1988).

In early 1990, additional development on the former military site increased public pressure on the military to make the Tierrasanta area safer. It was felt that past clearances had uncovered enough UXO to warrant further investigations into the amount of contamination remaining in the environs of Tierrasanta. The U.S. Army Corps of Engineers, Huntsville Division, contracted Environmental Chemical Corporation (ECC) to conduct clearance sweeps on 1904.24 acres using electromagnetic locators (see Table 4-1). The two contract periods were 29 November 1990 through 24 August 1993 and 23 August 1993 through 2 May 1994. During these two periods, 5,057 pounds of hazardous ordnance (3,991 of small arms and 1,066 larger munitions) and 28,491.7 pounds of ordnance scrap were removed. The Certificate of Ordnance Clearance states that all ordnance and related debris located during clearance operations by Environmental Chemical Corporation had been removed from the work site and disposed of in accordance with contract requirements (Environmental Chemical Corporation 1995a, 1995b).

4.2.3.2 Project 02 – Mission Trails

A visual site inspection of Project 02 Area, consisting of approximately 2100 acres, was conducted in March 1988. A map of the project area identifies an area of "highest contamination"; which was determined following an initial document review and site inspection. A visual surface sweep of Tierrasanta and Mission Trails, which was conducted in October and November 1973, uncovered 93 ordnance related items. The city of San Diego Fire Department records indicate that 8 OE items (7-75mm AP and 1-105mm HE) were found near Fortuna Mountain in 1984/1985. Included in this document are 27 pages of almost 400 OE-related items (artillery, rockets, fuses, mortars, rifle grenades, grenades) found by the City of San Diego, Engineering and Development Department between January and April 1984 and between July and August 1985. The INPR recommends an ordnance removal project. (USACE, Los Angeles District 1989).

4.2.3.3 Project 03 – East Elliott

UXO has been found in several locations in the 1980's and 1990's; and EOD teams conducted investigations in 1984 and 1994. OE found during these investigations consisted mainly of 37mm and 75mm HE shell fragments. The June 1984 survey, conducted by the U.S. Army 70th EOD, found, "moderate to heavy" contamination mostly from high explosive shells on the ridges within the 170-acre survey area. The 1994 visual and geophysical investigation involved the inspection of 11 grids. The results of this investigation revealed that 4 of the 11 grids, which contained OE, were located in the southeast portion of East Elliott within or near the 1984 survey area. Loose fragments from 37mm and 75mm HE rounds were found in the area that was surveyed in 1984 and 1994 during site visits in 1994 and 1995. An OE investigation

was conducted by CMS Environmental, Inc. (CMS) between September and December 1996. This consisted of surface clearing 89 survey grids, which were later swept using a magnetometer. UXO encountered consisted of 4-75mm HE projectiles. The largest concentration of OE was found in the southeast quadrant. All but one of the 75mm projectiles found were pointing westward, indicating that they were likely fired from the southeast corner of East Elliott. A total of 758 pounds of OE and scrap were removed and disposed of. 27 identifiable OE items, which consisted of various 37mm and 75mm rounds, various fuses, and an M57 WP 81mm Mortar, were encountered. Due to the large concentration of OE in the eastern portion of the site, a Time Critical Removal Action was conducted in this area in late 1998 and early 1999 (Montgomery Watson 1995, 1999).

The Time Critical Removal Action involved performing surface and subsurface (to a depth of three feet) OE clearance of approximately 70 acres adjacent to the northern boundary of the Little Sycamore Canyon (San Diego County) landfill, a surface clearance of 600 acres of trails and open space in section 4 north of West Hills High School, and provide UXO support during the earth moving operations for the landfill expansion project. The surface clearance included the removal of partially exposed OE items. A total of 48 explosive ordnance items were located and destroyed and 1348.5 pounds of OE scrap was recovered, inspected, and disposed. Based on the results of the removal activities, it was determined that a Certificate of Clearance could be issued for 53.3 acres around the north section of the current landfill and approximately 900 acres of trails and open space. However, areas within the 900 acres containing brush and heavy vegetation were not cleared. Additional sub-surface removal activities were recommended in Section 4 based on the amount of OE found in the area, and the amount of subsurface hits encountered (Human Factors Applications, Inc 1999).

Table 4-2 is a summary of ordnance clearance and survey operations conducted within the boundaries of East Elliott between 1978 and 1999.

TABLE 4-2
SUMMARY OF ORDNANCE CLEARANCE/SURVEY OPERATIONS
IN EAST ELLIOTT

Date	LOCATION	REMARKS
12/07/78	E-sloping tributary canyon of Sycamore Cyn; due east of the landfill	1 "live" 75mm HE round found by San Diego Co surveyor
Jun 1984	Ridge between Little Sycamore and Sycamore Cyns	June 1984 site survey by US Army 70th EOD identified "one area of moderate to heavy contamination" consisting of HE shell fragments
05/21/91	Tributary gully east of Little Sycamore Cyn, SE of landfill	1 75mm HE projectile found during a biological/habitat survey
05/29/91	N end of Spring Cyn, immediately E of canyon bottom	1 M67 105mm HEAT projectile and 1 M62 fuze plug found during a biological/habitat survey

TABLE 4-2 SUMMARY OF ORDNANCE CLEARANCE/SURVEY OPERATIONS IN EAST ELLIOTT		
Date	LOCATION	REMARKS
Apr 1994	Ridges between Little Sycamore and Sycamore Cyns	1994 UXB OEW Sampling – OEW consisting of 91 pieces of loose fragmentation and 1 fuze component
Oct 1994	N. end of Oak Cyn (likely on DoD property)	Explosions and detonations noted by firefighters during brushfire
11/29/94	Ridges between Little Sycamore and Sycamore Cyns	Loose, surface fragments from 37mm and 75mm projectiles found during CEHND site visit
Nov 1996	North of Sycamore Canyon	1-75mm HE round found during landfill grading operation
Sep – Dec 1996	89 grids scattered throughout East Elliott	OE Survey and Removal – UXO consisted of 4-75mm HE projectiles. Identifiable OE items consisted of an M57 WP 81mm Mortar and numerous various 37mm, 75mm, and fuses.
Feb – Apr 1998	53.3 acres (or 70 acres, depending on source) on the north side of the landfill	Construction Support – 24 UXO items (37mm and 75mm) and approximately 64 pounds of OE scrap discovered. Recommendations include providing construction support during all landfill expansion activities.
Jul 1998 – Feb 1999	900 acres of trails and open space in Section 4 north of West Hills High School	Time Critical Removal Action – surface clearance of 900 acres. 24 UXO items (fuses, 37mm, 75mm, and 81mm Mortars) and approximately 1,250 pounds of OE scrap were discovered. Based on the results of the removal activities, it was determined that a Certificate of Clearance could be issued for 53.3 acres around the north section of the current landfill and approximately 900 acres of trails and open space. However, areas within the 900 acres containing brush and heavy vegetation were not cleared. Additional subsurface clearance operations were recommended.
References: Montgomery Watson 1995, 1999; Human Factors Applications, Inc 1999		

4.2.3.4 MCAS, Miramar

During February 1996, the Corps of Engineers, Rock Island District assessment team conducted a site visit of NAS Miramar. Their primary task was to assess OE presence and potential due to former use as an infantry training camp, Naval Auxiliary Air Station, bombing range, explosives testing site, rocket firing site, and Marine training area. Among other OE related items, they found hundreds of 3, 100, and 500-pound practice bombs and 2.25 inch practice rockets in the vicinity of the East Miramar Bomb Target, which was located just east of a bomb disposal area (this range overlaps onto FUDS, Area G); a 37mm armor-piercing tracer and a live 75mm M61 armor-piercing

capped projectile at the Anti-Tank Range Target (this range fan overlaps onto FUDS project area 03); and 60mm and 81mm HE mortar fins, a live M49 trip flare with the safety pin still present, 3.5" bazooka rockets, and 75mm and 155mm HE fragments in East Miramar (Camp Elliott Impact Area) (U.S. Army Corps of Engineers, Rock Island District 1996a). All items listed above were found within the current property boundaries of MCAS, Miramar within or near range fans that extend onto or from FUDS property.

4.2.4 EOD INCIDENTS

After the explosion of a 37mm anti-tank shell in December 1983 that killed two boys and injured others, clearance operations were conducted. However, between April 1984 and February 1985, the Fire Dept had been called out 30 times to pick up OE. Items found included 81mm mortar, signal flares, 75mm and 20mm projectiles, .50-cal AP rounds, 25-lb practice bomb, 51mm AP round, projectile simulator, and a 90-lb 105mm shell that was determined to be a WWI experimental one (USACE Los Angeles District 1985).

4.3 OTHER POTENTIAL AREAS OF ENVIRONMENTAL INTEREST

No other potential areas of environmental interest located within the FUDS project areas were found during the preparation of this ASR.

4.4 MAP ANALYSIS

4.4.1 GENERAL AREA MAP ANALYSIS

Camp Elliott FUDS covers approximately 15,000 acres of land in the central/western portion of San Diego County in southern California, approximately twelve miles north of the city of San Diego and just south of Poway, California. Interstate Highway 15 serves the area and skims the western boundary of the site area. The site is situated six miles east of the Pacific Ocean and contains features found in a semi-arid environment, typically, mesas, scrub areas and rolling hills. The FUDS contains numerous canyons and valleys.

U.S. Geological Survey (USGS) Maps reviewed include the following 1:24,000 7-1/2 minute quadrangles: El Cajon, CA 1967, photorevised 1975; La Mesa, CA 1994; Poway, CA 1967, photorevised 1975; and San Vicente Reservoir, CA 1955, photorevised 1971. These show both planimetric and topographical features.

4.4.2 SITE SPECIFIC MAP AND DRAWING ANALYSIS

Map analysis was performed on all maps listed in APPENDIX G. However, only those that identified OE and CWM related features on the FUDS properties are listed below with a paragraph describing all OE and CWM features on or off the FUDS property. Copies of the majority of the maps listed below are included in APPENDIX G.

Fortieth Division Engineer.

1918 "Eastern Sector, Camp Kearny, Calif.," including Ranges Plotted by the 434th Engineers on 25 August 1918. Record Group 393 (Western Dept.); Posts; Camp Kearny, CA. National Archives II-Cartographic Branch, College Park, MD.

This map shows numerous ranges located at Camp Kearny, which is on the north side of the present day airfield. On the north side of Camp Kearny is a 1000-inch Machine Gun Range and three rifle ranges. Nine pistol ranges are located around the cantonment within canyons. Northeast of the cantonment is a machine gun range with six emplacements and targets at 500, 600, and 1200 yards and a Machine Gun Dugout and Emplacement area. An artillery range (emplacements and a target area) is located southeast of the cantonment. An artillery range fan drawn from the emplacements to the target area would extend onto FUDS property. The small arms ranges were located on current MCAS Miramar property.

Second Engineer Company, F.M.F.

1937 "Camp Kearny Artillery and Combat Range," dated 15 June 1937. Record Group 127; Entry 140; Box 65. National Archives I-Washington, D.C.

Located south of Old Escondido Road is a range (field target/combat range) with an impact area and right and left boundaries designated. East of this area is a machine gun range with a firing direction from southwest to northeast. A pencil notation on this topography map of Camp Kearny shows an "Impact Area 75-mm and 81-mm Chemicals" (WP and FS). This pencil notation appears to be in the same location as the artillery target area seen on the map dated 1918 above. The combat range and machine gun range were located on current MCAS Miramar property.

U.S. Marine Corps, 2nd Engineer Battalion, F.M.F.

1941a Terrain Map of Camp Elliott Reservation, (copied in two sheets)
1941b showing ranges and primary purposes, dated August 1941. Record Group 71; Entry ACA4758; Box 3; File: Drawings, Plans, Specifications, Sheet Nos. 1 (1941a) and 2 (1941b). National Archives-Pacific Southwest Region, Laguna Niguel, CA.

This map (in two sheets) shows Camp Elliott boundaries and ranges. The following identifies the ranges and their uses.

RANGE	PRIMARY PURPOSE
A	Rifle Marksmanship
B	.22 Caliber Anti-Aircraft (To be installed when rifles available)
C	37-MM Anti-Tank Guns, .30 and .50 Caliber Machine Guns
D	.30 Caliber Machine Guns, Maneuver, Combat and Marksmanship
E	Tank Course and Combat Firing
F-1	.30 Caliber Anti-Aircraft (When site obtained)
F-2	.30 and .50 Caliber Anti-Aircraft Firing
G	60 and 81mm Mortars and .45 and .30 Calibers
H-1	Moving Vehicle and Tank, .30 Caliber
H-2	Moving Vehicle and Tank, .30 Caliber
I	Anti-Tank Rifle and Machine and Anti-Tank Guns, and Howitzers to include; 75mm Guns. Pending installation of Electrical Moving Targets use as Maneuver, Musketry, and Combat, .30 and .50 Caliber, 37mm 60mm and 81mm Mortars
J	Maneuver, Musketry and Combat, .30 Caliber, 60 and 81mm Mortars
K	Maneuver, Musketry and Combat, .30 Caliber, 60 and 81mm Mortars
L	Maneuver, Musketry and Combat, 30 Caliber
M	Moving Target, .30 and .50 Caliber, 37mm and 75mm Howitzers and Guns
N	Artillery
O	Miniature Moving Target, .22 Caliber
P	Camouflage
Q	Demolition
R	1000 Inch, .30 Caliber
S	1000 Inch, .22 Caliber
T	Electrically Operated Pistol Marksmanship (When Completed)
U	Maneuver, Combat and Musketry, .45, .30, and .50 Calibers, 60 and 81mm Mortars, and 37mm Guns (When Obtained)

RANGE	PRIMARY PURPOSE
V	Maneuver, Combat and Musketry, .45, .30, and .50 Calibers, 60 and 81mm Mortars, and 37mm Guns (When Obtained)
W	.22, .45, and .30 Calibers
X	.22, .45, and .30 Calibers
Y	.22, .45, and .30 Calibers
Z	Maneuver, Combat and Musketry, .45, .30 and .50 Caliber, 60 and 81mm Mortars, and 37mm Guns

In addition to the ranges listed above, the following are also shown on the map: cantonment area, Linda Vista Camp, Green's Farm Camp, Jacques Farm, River Camp, Oak Canyon Camp, Obstacle Course, Bayonet 1, Bayonet 2, and Grenade Course.

U.S. Marine Corps, 2nd Marine Division, F.M.F.

1940 Correspondence to the Major General Commandant, dated April 22, 1941
1941 regarding artillery and antiaircraft ranges, with attached map titled, "Camp Elliott Combat Area", dated January 1940, revised July 1940. Record Group 127, Entry 18B, Box 212, File: 1275-65 (Ranges, Targets). National Archives II-Textual Branch, College Park, Maryland.

The layouts of Ranges H, F, J, G, K, N, L, and M are shown; but no descriptions are given. Ranges H and F appear to be classified differently from the others since the actual range area (firing position and target areas) are cross-hatched. It is believed the other ranges are either artillery or anti-aircraft ranges since the subject of the attached correspondence is "Artillery and Anti-Aircraft Ranges." Based on the location of the ranges, ranges F, H, J, K, M, and N appear to correspond to ranges A, D, J, K, M, and N, respectively, on the 1941 map with ranges A through Z above. Ranges G and L don't appear to correspond to any other range on the map above, and are therefore, believed to be different/new ranges.

Headquarters, U.S. Marine Corps.

1941a Correspondence to the Major General Commandant, dated 13 November
1941b 1941 regarding Inspection of Combat Range at Camp Elliott with attached map titled, "U.S. Marine Corps Combat Range, Camp Elliott, California," dated October 3, 1941. Record Group 127, Entry 18B, Box 211, File: 1275-65 (Ranges, Targets). National Archives II-Textual Branch, College Park, Maryland.

Several range layouts with their primary purpose are denoted on this map and listed below. If the range corresponds to a range on the map with ranges A through Z above, that range it corresponds to is also listed below.

RANGE	PRIMARY PURPOSE	CORRESPONDS TO:
AREA B	Bayonet and Grenade Course	Bayonet 1, Bayonet 2, Grenade Course
D	Demolitions	Range Q – Demolition
E1	1000 Inch Landscape	Range S – 1000-inch, .22-caliber; or Range T – Electrically operated Pistol Marksmanship
E2-3	1000 Inch MG and Rifle	Range R – 1000-inch, .30-caliber
F	1000 Yd MG Qualification	Range A – Rifle Marksmanship
G	.22 caliber Miniature AA	
H1	1000 Yd MG Qualification	Range D - .30-cal MG, Maneuver, Combat and Marksmanship
H2	Rifle and MG Combat	Range D - .30-cal MG, Maneuver, Combat and Marksmanship
I	AA Towed Target	
J	Musketry Combat	Range J – Maneuver, Musketry and Combat, .30-cal and 60 & 81mm mortar
K	Rifle and MG Combat	Range L – Maneuver, Musketry and Combat, .30-cal
L1	.50 caliber AA Towed Target	
L2	.30 caliber AA Towed Target	Range F2 - .30 & .50-cal Anti-Aircraft Firing
M	Anti-Tank	Range M – Moving Target, .30 & .50 calibers, 37mm and 75mm howitzers
- - - -	Proposed Anti-Tank	

The boundary of Camp Elliott is also shown. However, the northeastern boundary appears to be different from other 1941 maps.

Naval Operating Base, San Diego, California.

1943b "Marine Barracks, Camp Elliott, Anti-Tank Range," originally dated February 16, 1942, revised June 15, 1943. Accession 181-71A-157; Roll #5. Federal Records Center, Los Angeles, CA.

This drawing shows details of the Anti-Tank Range northeast of Camp Elliott Cantonment and south of Old Escondido Road. The range is a distorted oval shape with a Figure 8 in the center. This is also known as "Range I – Anti-Tank" on the 1941 map with ranges A through Z above.

Naval Operating Base, San Diego, California.

1945 "Map of Naval Training and Distribution Center, Fleet Marine Force, Camp Elliott, Naval Operating Base, San Diego, California, Showing Conditions on June 30, 1945." Record Group 127, Entry 18B, Box 225, File: 1275/70-2050 Camp Elliott. National Archives II-Textual Branch, College Park, Maryland.

A 600-yard .30-caliber Rifle Range is shown adjacent to the northeast side of Camp Elliott's main cantonment area. South of Old Escondido Road is an Anti-Tank Range. The document this map was attached to discusses property and facilities to be retained for activities by the 11th Naval District. The boundary of this property, approximately 7,450 acres, is shown. Also shown are the locations, camp layouts, building numbers and uses of Green's Farm Camp, Linda Vista Camp, and Jacques Farm Camp. Located on Jacques Farm Camp was a small arms magazine, building #523.

U.S. Geological Survey.

1953 "La Mesa, California," Quadrangle. U.S. Geological Survey.

This historical USGS quad shows a portion of Camp Elliott, including the cantonment area and south and east to the boundary. A Rifle Range is located on the eastern end of the cantonment area and a Pistol Range is located on the southeastern end of the cantonment.

Department of the Navy.

1969 "U.S. Naval Air Station, Miramar, California, Activity Code No. 1452-606 Management Buaer, Real Estate Summary Map," Yards and Docks Drawings No. 945367, originally dated 25 March, 1964, revised 11 August 1969. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

The installation boundaries and notes regarding perimeter data, the acreage, and method of acquisition are shown on this map.

n.a.

n.d.c Map of northern Miramar showing Camp Elliott, 30 Caliber Rifle Range, Linda Vista Tent Camp, Anti-Tank Range, District Bomb Disposal Area, no date. Record Group 127, Entry 18A, Box 225, File: 1275/70-2050 Camp Elliott. National Archives II, College Park, MD.

Located east of Highway 395 within a 7,450-acre area are the main Camp Elliott Camp, Linda Vista Tent Camp, Marine Corps Women's Reserve, a .30-caliber rifle range, and anti-tank range. East of this area are Green's Farm Camp and a "District Bomb Disposal

Area, 922.0 acres." This southwest corner of the bomb disposal area is located at the intersection of T14S, R2W; T14S, R1W; T15S, R2W; and T15S, R1W. This bomb disposal area extends onto FUDS Project Area 4 (Area G).

n.a.

n.d.d "Camp Elliott Property Map," no date. Record Group 71, Entry 1001, Box 49. National Archives II-College Park, MD

The boundaries, an Anti-Tank Range, Rifle Range, and three outlying camps, Green's Farm Camp, Jacques Farm Camp, and Linda Vista Tent Camp, and the Main Camp are depicted on this Camp Elliott Property Map.

n.a.

1967 "Parcel Map of Camp Elliott, San Diego, Calif," dated 18 January 1967. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

This Parcel map shows land excessed and the old Camp Elliott boundary. All the land is located east of highway 395. Most excessed land is either located on the north side or south side. Excessed areas are labeled as A, B, D, G, H, and J and are parceled within the areas. No OE related items are identified on this map.

U.S. Geological Survey.

n.d.a "Overlay No. 1, To Accompany Report of Board on Feasibility of Purchase of Land in Camp Kearney Area for Training Purposes," no date. Record Group 127; Entry 140; Box 65. National Archives-Washington, D.C.

A Navy Emergency Landing Field is located in the vicinity of the old Camp Kearny site. A Navy Bombing Range is located north of this and an area identified as "present leased area" is located east of Highway 395. West of Highway 395 is a rifle range adjacent to Highway 101.

U.S. Geological Survey.

n.d.b "Overlay No. 2, To Accompany Report of Board on Feasibility of Purchase of Land in Camp Kearney Area for Training Purposes," no date. Record Group 127; Entry 140; Box 65. National Archives-Washington, D.C.

The "Present Leased Area" shown on the map above, "Overlay No. 1 . . . ," is also shown on this map and is located within the boundaries of a Proposed Combat Training Area. The combat training area is bounded by U.S. Highway 395 on the west and the north, the San Diego River on the south, and a H.V. Transmission Line on the east.

4.5 AERIAL PHOTO INTERPRETATION

Government and contractor personnel conducted an aerial photography database search. The aerial photography retrieved covered Camp Elliott during and following military use. The imagery acquired is in photographic print format. The analyst performed the interpretation using the following source materials:

Photography Date	Approx. Scale	Source	Frame ID #s
5 Jan 1944	1:20,500	National Archives (DIA)	VV6-22; 29-36; 40-55
14 April 1953	1:20,000	National Archives (USDA)	AXN-9M 72-76; 147-154; AXN-10M-14-22; 99-107
17 May 1953	1:20,000	National Archives (USDA)	AXN-3M-97-108 AXN-14M-88-1000
5 June 2002	1:40,000	USDA Aerial Photography Field Office – Salt Lake City	12502-49-53
15 June 2002	1:40,000	USDA Aerial Photography Field Office – Salt Lake City	12475-84-87; 14-15 12513-79-83; 67-69

The analyst delineated imagery containing important areas on hard copy plots and digitized it using Computer-Aided Drafting and Design (CADD) software. The digitized features overlay scanned aerial photography, resulting in the final plots (see PLATES 4 through 8). The analysis involved using stereo viewing of photography that allows more accurate identifications than monoscopic interpretations. Resolution and scale of the imagery limited the identification of features discussed in this study. The analyst used the word "probable" when discussing features for which identification is reasonably accurate. The analyst used the term "possible" when identification was not positive, but the object/area matched known features/locations on other sources. Analysis of the aerial photographs referenced the site maps discussed in sections 4.4.1 and 4.4.2 above. In particular, the 1941 Marine Corps map with ranges A through Z was referenced. When the feature corresponds to one of those ranges, that range is listed in parentheses. The **bolded** numbers in parentheses referenced in the sub-paragraphs below refer to the feature descriptions on the annotated aerial photography plates. The sub-paragraphs below describe the relevant features identified on the imagery:

4.5.1 1944 IMAGERY

Project 01 – Tierra Santa (see PLATE 4): (**1**) A small arms range (Range H1 – Moving Vehicle and Tank, .30-cal) running north-south about 3,200 feet with short (50-60 +/- feet) east-west oriented berms scattered along the road running through the range. (**2**) Small arms range (Range X – .22, .45, and .30 calibers) consisting of firing positions, several small berms, and one small building (this is most likely Building 523 – Small Arms Magazine) are noted on the aerial photography. (**3**) A small arms range (Range W – .22, .45, and .30 calibers) and firing positions. Several roads cross this site and it appears that several locations within the area could have been used as firing positions. The area is approximately 1,500 feet in length and oriented northwest-southeast. (**4**) Possible artillery firing positions (Jacques Farm Area). (**5**) Possible artillery firing positions (Range N – Artillery). (**6**) Small arms range firing position (Range F2 – .30 and .50 cal Anti-Aircraft Firing). This is a disturbed area along both sides of a road that is 3-400 feet in width and approximately 1,000 feet in length, north to south. (**7**) Small arms range (Range L – Maneuver, Musketry, and Combat, .30 cal) firing positions located just outside the northeast border of this project area on MCAS Miramar property. The area appears to be a disturbed or excavated area at the end of a road.

Project 02 – Mission Trails (see PLATE 5): There is no indication of ranges or firing areas within this FUDS project area. Neither impact areas nor disturbed areas are discernible.

Project 03 – East Elliott (see PLATE 6): (**8**) There is a possible training area in the southeast corner of this area. Several roads crisscross the site running east-west and north-south. The area is about 5,400 feet in length east-west and 1,200 feet north-south. This area does not correspond to any range uncovered during research. No other indication of ranges, firing areas, ordnance or chemical weapons areas within this FUDS was noted.

Project 04 – Areas G, H, and D (see PLATE 7):
Area G: There is no indication of ranges or firing areas within Area G.

Area H: There is no indication of ranges or firing areas within Area H.

Area D: (**9**) There is an extensive small arms range (Range D – .30 cal, Machine Guns, Maneuver, Combat and Marksmanship) outlined with down range berms located just outside the southwest corner of this project area on MCAS Miramar property. This range is approximately 3,000 feet in length east-west and 1,200 feet in width north-south. No indication of ranges, firing areas, ordnance or chemical weapons areas within Area D was noted.

4.5.2 1953 IMAGERY

For all project areas, refer to PLATE 8.

Project 01 – Tierra Santa: (**1**) The small arms range (Range H1) appears to be abandoned and the berms are not as prominent as on the 1944 imagery. (**2**) There is not much change from the 1944 photos. Therefore, the small arms firing positions (Range X) are possibly still active during this time period. Several berms and one building are noted on the aerial photography. (**3**) Small arms firing range and positions (Range W) appear to be abandoned. (**4**) The possible artillery firing positions (Jacques Farm) are not visible on this photo set. (**5**) Possible artillery firing positions (Range N) appear to be abandoned on this photo set. (**6**) Small arms range firing position (Range F2). No permanent structures can be seen but the area looks like it is still active. (**7**) Small arms range firing positions (Range L) located just outside the northeast border of the area. This feature looks like a road cut on this set of photos but could have been used as a firing position as well. (**10**) This feature did not appear on the 1944 photography. It appears to be a firing position (it is in the location of the "Convair Range", which was used by the USAF for testing small projectiles) and has a unique square/diamond shaped pattern on the ground with a building or other structure in the center.

Project 02 – Mission Trails: There are no indications of ranges or firing areas within this FUDS project area.

Project 03 – East Elliott: (**8**) The possible training area in the southeast corner of this area shows little or no change from the 1944 photography. Several roads crisscross the site running east-west and north-south. No other indications of ranges, firing areas, ordnance or chemical weapons areas within this FUDS project area were noted.

Project 04 – Areas G, H, and D:
Area G: There are no indications of ranges or firing areas within this FUDS.

Area H: There are no indications of ranges or firing areas within this FUDS.

Area D: (**9**) There is an extensive small arms range (Range D) outlined with down range berms located just outside this area off the southwest border. The outline of the range is still visible but it does not appear to be actively in use (the area is not well maintained) on this photo set. No other indications of ranges, firing areas, ordnance or chemical weapons areas within this FUDS were noted.

4.5.3 2002 IMAGERY

Project 01 – Tierra Santa: None of the previous features are noted on this photography. Eighty percent of the area is covered with housing and recreational facilities (a golf course). There are no additional indications of ranges or firing areas within this FUDS, nor any indication of ordnance or chemical weapons.

Project 02 – Mission Trails: This area appears to be totally undeveloped. There are no indications of ranges or firing areas within this FUDS, nor any indication of ordnance or chemical weapons.

Project 03 – East Elliott: This area remains undeveloped except for a large landfill in the center of the area. (**8**) The possible range/training area in the southeast corner of this area noted on the 1944 and 1953 photography appears more as a network of recreational traveled roads on this set of photography. There are more roads visible and they extend out towards the landfill in the central portion of the area. A main road coming from the south enters the landfill in the very southwest corner. No other indications of ranges, firing areas, ordnance or chemical weapons areas within this FUDS were noted.

Project 04 – Areas G, H, and D:
Area G: Minor development is noted in this area, which includes some buildings and some new roads but less than one percent developed throughout. There is no indication of ranges or firing areas within this FUDS.

Area H: No development is noted in this area. There is no indication of ranges or firing areas within this FUDS.

Area D: This area has been 80% developed and covered with housing. (**9**) The small arms range outlined with berms located just outside this area off the southwest border noted on the 1944 and 1953 photography, is not visible on this set of photography. An interstate highway (I-15) goes right through the middle of the former range location. There are no other indications of ranges or firing areas within this FUDS, nor any indication of ordnance or chemical weapons.

4.5.4 Additional Aerial Photos

Historical aerial photos dated between 1939 and 2002 of the former Camp Elliott were examined by the US Army Topographic Engineering Center. Photos of the project 01 area from the 1940's revealed several areas of ground scars and vehicle/tank tracks, abandoned ranges or training areas, and trenches. Photos from 1953 reveal ground

scars and a berm in the location of the former Convair (test) Range. Photos of the project 03 area from 1953 show a circular shaped pit. Structures, berms, and vehicle/tank tracks are identified on 1944 aerial photos in the southeast corner of project 03 area. Pits, ground scars, and trenches are identified on 1940's and 1950's photos of Area D. A circular shaped pit is seen on a 1958 photo of Area G. Photos dated 1966 of Area G reveal several buildings and possible bunkers (US Army Topographic Engineering Center 2004).

4.6 INTERVIEWS

The archive search team did not conduct any telephone and personal interviews to assist in the collection of information for this report.

5.0 SITE ELIGIBILITY

5.1 CONFIRMED FUDS

On 23 May 1917, the U.S. Government leased 8,000 acres for the establishment of Camp Kearny. By 18 July 1917, additional acreage of adjacent land, bringing the total to 12,721 acres, was leased for practice and drill maneuvers. However, one document dated 1920 regarding data on Camp Kearny states that the total area, including artillery and machine gun ranges, was 13,720 acres (Hinds 1986; Kinman 1920; SCS Engineers, Inc. 1984).

In 1934, the Marine Corps leased 19,298 acres to be used primarily for artillery, anti-aircraft, and machine gun firing. On 7 September 1939, recommendations were made to the Commanding General, Fleet Marine Force to acquire approximately 19,000 acres to be used as a Combat Training Area. The following are the boundaries of this training area, which was used for practice firing of various weapons:

Southern Boundary – San Diego River
Eastern Boundary – high tension power line running generally north from the San Diego River via Oak Canyon to Poway
Northern Boundary – Pomerado Road and Scripps Canyon Road
Western Boundary – U.S. Highway 395

Less than two years later, in the spring of 1941, a declaration of taking granted immediate possession of 19,298.25 acres. According to one document, additional acquisitions increased the training area to 26,034 acres; and others state the training area increased to approximately 32,000 acres with a 40.8-mile perimeter (Commanding General, Fleet Marine Force 1939; Commanding General, Marine Corps Base, San Diego 1939b; Fleet Marine Force 1940; Hinds 1986; Jones 1943; U.S.G.S. n.d.b).

There are discrepancies regarding the actual acreage, which was known as Camp Elliott. Several documents state that Camp Elliott consisted of approximately 32,000 acres (Jones 1943; USACE, Los Angeles District c1988). Other documents state that Camp Elliott consisted of 31,500 acres (28,000 acres fee and 2,500 acres withdrawn from public land (USACE, Los Angeles District 1985; 1991) or 29,438 acres (Deputy Chief of Naval Operations (Logistics) 1983).

According to a document, effective 1 July 1940, the boundary of Camp Elliott changed when an area (acreage unknown) in the northeast corner was excluded (Headquarters, Fleet Marine Force 1940b). In 1946, recommendations for retaining 7,450 acres (Linda Vista Tent Camp, Main Camp and surrounding area); and declaring surplus 21,429 acres (Green's Farm, Jacques Farm, and remaining Camp Elliott); totaling 28,879 acres east of Highway 395 were proposed. A 1945 map showing the boundary of the 7,450

acres and the remaining acreage does not show the northeast corner being excluded (Headquarters, Marine Training & Replacement Command 1946; Naval Operating Base, San Diego, California 1945).

The following is a summary of documents found regarding lease renewals (Major General Commandant 1940a, 1940c, 1940d, 1941a, 1941b):

Document Date	Location	Lease Period	Use	Acreage
21 Mar 1940	Camp Kearney Area	1 Jul 1940–30 Jun 1941		17,816
21 Mar 1940	Rancho Ex-Mission, Murphy & Shepherd Canyon Area	1 Jul 1940–31 Dec 1941		1,692.2
13 Jun 1940	Camp Kearney Area	1 Jul 1940–30 Jun 1941	Combat Range	13,382
7 Jun 1940	Rancho Ex-Mission, Murphy & Shepherd Canyon Area	1 Jul 1940–30 Jun 1941	Combat Range	1,732.2
19 Mar 1941	Camp Kearney Area	1 Jul 1941–20 Jun 1942		15,942
19 Mar 1941	Rancho Ex-Mission, Murphy & Shepherd Canyon Area	1 Jul 1941–20 Jun 1942		1,732.2
19 Mar 1941	Rosedale	1 Jul 1941–20 Jun 1942		389.3

There are also discrepancies regarding the amount of acreage that was surplused, when it was surplused, and the amount of acreage still retained by Department of Defense.

Several documents state that 13,277 acres were declared surplus to General Services Administration (GSA) in either 1960 or 1961 (USACE, Los Angeles District 1985; c1988; 1989). Other documents state that approximately 15,000 acres were reported to GSA in 1961 (Montgomery Watson 1995; USACE, Los Angeles District 1991). Between 1962 and 1974, this property was sold to various parties.

In the early 1960's the Department of the Navy transferred approximately 5,700 acres in the Sycamore Canyon area to the Air Force and subsequently to NASA for the Atlas Missile Facility. In 1969, NASA determined the property, approximately 7,400 acres (of which approximately 1,700 acres are public domain land controlled by the Navy) was no longer needed, and returned it to the Navy in either 1971 or 1972, who incorporated it into NAS, Miramar (Deputy Chief of Naval Operations (Logistics) 1983; NAS, Miramar Marine Public Affairs Office c1994; Office of the Los Angeles District Engineer 1963).

Depending on the source, MCAS, Miramar currently consists of 411.66 acres of aviation easements; either 7,801, 7,780, or 7,475 acres west of Highway 395; either 7,710, or 7,760, or 8310 acres east of Highway 395; and approximately 7,400 acres in the Sycamore Canyon area (Assistant Secretary of Defense for Installations and Logistics

1972; Deputy Chief of Naval Operations (Logistics) 1983; KTU&A 1997b).
Project 01 area is currently residential, educational, and recreational; project 02 is a regional park (recreational and undeveloped); project 03 is mostly undeveloped with a quarry in the center; and project 04 is mostly undeveloped with some residences and educational areas.

5.2 ADDITIONAL CONFIRMED FUDS ACREAGE

An area, known as Outlying Field Miramar and Miramar Bomb Target 31, north of the installation, was used as a bombing target for dive-bombing practice. This target was shown on two USGS maps (U.S.G.S. n.d.a; U.S.G.S. 1940). A compilation of Naval Air Targets included Miramar No. 31 at location N32°54' 54", W117°07'19" with concentric circles at 50', 100', and 200' radii. Its stated use was for "dive and glide bombing controlled practice and miniature bombs" (Office of the chief of Naval Operations n.d.). This area is currently covered with housing and commercial buildings. An ASR on the Linda Vista Valley Aux Landing Field (J09CA7236) completed by CEMVR in 2001 covers this bombing target and auxiliary field. See PLATE NO. 2 – PROPERTY / PROJECT BOUNDARIES.

A map dated 1919 shows the boundary of Camp Kearny cantonment area and Maneuver Area (Construction General 1919). A portion of this boundary falls outside current DoD property and the Camp Elliott FUDS property boundaries. See PLATE NO. 2 – PROPERTY / PROJECT BOUNDARIES.

5.3 POTENTIAL FUDS

A 1945 Air Traffic Control Board document recommends the 5-mile radius danger area centered at Latitude 32° 47' 45" N, Longitude 117° 07' 00" W (located just west of the southwestern boundary of Project 01 area) used by Camp Kearney be removed from all aeronautical charts. Apparently the danger area was in effect prior to the establishment of the Board (Interdepartmental Air Traffic Control Board 1945b). It is unknown why this danger area was established. See PLATE NO. 2 – PROPERTY / PROJECT BOUNDARIES.

Included in a listing of Bombing Targets in Southern California was Miramar BT at location N 32°54'06", W 117°07'04". The type of bombing run had not been determined at this time since plans to avoid conflict with traffic on Camp Kearny Field were needed (Eleventh Naval District 1944). This location above fell between Camp Kearny Field and Miramar No. 31. No remnants of a bombing target were seen in this area on any aerial photos. It is assumed the target was moved north to N 32°54'54", W 117°07'19" due to traffic at Camp Kearny Field, and location N 32°54'06", W 117°07'04" was never used for a target.

6.0 VISUAL SITE INSPECTION

6.1 GENERAL PROCEDURES AND SAFETY

The ASR site inspection characterizes OE and CWM potential based on a visual examination Camp Elliott FUDS. This inspection includes only visual and non-intrusive methods of inspection. The team follows a site safety and health plan (SSHP) prohibiting digging or handling of potential OE/CWM. The SSHP defines standard operating procedures to ensure safety and prevent accidents.

6.2 SITE INSPECTION SYNOPSIS

A site inspection on Camp Elliott FUDS was not conducted at this time.

7.0 SITE OE/CWM TECHNICAL DATA

7.1 OE ITEMS HISTORICALLY EXISTING ON SITE

The archive search identified the following ordnance items associated with Camp Elliott. The team compiled this list from maps, documentation, previous surveys/cleanups, and incident reports. The following items have either been found within the FUDS Project Areas or would most likely have been used/fired on those ranges that existed on FUDS property and/or overlapped onto the FUDS property. Please note that there are some munitions categories where actual munitions are not listed. Only those munitions in which there are ordnance data sheets (located in Appendix D) are listed below. Additional items (i.e., M520 fuse) are not listed; however, the general category is covered and listed below.

MUNITION CATEGORY	MUNITION
SMALL ARMS	SMALL ARMS
HAND GRENADES (INCENDIARY, SMOKE)	M18, SMOKE GRENADE
HAND GRENADES, PRACTICE	M21, PRACTICE HAND GRENADE
BOMBS, HIGH EXPLOSIVE	BOMBS, HIGH EXPLOSIVE
BOMBS, PRACTICE	AN-MK 5, AN-MK 23, AN-MK 43, PRAC SIGNAL, PRACTICE BOMB, MK 4
	BOMB, PRACTICE, BDU 33
GROUND ROCKETS, LIVE	M28, ROCKET, HEAT, 3.5-INCH
	M6A1, ROCKET, HEAT, 2.36-INCH
	M6A3, ROCKET, HEAT, 2.36-INCH
RIFLE GRENADES, LIVE	M9A1, RIFLE GRENADE, ANTI-TANK
GROUND ROCKETS, RIFLE GRENADES, PRACTICE	M11A2, PRACTICE RIFLE GRENADE
	M29, PRACTICE ROCKET, 3.5-INCH
	M7A1, PRACTICE ROCKET, 2.36-INCH
	M7A3, PRACTICE ROCKET, 2.36-INCH
GROUND ROCKETS, RIFLE GRENADES (WP)	M19A1, RIFLE GRENADE, SMOKE, WP
AERIAL ROCKETS (PRACTICE)	3.25-INCH, TARGET ROCKET, M2
MEDIUM CALIBER (20MM, 25MM, 30MM), HE	1.1-INCH AA, MK I
LARGE CALIBER (37MM AND LARGER), HE	105MM, FIXED, HE, M38
	105MM, HEAT, M67
	155MM, SHRAPNEL, MKI
	3-POUNDER, MK4
	3-INCH, AP. M62
	3-INCH, AP. M79
	3-INCH, HE. MKIX
	37MM, AP, M74
	37MM, AP, M80
	37MM, APC, M59

MUNITION CATEGORY	MUNITION
	37MM, CANISTER, M2
	37MM, HE, M54
	4.7-INCH, HE, M73
	57MM, RECOILLESS, HEAT, M307
	6-INCH, AP (SHELL), M1911
	6-INCH, AP (SHOT), M1911
	6-INCH, AP, MK XXXIII
	6-INCH, AP, MODEL 1911
	6-INCH, HE, MK IIA2
	75MM, AP, M72
	75MM, AP-C, M61
	75MM, GUN, HE, M48
	75MM, HOW, HE, M41A1
	75MM, HOWITZER, HE, M48
	75MM, SHRAPNEL, MKI
	COAST ARTILLERY EARLY 1900S
	90MM, AP M77
LARGE CALIBER (37MM AND LARGER), (INCENDIARY, SMOKE)	105MM, SMOKE, M84 SERIES
	75MM, SHELL, CHEMICAL, SMOKE, MKII
LARGE CALIBER (37MM AND LARGER), PRACTICE	105MM, FIXED, PRACTICE, M38
	3-INCH, PRACTICE. M42B2
	37MM, TP, M63
	37MM, TP, M92
MORTARS, HE	4.2-INCH, MORTAR, HE, M3A1
	60MM, HE, M49
	81MM, HE, M43
	81MM, HE, M56
MORTARS, (INCENDIARY, ILLUMINATION, SMOKE)	60MM, ILLUM, M83
	81MM, CHEMICAL, SMOKE, M57
MORTARS, (WP)	4.2-INCH, MORTAR, WP, M2A1
	81MM, SMOKE, WP, M57
MORTARS, PRACTICE	60MM, PRACTICE, M50A2
	81MM, TP. M43A1
LANDMINES, ANTI-PERSONNEL	M2, MINE, ANTI-PERSONNEL
LANDMINES, PRACTICE (WITH SPOTTING CHARGES)	M8, MINE, PRACTICE, ANTI-PERSONNEL
DEMOLITION MATERIALS	BANGALORE TORPEDO
	EXPLOSIVES, DETONATING CORD
	EXPLOSIVES, TNT
DETONATORS	DETONATORS
BLASTING CAPS	BLASTING CAPS, ELEC & NONELEC, M6 & M7

MUNITION CATEGORY	MUNITION
FUZES, BOOSTERS, OR BURSTERS	FUZE, BD, PRAC, M38
	FUZE, BASE DETONATING, M62
	FUZE, BASE DETONATING, M66
	FUZE, COMBINATION, M1907M
	FUZE, POINT DETONAING, M52
	FUZE, POINT DETONAING, M56
	FUZE, POINT DETONATING, M46
	FUZE, POINT DETONATING, M48
	FUZE, POINT DETONATING, M54
	FUZE, POINT DETONATING, M557
PRACTICE ORDNANCE (WITHOUT SPOTTING CHARGES)	20MM, DUMMY, M51A2
	3-INCH, DRILL, M9 & M10
	37-MM, TP-T, M51A2
	60MM, TRAINING, M69
	81MM, TRAINING, M68
FLARES, SIGNALS, SIMULATORS OR SCREENING SMOKE (OTHER THAN WHITE PHOSPHOROUS)	M48, TRIP FLARE
	M49A1, FLARE, SURFACE

7.2 CWM ITEMS HISTORICALLY EXISTING ON SITE

There are no known CWM items, which historically existed or were used on the FUDS properties. No known CWM items have been uncovered from the FUDS properties.

8.0 EVALUATION OF ORDNANCE PRESENCE

8.1 GENERAL EVALUATION OF OE AND CWM PRESENCE

8.1.1 Evaluation of OE Presence

The archive search uncovered evidence that the Army National Guard, Navy, and Marine Corps utilized conventional ordnance at Camp Elliott. The types of ordnance and explosives associated with the site included small arms, bombs, landmines, artillery, mortars, hand and rifle grenades, rockets, flares, and demolition material. This information was gathered from documentation, maps, previous surveys/clearances, incident reports, and aerial photography analysis.

In December 1983, the explosion of a 37mm HE projectile in Tierrasanta killed 2 children and critically injured 3 others. Numerous surveys/sweeps/clearances (1964, 1965, 1973, 1984, 1985, 1986, 1988, 1990-1994, 1994, 1996, and 1998-1999) have been completed on different portions (Projects 01, 02, and 03 areas) of Camp Elliott FUDS property. On all occasions, OE related items were uncovered. Clearance documentation for the project 04 area was not uncovered. In addition to these clearances, the San Diego Fire Department has been called out numerous times for ordnance pick-up in the past.

8.1.2 Evaluation of CWM Presence

The archive search uncovered no evidence of toxic chemical warfare materials storage, usage or disposal on the Camp Elliott FUDS property. The aerial photography analysis did not locate any distinct signs of on-site burial. None of the clearances conducted on the FUDS uncovered any toxic CWM items. However, 75mm and 81mm WP and FS filled projectiles and 4.2-inch FS filled mortars were used on ranges; and have been found on Camp Elliott FUDS. Chemical warfare training at Camp Elliott consisted of tear and chlorine gas chambers (none were located on FUDS property), defense against chemical agents, history of chemical warfare, chemical agents and their identification, military chemistry, gas projectors, gas grenades, surprise gas attacks, daily sniff tests to teach instant identification of various war gasses, and exploding chemical landmines and demolition charges. The location(s) of this training (except for the gas chambers) is unknown.

8.2 SITE SPECIFIC AREAS

8.2.1 Military Munitions Response Areas

MILITARY MUNITIONS RESPONSE (MMR) AREA SUMMARY					
PROJECT NO.	**NO.**	**MMR NAME**	**APPROX ACRES**	**OE/CWM Related Function**	**OE/CWM Potential**
01	R01	RANGE Q - DEMOLITION	25	explosive demolitions, demonstrations, and EOD explosives operations	**Confirmed.** Items found 1990-1994: .30-cal blanks, .30 cal projs, 12 gage shell, 2.36" bazooka HEAT rockets, 2.36" bazooka rockets, and an M1907 fuze. Items most likely used on a demolition range: TNT, dynamite, Bangalore Torpedo, Crater charges, and Blasting Caps.
01	R02	RANGE P - CAMOUFLAGE	48	Based on MMR name, munitions use isn't suspected.	**Confirmed.** Items found 1990-1994: numerous small arms ammunition, 60mm mortar, and 75mm shrapnel.
01	R03	RANGE H1 - MOVING VEHICLE & TANK	73	"Moving Vehicle and Tank, .30-cal" ranges were designed to train personnel to engage targets with tracked and untracked vehicles or tank mounted machine guns.	**Confirmed.** Items found 1990-1994: .30 cal blanks, tracers, & API; 60mm mortar; .50 cal API; 75mm HE & shrapnel, 81mm HE mortars, 3.5-inch rockets & motors, M18 smoke grenade, and fuzes (including M66, M52, & grenade). Small arms were most likely used since designated, ".30-cal."
01	R04	RANGE X - .22, .45, & .30 CALIBERS	89	Small Arms ammunitions firing/training.	**Potential.** No OE items were found 1990-1994 in the swept grids in the area of this range. Based on the name of the range, small arms were most likely used.
01	R05	RANGE COMPLEX (PROJECT 01)	3371	Series of overlapping small arms, artillery, and mortar ranges.	**Confirmed.** Items found 1990-1994: small arms, fuzes, rockets, rifle grenades, practice bombs, artillery projectiles, mortars, flares, and smoke grenades.
02	R01	RANGE COMPLEX (PROJECT 02)	7819	Series of overlapping small arms, artillery, and mortar ranges.	**Confirmed.** Several artillery rounds found in 1984/1985. Base of Fortuna Mountain categorized as highly contaminated.
03	R01	RANGE COMPLEX (PROJECT 03)	2980	Series of overlapping small arms, artillery, tank, and mortar ranges.	**Confirmed.** OE items found 1978-1999: artillery projectiles, fuzes, mortars.
04	R01	BOMB DISPOSAL AREA	94	used by the District Bomb Disposal Unit to destroy hazardous and unserviceable ammunition.	**Potential.** munitions available to Camp Elliott as well as Camp Kearny could have been destroyed at this location.

MILITARY MUNITIONS RESPONSE (MMR) AREA SUMMARY					
PROJECT NO.	**NO.**	**MMR NAME**	**APPROX ACRES**	**OE/CWM Related Function**	**OE/CWM Potential**
04	R02	RANGE B - .22 CAL ANTI-AIRCRAFT	238	Small arms firing/training	**Potential.** Based on the name of the range, small arms ammunition was most likely used on this range.
04	R03	RANGE E - TANK COURSE	826	primarily for tank units to fire both percussion and battle sight engagement with the main gun, secondary gun, and machine guns simulating actual combat.	**Potential.** Based on the name of the range "Tank Course and Combat Firing", it is assumed that small arms and artillery could have been fired.
04	R04	RANGE COMPLEX NO. 1 (AREA D)	115	Two overlapping small arms ranges	**Potential.** Small arms ammunitions would have been fired.
04	R05	RANGE COMPLEX NO. 2 (AREA D)	40	Series of overlapping small arms and artillery ranges.	**Potential.** Small arms and artillery would have been used.
Note: A Range Complex is comprised of several overlapping ranges.					

All MMR Areas (including the overlapping sub-ranges that constitute the identified range complexes) are shown on PLATE 9 – Military Munitions Response Areas.

8.2.1.1 Range Complex (Project 01)

This range complex covers the majority of Project 01 property boundaries. Project 01 is situated in the southwest portion of the Camp Elliott FUDS.

Range Complex (Project 01) is comprised of 15 overlapping ranges, of which most extend outside Project 01 boundaries:

- 75mm Artillery (south)
- Howitzer Range
- 75mm Artillery (west)
- Range N – Artillery
- Range M - Moving Target
- Range K - Combat, Mortar
- Range J - Combat, Mortar
- Range L - Combat, .30-Cal
- Range F2 - Anti-Aircraft
- Range H2 - Moving Vehicle and Tank
- Range W - .22, .45, .30 calibers
- Range O - Miniature Moving Target
- USAF (Convair) Range
- Range L1 - .50 cal AA Towed Target
- Range G - .22 cal Miniature AA

Ranges N, M, K, J, L, F2, H2, W, & O were identified on a map dated 08/1941; and Ranges L1 & G were identified on a map dated 10/1941. The range fans, as delineated on these historic maps, are shown. The approximate firing pattern and firing positions for the remaining 3 range fans were assumed based upon research, interviews, and field surveys conducted between 1973 and 1988.

Use of these ranges by the Marines probably began in the summer or fall of 1941 and ended in 1944 when they began to move to Camp Pendleton. The USAF Range, which was delineated on an undated historical map and a map dated c.1956, was used for approx 2 years for testing small projectiles.

The area was cleared in 1964, 1965, & 1973; however, in 12/1983, 2 youths were killed and 3 critically injured by the explosion of a 37mm HE projectile. Following these deaths, US Navy and Marine Corps personnel conducted sweeps in 1984 & 1985. Additional surveys were done in 1986 & 1988.

The extent of this range fell within numerous Sub-Areas delineated in the ordnance cleanup completed in 1994. Items found include: small arms, fuzes, 2.36", 3.5", and 4.5" rockets, rifle grenades, 1-lb and 4-lb practice bombs, 37mm, 40mm, 57mm, 75mm, 105mm, and 155mm artillery, 4.2-inch, 60mm, and 81mm mortars, flares, and smoke grenades.

This range had been located on property, known as Tierrasanta, which was surplused in the 1960s and has been an active suburb of San Diego since the early 1970s.

8.2.1.2 Range Complex (Project 02)

This range complex covers the majority of the property within Project 02. Project 02, Mission Trails, is situated in the south central portion of the Camp Elliott FUDS.

Range Complex (Project 02) is comprised of 11 overlapping ranges with firing positions located on either MCAS Miramar or in Tierrasanta:

- 75mm Artillery (south)
- Howitzer Range
- 75mm Artillery (west)
- Range N – Artillery
- Range M - Moving Target
- Range K - Combat, Mortar
- Range J - Combat, Mortar
- Range L - Combat, .30-Cal
- Range F2 - Anti-Aircraft
- Range L1 - .50 cal AA Towed Target

- Range G - .22 cal Miniature AA

Ranges N, M, K, J, L, & F2 were identified on a map dated 08/1941; and Ranges L1 & G were identified on a map dated 10/1941. The range fans, as delineated on these historic maps, are shown. The approximate firing pattern and firing positions for the remaining 3 range fans were assumed based upon research, interviews, and field surveys conducted between 1973 & 1988.

Use of these ranges by the Marines probably began in the summer or fall of 1941 and ended in 1944 when they began to move to Camp Pendleton.

The area was surface cleared in 1973; however, in 12/1983, 2 youths were killed and 3 critically injured by the explosion of a 37mm HE projectile in Tierrasanta. Following these deaths, additional sweeps and surveys were conducted in Tierrasanta; & a visual inspection of Mission Trails was conducted in 1988. An area at the base of the western side of Fortuna Mountain was deemed highly contaminated.

The extent of this range fell within numerous Sub-Areas delineated in the ordnance cleanup in Tierrasanta completed in 1994. Items found include: small arms, fuzes, 2.36", 3.5", and 4.5" rockets, rifle grenades, practice bombs, 37mm, 40mm, 57mm, 75mm, 105mm, and 155mm artillery, 4.2-inch, 60mm, and 81mm mortars, flares, and smoke grenades. It is likely that these same items could be found within Project 02 boundaries. In 1984 & 1985 the San Diego Fire Department responded to 3 ordnance reports near Fortuna Mountain. A total of 8 rounds (7-75mm AP & 1-105mm HE) were found.

An ordnance removal project within Mission Trails was proposed in 1989.

8.2.1.3 Range Complex (Project 03)

This range complex covers the majority of the property within Project 03. Project 03, East Elliott, is situated in the southeastern portion of the Camp Elliott FUDS.

Range Complex (Project 03) is comprised of 9 overlapping ranges. All but 3 ranges (Tank Range, Ranges U & V) have firing positions located on either MCAS Miramar or within Project 01 boundaries and extend over Project 02 boundaries:

- 75mm Artillery (south)
- 75mm Artillery (west)
- WWI Artillery
- Range I – Anti-Tank
- Range U – Combat & Musketry
- Range V – Combat & Musketry

- Range I – AA Towed Target
- Tank Range

Ranges I (Anti-Tank), F2, U, & V were identified on a map dated 08/1941; and Range I (AA Towed Target) was identified on a map dated 10/1941. The range fans, as delineated on these historic maps, are shown. The approx firing pattern and firing positions for the 75mm Artillery ranges were based upon research, interviews, and field surveys conducted between 1973 & 1988. Use of these ranges by the Marines probably began in the summer or fall of 1941 and ended in 1944 when they began to move to Camp Pendleton. The WWI Artillery Range layout is based upon the locations of the artillery emplacements and targets denoted on a map dated 08/1918. This range was probably used for approx 2½ yrs, between late 1917 (early 1918) and mid to late 1920. The Tank Range layout is based on a 1944 aerial photo showing the firing positions and the types and locations of munition items found over the years.

The extent of this range fell within numerous Sub-Areas delineated in the ordnance cleanup in Tierrasanta completed in 1994. It is likely that some of these same items could be found within East Elliott.

OE items found in East Elliott between 1978 and 1999 include: numerous 37mm and 75mm, M67 105mm HEAT, M62 fuze plug, M57 WP 81mm Mortar (located in the SE corner), and loose, surface fragments from 37mm & 75mm projectiles. In 06/1984, the US Army 70th EOD identified the ridge between Little Sycamore & Sycamore Canyons as being moderately to heavily contaminated with HE shell fragments. A TCRA and construction support activities in the eastern portion of East Elliott were conducted in 1998 & 1999. A Certificate of Clearance was issued on 53.3 acres. However, additional subsurface clearances were recommended.

8.2.1.4 Range Complex No. 1 (Area D)

This range complex is located in the southwestern corner of Area D, Project 04. It is comprised of only small arms ammunition ranges.

Range Complex No. 1 (Area D) is comprised of 2 overlapping ranges. Both ranges have firing positions located on MCAS Miramar; and fire east onto Project 04, Area D:

- Range D - .30 Cal Machine Gun
- Range I - AA Towed Target

Range D was identified on a map dated 08/1941; and Range I was identified on a map dated 10/1941. The range fans, as delineated on these historic maps, are shown. Use of these ranges by the Marines probably began in the summer or fall of 1941 and ended in 1944 when they began to move to Camp Pendleton.

The acreage provided is equal to the portions of the ranges within the boundaries of Project 04.

Based on the names of the ranges, small arms ammunition were most likely fired on these ranges.

No ordnance removal projects / sweeps / surveys / reports were found for the Project 04 area.

8.2.1.5 Range Complex No. 2 (Area D)

This range complex is located along the southern boundary of Project 04, Area D. Area D is situated in the northwest corner of the Camp Elliott FUDS.

Range Complex No. 2 (Area D) is comprised of 4 overlapping ranges. All ranges have firing positions located on MCAS Miramar; and either fire east or northeast onto Project 04, Area D:

- Range D - .30 Cal Machine Gun
- Range C - 37mm Anti-Tank
- Range Y - .22, .45, & .30 Calibers
- Range I - AA Towed Target

Ranges D, C, & Y were identified on a map dated 08/1941; and Range I was identified on a map dated 10/1941. The range fans, as delineated on these historic maps, are shown. Use of these ranges by the Marines probably began in the summer or fall of 1941 and ended in 1944 when they began to move to Camp Pendleton.

The acreage provided is equal to the portions of the ranges within the boundaries of Project 04.

Based on the names of the ranges, small arms ammunition were most likely fired on Ranged D, Y, and I. In addition to small arms, 37mm would have been fired on Range C.

No ordnance removal projects / sweeps / surveys / reports were found for the Project 04 area.

8.2.2 Storage Areas and Indoor Ranges

Analysis of the information gathered during the archive search identifies the following confirmed and potential OE / CWM non-Military Munitions Response areas on Camp Elliott FUDS.

NON-MILITARY MUNITIONS RESPONSE AREAS			
Storage Areas or Indoor Ranges	**Acreage (est.)**	**OE/CWM Related Function**	**OE/CWM Potential**
Small Arms Magazine, Building No. 523 (located less than a mile south of the cantonment area of Jacques Farm Camp)		Storage area for small arms ammunitions	**Documented Past Use** (historical map and 1944 aerial photo), but no physical evidence (not on 1953 aerial photo)

No other storage areas associated with Camp Elliott were located on FUDS property.

APPENDIX A

REFERENCE SOURCES AND RECORDS REVIEWED

APPENDIX A

REFERENCE SOURCES AND RECORDS REVIEWED

APPENDIX B contains full references of all in text citations along with the location of the copied document. Concentration in three areas directed the research for this report:

- locating documentation concerning the military use of the site
- compiling the types, quantities and probable locations of OE and/or CWM used by the military
- collecting real estate information

Researchers searched the following locations for records relating to OE and CWM activities at former Camp Elliott. Most of the repositories were researched in 1998 when preparing and ASR for MCAS Miramar. Additional Navy and Marine Corps records were searched for this ASR at the National Archives and Record Center in the Washington D.C. area. The research team used finding aids and records managers to assist in locating documents relevant to the research topic.

A.1 TEXTUAL AND CARTOGRAPHIC REPOSITORIES

A.1.1 NATIONAL ARCHIVES I--WASHINGTON DC
700 PENNSYLVANIA AVE., NW
WASHINGTON, D. C. 20408-0001
(202) 501-5400

Record Group 45: Naval Records Collection of the Office of Naval Records and Library
Entry: Subject Files, 1911-1927
Boxes 350: 12th Naval District, San Diego, plans for development
Boxes 531-532: Naval Activities at San Diego, fleet and vessels

Record Group 71: Records of the Bureau of Yards and Docks
Entry 17: Index to Correspondence
Based on this index, several boxes from Entry 19 were consulted.

Entry 19: General Correspondence 1925-1942
Boxes 995, 1011 and 1194-1199
No useful information on MCAS Miramar.

Box 1083
File: NA11/N1-13
Correspondence relating to the purchase of Combat Training Area and the lease of San Marcos Creek Auxiliary Field

Entry 21: Index to Correspondence 1925-1942
Boxes 77, 78, 90, and 121
No other boxes were pulled after consulting this index.

Record Group 80: General Records of the Department of the Navy
Entry: Naval General Correspondence 1926-1942
Boxes 2333, 2334, 2336, 2340, 3096-3101, and 3114-3118
No useful information on MCAS Miramar.

Record Group 127: Records of the United States Marine Corps
Entry 18A: General Correspondence, 1913-1932
Boxes 241, 1091, 1098, 1119-1120, 1981
Nothing of value on our site

Box 27
File: 1275-65
Correspondence concerning the construction of an Anti-Aircraft Marksmanship (infantry weapon) range

File: 1275-70
Correspondence on leasing land in the Camp Kearney Area

Entry 140: Quartermaster, General Correspondence 1927-1933
Box 29
File: 132-37, extension of Camp Holcomb

Box 65
Contained a map of Camp Kearney Artillery and Combat range showing a chemical area, dated 15 June 1937

File: 198-4, San Diego Vol. A
Correspondence regarding an artillery range in Cleveland National Forest and other range area

Boxes 73, 75 thru 84, 115, and 119 contained information concerning rifles, ordnance, gas masks, etc., none relative to our site.

Record Group 153: Records of the Judge Advocate General (Army)
Entry 56: Reservation File: Subseries 1, 1809-1948
Box 8: California, Alcatraz to Ft. Jones
No file on Camp Elliott.

Box 9: California, Camp Kearney to Peninsula
Nothing of value on Camp Kearney.

Entry 56a: Reservation Files 1800-1950
Box 87: California
No file on Camp Elliott, Camp Holcomb, or Camp Kearney

Record Group 177: Records of the Chief of Arms
Entry 33: Index to Correspondence in Entry 34 (1917-44)
Boxes 161-163: Posts, Camps, and Stations
Nothing on our site.

Record Group 393: Records of U.S. Army Continental Commands, 1821-1942
Entry 3: General Correspondence, 1917-1920
Box 11: Correspondence from the Commanding Officer regarding small arms ranges at Camp Kearny.

Box 15: Correspondence regarding construction data at Camp Kearny.

Record Group 407: Records of the Adjutant General's Office
Entry: Central Decimal Files, Project Files, 1917-25
Box 1195
File: Camp Kearney to Camp Kendrick
This file contained useful correspondence concerning acquisition and use of lands at Camp Kearny during 1918 and 1919.

A.1.2 NATIONAL ARCHIVES II--COLLEGE PARK
8601 ADELPHI ROAD
COLLEGE PARK, MD 20740-6001
(301) 713-6800

A.1.2.1 TEXTUAL REFERENCE BRANCH

Record Group 18: Records of the Army Air Forces
Entry 1A: Decimal File 1945
Box 276
File: 601.53 Leases and Loans
Correspondence relating to the request for cancellation of lease of property to the east of Camp Kearney

Entry 297: Project Files – Army Corps 1939-1942
Boxes 1058, 1084-1086
Nothing of value found on our site

Record Group 38: Records of the Office of the Chief of Naval Operation
Entry: World War II Diaries
Nothing of value found on NAS Miramar.

Record Group 48 (Records of the Office of the Secretary of Interior)
Entry 749A: Central Classified Files
Box 712
File: 2-68 California
Nothing of value on Camp Elliott

Entry 749B: Central Classified Files, 1937-1953
Box 3220
File: 2-68 California
Some real estate information on Camp Kearney

Record Group 71: Records of the Bureau of Yards and Docks
Entry 24: Unprocessed Naval Property Case Files,
Box 16: 11th Naval District Targets
Statement regarding leases of land at NAAS Camp Kearney

Entry 1001: Naval Property Case Files, 1941-1958
Box 48
File: Camp Elliott
Outlease of land at Camp Elliott

Box 49
File: Camp Elliott W5-40-SD-(CE) 6
Modification of Grazing Lease.

Box 112
File: San Diego: C5-2SD-3-160
Correspondence regarding markers on the flight path for Miramar Bombing Range.

Box 116
File: San Diego, C5-2SD-27
Correspondence regarding the joint use of MCAS Miramar by the Marine Corps and the City of San Diego and various development plans.

Box 119
File: San Diego, TS-7-SD-7
Report on Status of Department of the Interior Lands Under Jurisdiction of the Navy Department and memorandum regarding discontinuance of target bombing and rocket ranges.

Boxes 114, 117-119, and 120-131
Information of Naval activities in the San Diego area, nothing useful concerning MCAS Miramar.

Box 132: San Diego
File: C5-40-SD, M.C. Training Area Camp Elliott, CA
Documents on acquisition of land for use for combat and training areas associated with Camp Kearney.

Box 133
File: MC Training Area, Camp Elliott #2
Correspondence regarding land acquisition for Camp Kearney and combat training areas.

Box 134
File: C5-40-SC, File #1
Camp Elliot Property Map

File: C5-40-SD, File #7
Disposal No. 269, submitted by the Bureau of Yards and Docks in 1947.

Box 138
Map showing artillery firing ranges.

Boxes 139-143
No useful information on this site.

Entry 1015: Prospectuses submitted to the Navy Department for offerings of property in Florida, California, and for properties owned by the Packard Motor Car Company, 1942-1944
Boxes 1-2:
No information on Camp Elliott

Entry 1016: Navy Land Acquisition Report of the Real Estate Division, July 1, 1940-December 31, 1943
Box 1
No information on Camp Elliott

Entry 1030: Report on Army Facilities Acquired in 1944
Box 1
No information on Camp Elliott

Entry 1037: Lease Files, 1941-1947
Boxes 1-4
Information on leases in the area, but nothing of value on Camp Elliott

Record Group 72: Records of the Bureau of Aeronautics
Entry 62B: General Correspondence, 1943-1945
Box 1-5: File, A1-1 Developments and A1-4, Public Works
Al-4 document concerning magazines at NAAS Camp Kearney

Box 91-94: File, A5 Exercises, Practice and Competitions
Nothing of value on Camp Elliott

Box 507-508: File, F41-10 Training and Target Practice (Material)
Nothing of value on Camp Elliott

Box 2160: File, H2-14 Target and Torpedo Ranges
Nothing of value on Camp Elliott

Box 2320-2321: File, KP144 Camp Elliott and KV4 USMC San Diego
Nothing of value on Camp Elliott

Box 2805: File, N1/KP144 and N1/KV4 Buildings and Grounds
No files on our sites

Box 2808: File, N1/NA11 Buildings and Grounds
Nothing useful on our site

Box 2814: File, N1/NA138 NAAS Camp Kearney
No file on NAAS Camp Kearney

Box 2817-2820: File, N1-1 and N1-9 Surveys and Landing Fields
Nothing useful on our site

Box 2827: File, N1-9/NA11 Landing Fields, NAS San Diego
Nothing useful on our site

Box 2828: File, N1-9/Nall (6)
Correspondence on the expansion of Camp Kearney Auxiliary Landing Field

Box 2858: File, N1-9/NA138 and 292 Landing Files, NAAS Camp Kearney and NAS Miramar
No files on our site

Box 2860: File, N1-9/ND11 Landing Fields/11th Naval District
Included a Declaration of Surplus for property in San Diego County

Box 2865: File, N1-9 and N1-13 Landing Fields and Lands
Nothing of value on our site

Box 3065-3066: N12
Map of San Diego County Bombing Targets

Box 3068: File, N12/NA11 Military Structures NAS San Diego
Recommendation concerning outdoor gunnery ranges at NAAS Camp Kearney

Box 3114-3115: File, N20-10 Target and Torpedo Ranges
Nothing of value on our sites

Box 3379-3381: File, NA11 NAS San Diego
Statement regarding a bombardment unit at NAAS Camp Kearney

Box 3413: File, NA138 NAAS Camp Kearney
Nothing of value on our site

Box 3415: File, NA292 NAS Miramar
Nothing of value on our site

Box 3462: File, ND11 11th Naval District
Nothing of value on Camp Elliott

Entry: Unclassified General Correspondence, 1948-1949
Box 369
The file on Miramar did not contain any useful information.

Boxes 392-397
These records pertained to the air station in San Diego.

Entry: Unclassified General Correspondence, 1950
No information for this site.

Entry 1001C: General Correspondence, 1951
Box 1: File, A1-1 Developments
All research and development information

Box 3: File, A4-2 Shore Stations
No files on these subjects

Box 142: File, F4-10 Training and Target Practice and H2-14, Target and Torpedo Ranges
No files on these subjects

Box 161-161B: File, KV USMC Air detachments
Nothing of value under KV/General or KV/4 USMC, San Diego

Box 163-164: File, N1-13 (Lands), N12 (Military Structures), NA (Air Stations)
No files on N1-13 or N12, nothing useful under NA

Box 171-172: NA (Air Stations) and NA11 (NAS San Diego)
Nothing of value on our site

Box 203: File, NA 138 (NAAS Camp Kearney) and NA292 (NAS Miramar)
No files on these subjects

Entry 1001D: General Correspondence, 1952
Box 1: File A1-1, Developments
All research and development

Boxes 2-3: File, A4-2 (Shore Stations) and A-5 (Exercises, Practice and Competitions)
No files on these subjects

Box 19: File, A16-3 Warfare Operations
Nothing of value on Camp Elliott

Box 137: File, F41-10 Training and Target Practice
No file on this subject

Boxes 158-159: File, KV USMC Air Detachments
Nothing of value on Camp Elliott

Box 163: File, N1-9 (Landing Fields), N1-13 (Lands), and N12 (Military Structures)
No files on these subjects

Entry 1001H: General Correspondence, 1956
Boxes 1-4: File A1-1, Developments
All research and development

Box 6: File, A5 Exercises, Practice and Competitions
No file on this subject

Box 52: File, A16-3 Warfare Operations
Nothing of value on this subject

Box 165: File, F41-10 Training and Target Practice
No file on this subject

Box 166: File H2-14 Target and Torpedo Ranges
No file on this subject

Box 183: File, KV USMC Air Detachments
No file on KV/San Diego

Box 184-185: N1-1, N1-9, N12, and NA
Only a general file on Air Stations

Box 206: File, NA/Miramar
Nothing of value on Camp Elliott

Box 218: File, NA/San Diego
Nothing of value on our site

Entry 1001J: General Correspondence, 1958
Box 1-5: File, A1-1 Research and Development
Nothing of value on our site

Box 6: File, A4-2 Shore Stations
No file on this subject

Box 33: File A16-3 Warfare Operations
No file on this subject

Box 144: File, KV USMC Air Detachments
No file on this subject

Box 163: File, NA Miramar
Noting of value on our site

Boxes 171-172: File, NA Air Stations
No files on NAS San Diego

Record Group 74: Records of the Bureau of Ordnance
Entry 4444
Box 287
File: ND8-ND11, 1946
Correspondence regarding West Coast Service and Training Munitions Requirements.

Record Group 77: Records of the Office of the Chief of Engineers
Entry 106B: General Correspondence, 1918-1945
Box 704
File: 470.6
Communication Synopsis concerning a chemical warfare training film made at Camp Kearney.

Entry 1011: Formerly Security Classified Subject Files 1941-1945
Box 479, 510, 580-581
Nothing of value on our site

Entry 1019: General Correspondence with Service Commands, 1918-1946
Box 29-33: 8th Corps Area thru 9th Corps Area
Nothing of value on our site

Record Group 92: Records of the Office of the Quartermaster General
Entry 1891: Geographic File, 1922-35
Box 1016: Kansas to Kearney
File: 153 Camp Kearney, CA
Proceedings of a Board of Officers Convened at San Diego, California, November 14, 1922, concerning a legal claim against the government for land used as an artillery range.

Entry 1894a: General Correspondence Misc. File, 1939-1945
Box 60-70: 8th Corps Area thru 9th Corp Area
Nothing on value on our site

Entry 1896: General Correspondence
Box 389-411: 9th Corps Area 1922-1935
Nothing of value on our site

Entry 1974: Construction Completion Reports, 1917-19
Box 142: Camp Johnson to Kelly Field
File: Camp Kearny
Camp Kearny Construction Completion Report dated 1918.

Entry 1998: Real Estate Records 1917-1922—Sub Series 1
Box 95: Ellington Field to Erie, PA
No file on Camp Elliott

Box 127: Camp Kearney, CA to Kiser, VA
File on Camp Kearney did not contain anything useful.

Entry 1998: Real Estate Records 1917-1922--Subseries 2
Box 272: Campo to Eureka
No file on Camp Elliott.

Box 274: Fresno to Camp Kearny
File: 601.53 Camp Kearney, Calif. Amey L. Bryson
Correspondence relating to the lease of the Bryson land for a machine gun range.

Record Group 127: Records of the United States Marine Corps

Entry 18B: General Correspondence

Box 200
File: 1275/10
Correspondence regarding excess Navy lands

Box 204
List of Installations to be declared surplus

Box 206
File: 1275/10
Construction at Camp Elliott

Boxes 210-216:
Maps and other information on the ranges at Camp Elliott filed under the File No. 1275-65 and 1275-60

Boxes 217-225:
Site specific files under File No. 1275-70; Map on Camp Elliott in Box 225

Box 232
No information concerning Miramar.

Boxes 1972-1983: File No. 2400-10
Firing Records for USMC units worldwide, includes many records from ranges on Camp Elliott. Numerous documents concerning the practice firing on leased land east of Camp Kearney. This also includes the use of 4.2" chemical mortars.

Entry 36A: Division of Public Information, General Correspondence
Nothing of use on this site.

Entry 37A: Records of Training Exercises and Maneuvers '41-50
Boxes 5-15: None of the exercises in these records occurred at Camp Elliott

Entry 46A: General Correspondence, 1942-1950
Box 1: Nothing of value on Camp Elliott

Entry 140B: General Correspondence, 1940-1942
Nothing in this entry matched the following file numbers:
1275, Buildings and Grounds
2400, Targets and Target Practice

Entry 237C: General Administration Files
Box 1-19: Nothing of value on Camp Elliott

Entry 238C: Formerly Top Secret Correspondence
Box 1-2: Formerly Secret General Correspondence, 1940-1942, Fleet Marine Force
Nothing on Camp Elliott

Entry 238E: General Correspondence, 1944-45
Box 4-7: File, 1275 Buildings and Grounds
Nothing of value on our site, all Hawaii and Pacific Islands

Box 111: File, 2400, Targets and Target Practice
All shore bombardment information, nothing of Camp Elliott

Record Group 160: Records of Headquarters Army Service Forces
Entry: 9th Service Command
Box 1-10, 14, 23, 28, 31-37, 45
Nothing of value on our site.

Entry 196A: Special Services Division, General Records, 1941-1945
Box 268, 352-356, 431, 435-436
Nothing of value on our site

Record Group 175: Records of the Chemical Warfare Service
Entry 1: Central Correspondence, 1918-1942
Box 477
File: 470.71/379, 6 January 1919
Correspondence from Chief Gas Officer at Camp Kearny regarding the shipment of empty chlorine containers.

Entry 1A: General Correspondence, 1918-1940
Box 290: Camps
Nothing of value on our site

Entry 2: Index Briefs
Box 65: One reference to Defective 4.2-inch Chemical Mortar Ammuniton
Box 64, 66, 81
Nothing of value on our site

Entry 2A: General Correspondence (Subject Series) 1942-1945
Box 8, 14, 34-37
Nothing of value on our site

Entry 4B: Security Classified Correspondence, 1942-1945, Misc. Series
Box 164-178
Nothing of value on our site

Entry 4C: Station Series
Box 179-183
Nothing of value on our site

Record Group 237 (Records of the Federal Aviation Administration)
Entry 37: Records Relating to the Interdepartmental Air Traffic Control Board Meetings
Boxes 1-4
Minutes of meeting of the interdepartmental Air Traffic Control Board discussing danger areas in the Miramar/Camp Kearney vicinity

Record Group 291 (Records of the Federal Property Resources Service)
Entry 1: Old Accession 68A-5714: Real Property Disposal Case Files
Box 18
File: Linda Vista Project
14.2433 acres to San Diego Unified School District

Box 32
File: Linda Vista Project, Chesterton Section
Housing area disposal

Box 42
File: San Diego Missile Site
1.63 acres of land to San Diego Gas and Electric

Box 47
File: Linda Vista Auxiliary Landing Field
File did not concern our site

Box 51
File: San Diego Naval Auxiliary Landing Field
File did not concern our site

Box 63-68
Nothing of value on our site

Entry 5: Real Property Disposal Case Files, 1949-1962
Box 21
File: Linda Vista Project
Housing property

Box 29
File: Linda Vista Project
Capehart Housing property

Entry 6: Old Accession 72A-7812: Real Property Disposal Case Files
Box 3
File: Railroad Spur Tracks and Camp Elliott (portion)
Neither of these files concerned our assigned portion of Camp Elliott

Entry 7: Old Accession 73-0011: Real Property Disposal Case Files
Box 4
File: NASA Combined System Test Stand, San Diego
Not associated with our site, in San Diego proper

Record Group 319: Records of the Army Staff
Entry: Army-Intelligence Project Decimal File, 1941-1945
Box 1236: Camp Edison to El Paso Army Air Force
Nothing of value on our site

Record Group 338: Records of U.S. Army Commands, 1942-
Entry: Ninth Service Command
Box 24: Nothing of value

Entry: Unit Histories
Box 1: Chemical Schools
Nothing of value

Entry 35226: Posts, Camps and Stations Alpha File
Box 1-10: Camp Blanding thru Fort Williams
Nothing of value on our site

Record Group 407: Records of the Adjutant General's Office, 1917-
Entry 37A
Box 1185-1186: Nothing of value on our site

Record Group 429 (Records pertaining to organizations in the Executive Office of the President)
Entry UD/12: Central Real Property Surveys
Box 67: Naval Air Station, Miramar
This report had been previously found at the WNRC

Entry UD/17: Property and Installation Surveys, 1978-1984
Box 9: Naval Air Station, Miramar
Installation Survey Report 19 May 1983

A.1.2.2 STILL PICTURES BRANCH

The card catalog was reviewed and no useful photographs were found.

A.1.2.3 MICROFILM BRANCH

The finding aids were reviewed and no useful information was found.

A.1.2.4 CARTOGRAPHIC BRANCH

Record Group 71: Records of the Bureau of Yards and Docks
Entry: Series II Microfilm
Reel 892
Frames 23-25: Marine Corps Combat Training Area (Camp Elliott on Kearney Mesa)

A.1.3 WASHINGTON NATIONAL RECORDS CENTER
4205 SUITLAND ROAD
SUITLAND, MD 20409-0002
(301) 457-7000

Record Group 127: Records of the U. S. Marine Corps
Accession: 127-80-0038
Boxes 4, 5, 7, 8, 9, and 15: Budget Submission records
Nothing useful on our site.

Accession: 127-95-0037
Boxes 1 thru 3: Viet Nam after action reports
Nothing useful on our site.

Accession: 127-63A-2000
Boxes 188 and 189: Testing of rifles, ordnance, and ammunition
Nothing useful on our site.

Accession: 127-79-0054
Boxes 1 thru 3: Correspondence January 1939 to December 1950
Nothing useful on our site.

Accession: 127-77-0055
Box 7: 11011 San Diego thru 11011 Quantico 1932-1973
Nothing useful on this site.

Accession: 127-75-0089
Box 1: Ground Unit Operations Report 1 January 1969 thru December 1969
No useful information on our site.

Accession: 127-65A-4849
Boxes 6 and 17: Subject correspondence files January 1959 - December 1959
No useful information on our site.

Accession: 127-79-0042
Box 16: Subject correspondence files.
No useful information on our site.

Accession: 172-75-0090
Box 2
File 1275: Correspondence regarding the acquisition of land for Camp Elliott.

Boxes 4, 6, and 8: Correspondence, January 1939 - June 1950.
No useful information on our site.

Record Group 291 (Records of the Federal Property Resources Service)
Accession 79-0020
Box 6 of 34
File: USN Retraining Command, Camp Elliott
Disposal information on a portion of our site

Accession 80-0005
Box 12 of 16
File: Miramar Naval Station, San Diego
Installation Survey Report on NAS Miramar from March 1972

Accession 80-0012
Box 2 of 11
File: Gravel Deposit, NAS Miramar and NASA Test Stand
Gravel Deposit is on current MCAS Miramar and the Test Stand is in San Diego proper

A.1.4 NATIONAL PERSONNEL RECORDS CENTER
MILITARY PERSONNEL RECORDS
9700 PAGE AVENUE
ST. LOUIS, MO 63132-5100
(314) 538-4085

The finding aids of this repository were reviewed during the preparation of an ASR on MCAS Miramar in 1998. It was determined there were no pertinent records.

A.1.5 NATIONAL ARCHIVES-PACIFIC REGION SOUTHWEST (LAGUNA NIGUEL)
24000 AVILA ROAD
LAGUNA NIGUEL, CA 92607-6719
(714) 360-2641

Record Group 71: Records of the Bureau of Yards and Docks
Entry: Aviation Division, Construction Department
Box 1: Air Station Files, 1925-1942
Nothing of value on our site

Record Group 77: Records of the Chief of Engineers
Entry: California Military Site Audit Files, 1849-1944
Box 35
File: Elliott, Camp (East)
Findings of Fact for Site No. J09CA006702

Entry: Military Land Acquisition Files, 1849-1994
Box 46: El Centro to Camp Elliott
Nothing of value on our site

Entry: Annual Fortifications Reports, 1915-1931
Box 1: No documents were copied

Entry: Monthly Fortification Reports, 1912-1919
Box 1 – 3: No documents were copied

Entry: Los Angeles District, General Administration Files, 1935-1950
Box 14-16: 461-676.3
Nothing of value on our site

Entry: General Administration Files, 1940-1958
Box 1 – 5: 153.1 thru 800.2
Nothing of value on our site

Record Group 92: Records of the Office of the Quartermaster General
Entry: Sub-depot, Los Angeles, General Correspondence 1918-1921
Box 1-4: 319 thru 370.02
Nothing of value on our site

Record Group 181: Records of Naval Districts and Shore Establishments
Entry: Eleventh Naval District Planning Office, General Correspondence 1925-1952
Box 38
File: N1-9
Report of Naval and Marine Flying Within Western Air Defense Zone.

Entry: Eleventh Naval District Formerly Classified Correspondence, 1921-1947
Box 24
File: CF 16 – SF 16 1946-1947
Correspondence relating the activities of Bomb Disposal Unit from 20 November 1945 to 10 January 1946.

Correspondence relating the activities of Bomb Disposal Unit from 5 March 1945 to 4 April 1945.

Correspondence relating to the Bomb Disposal Experimental Area

Entry: Commandant's Office, Formerly Classified Correspondence, 1921-47
Box 57
File: CF20C/SF20C/1943
Board Report of Investigation of Additional Facilities Requested at the Marine Corps Air Stations on the West Coast.

Entry: 63A0589 to 63K0589 (General Correspondence, 1924-55)

Box 377
File: KK
Station General Order 29-1947, dated 30 June 1947, redesignating the air station as a naval facility.

Box 379
File: KP104
Correspondence from the Commandant, Eleventh Naval District, regarding the extension of the Camp Elliott area.

Box 382
File: 1943
Correspondence from the Commandant, Eleventh Naval District, regarding gas defense and Training Memorandum Number 8-43.

Box 389
File: KV (Miramar) 1946
Naval Speedletter from Marine Air West Coast regarding the combination of Marine Corps operations at Camp Kearny.

Box 435
File: NA11/N1-9
Correspondence from the Secretary of the Navy, approving the acquisition of land for Camp Kearny.

Box 481
File: NM 69, Camp Elliott 1947
Correspondence from the Commandant, Eleventh Naval District, regarding allotments and the use of ranges at Camp Elliott.

File: NM 69 1948
Correspondence from the Corps of Engineers regarding the permit for use of 20,000 acres of land at Camp Elliott.

File: NM 69 1950
Correspondence from the Commandant, Eleventh Naval District, regarding the maintenance and security of Camp Elliott.

Entry: 63A600
Box 33
File: KP102 (1925-41) 1 of 2
Correspondence from the Commanding General, Marine Corps Base, regarding Camp Holcomb and Camp Kearny.

Box 38
File: N1-9, 1942-46
Correspondence regarding the construction of temporary buildings at Camp Kearny and the long range development of outlying fields.

File: N1-9, 1947-50
Correspondence from Naval Air Bases, Eleventh and Twelfth Naval Districts regarding the long range development mission of NAAS, Miramar.

Box 39
File: N1-9/KV 1942-45
Status of MCAD Miramar, dated 26 June 1944.

File: N1-9/KV 1946
Historical Report of MCAS, Miramar, from 1942 to present date, dated 20 May 1946.

File: N1-13, 1933-46
Correspondence from United States Fleet Aircraft, Battle Force, regarding non-naval real estate acquisition in the Eleventh Naval District and Marine Corps activity at Camp Kearny.

Box 46
File: NM 1941-45
Naval Speedletter from the Commandant, Eleventh Naval District, to Bureau of Naval Personnel regarding Camp Elliott.

File: NM(a) 1947-49
Correspondence from 114th AAA Brigade, California National Guard, regarding the use of Camp Elliott.

Record Group 270: Records of the War Assets Administration
Entry: Real Property Disposal Case Files
Box 51: Edwards AFB to Estrella AAF
File on Camp Elliott did not contain any useful information.

A.1.6 FEDERAL RECORDS CENTER-PACIFIC REGION SOUTHWEST (LAGUNA NIGUEL)
24000 AVILA ROAD
LAGUNA NIGUEL, CA 92607
(714) 360-2625

This repository had no records pertinent to our report.

A.1.7 NATIONAL ARCHIVES-PACIFIC REGION (SAN FRANCISCO)
1000 COMMODORE DRIVE
SAN BRUNO, CA 94066-2350
(415) 876-9018

Record Group 269: General Records of the General Services Administration
Accession: NC3-269-79-001
No useful information on MCAS Miramar.

Record Group 291: Records of the Property Management and Disposal Service
Accession 9NSS-121-92-001
Box 12: Real Property Disposal Project Files, 1965-1966
Various reports, inspection, and certificates concerning the Camp Elliott property.

A.1.8 FEDERAL RECORDS CENTER-PACIFIC REGION (SAN FRANCISCO)
1000 COMMODORE DRIVE
SAN BRUNO, CA 94066-2350
(415) 876-9009

The SF 135's were reviewed for Record Groups 45, 127, 181, 269, and 291. No accession description was pertinent to MCAS Miramar.

A.1.10 MARINE CORPS HISTORICAL CENTER
REFERENCE SECTION
BUILDING 58
WASHINGTON NAVY YARD
WASHINGTON, D.C. 20374-5040
(202)-433-3874

Geographic Files
File: MCAS Miramar, CA.

Several newspaper articles and related correspondence to MCAS Miramar were found at this repository.

A.1.11 MARINE CORPS HISTORICAL CENTER
ARCHIVES SECTION
BUILDING 58
WASHINGTON NAVY YARD
WASHINGTON, D.C. 20374-5040
(202) 433-3439

This repository contained 4 boxes concerning MCAS Miramar including command chronologies, news releases, bulletins and photos.

A.1.12 NAVY OPERATION ARCHIVES
BUILDING 57
WASHINGTON NAVY YARD
WASHINGTON, D.C. 20374
(202) 433-3224

Most records in the operational archives have been transferred to the National Archives II, College Park, MD, and they had no information on MCAS Miramar.

A.1.13 NAVAL HISTORICAL CENTER
AVIATION HISTORY BRANCH
BUILDING 157-1
WASHINGTON, D.C. 20374
(202) 433-9754

No pertinent information was found concerning this site.

A.1.14 NAVAL CONSTRUCTION BATTALION CENTER
COMMAND HISTORIAN
SEABEE MUSEUM
PORT HUENEME, CA 93043-4301
(805) 982-5563

This facility contained numerous newspaper and journal articles on the MCAS Miramar. Several histories, reports, and other information were copied to complete the historical section of this report.

A.1.15 NAVAL CONSTRUCTION BATTALION CENTER
CIVIL ENGINEERING SUPPORT OFFICE
PORT HUENEME, CA 93043
(805) 982-3057

The maps and drawings were consulted, but they were either illegible or had been found at other repositories.

A.1.16 NAVAL FACILITIES ENGINEERING COMMAND
ENVIRONMENTAL PLANNING BRANCH
900 COMMODORE DRIVE
SAN BRUNO, CA 94066-5006
(650) 244-3015

The master plan for NAS, Miramar from the 1980's was obtained here.

A.1.17 NAVAL FACILITIES ENGINEERING COMMAND
REGIONAL SPECIALIST SUPPORT TEAM (RSST)-CONSTRUCTION
BUILDING C233
900 COMMODORE DRIVE
SAN BRUNO, CA 94066-5006
(415) 244-3030

This office contained aperature cards for a variety of construction plans and as-built drawings on MCAS, Miramar. Various maps were copied.

A.1.18 MARINE CORPS RECRUIT DEPOT COMMAND MUSEUM
BUILDING 26
SAN DIEGO, CA 92140
(619) 524-4426

This museum has a large collection of photographs, many newspaper articles, books and general histories. Several documents concerning Miramar and Camp Elliott were copied.

A.1.19 U. S. ARMY CENTER OF MILITARY HISTORY
103 THIRD AVENUE
FORT MCNAIR, D. C. 20005-3402
(202) 685-4593

This facility contained a Camp Elliott property map and an article "San Diego's Military Sites."

A.1.21 U.S. ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT
911 WILSHIRE BLVD., SUITE 13129
LOS ANGLES, CA 90017-3401

The Engineering Division of the Los Angeles District contains the Inventory Project Report for Formerly Used Defense Sites including: USAR Tank Training, Miramar, Project No. J09CA065900; Linda Vista Mesa Field, Project No. JO9CA104500;Tierrasanta (Camp Elliott), Project No. J09CA006701, Mission Trails Regional Park (Camp Elliott), Project No. J09CA006702, East Elliott (Camp Elliott), Project No. J09CA006703, and Areas G, D, and H (Camp Elliott), Project No. J09CA006704. The Project Management office provided a copy of the "Former Camp Elliott, California, Examination of Historical Photography – Selected Sites, Final Report," dated May 2004.

A.1.22 U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT
ATTN: CEMVR-ED-DO
CLOCK TOWER BUILDING
P.O BOX 2004
ROCK ISLAND, IL 61204-2004
POC: MR. RON PLANTE
(309) 782-1481

USACE, Rock Island District had completed an ASR for the Navy in 1996. We borrowed their report and all of their back-up material including maps, documents, previous reports, and aerial photos. Some of this information was incorporated into this report.

A.1.23 U. S. ARMY MILITARY HISTORY INSTITUTE
CARLISLE BARRACKS
CARLISLE, PA 17013-5008
(717) 245-3601

This repository was visited while conducting research for MCAS Miramar. No useful information was found.

A.1.25 CALIFORNIA HISTORICAL SOCIETY
687 MISSION STREET
SAN FRANCISCO, CA 94105
(415) 357-1848

This repository was visited while conducting research for MCAS Miramar. No useful information was found at that time.

A.1.26 U.S. ARMY CHEMICAL AND BIOLOGICAL DEFENSE AGENCY
HISTORICAL DIVISION
BUILDING E5183
ABERDEEN PROVING GROUND, MD 21010-5423
(410) 671-4430

No useful information found.

A.1.27 FEDERAL CLIMATE COMPLEX
AIR FORCE COMBAT CLIMATOLOGY CENTER (AFCCC/DOO)
151 PATTON AVENUE, ROOM 120
ASHEVILLE, NC 28801-5002

Climatic Data Summaries dated June 2002 from http://www.afccc.af.mil/ and http://www.ncdc.noaa.gov/oa/ncdc.html.

A.1.28 INFORMATION ON FILE IN THE ST. LOUIS DISTRICT OFFICE.

Secondary material including: *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps 1940-46; Guide to Military Installations* by Dan Cragg; and *United States Navy and Marine Corps Bases, Domestic* edited by Paolo E. Coletta.

A.2 AERIAL PHOTOGRAPHY REPOSITORIES

A.2.1 NATIONAL ARCHIVES II--COLLEGE PARK
8601 ADELPHI ROAD
COLLEGE PARK, MD 20740-6001
CARTOGRAPHIC AND ARCHITECTURAL BRANCH
ROOM 3050
POC: JENNIFER NELSON OR HENRY GWZADO
(301) 713-7040 EXT. 230

The research team consulted the aerial photo coverage overlays in Record Group 373 (Records of the U.S. Defense Intelligence Agency) and Special List 25 (USDA) for imagery at a scale of 1:40,000 or better covering the area. Purchases are highlighted.

DATE	RECORD GROUP	SCALE	OLD CAN #	NEW CAN #	IM/NUS #	FRAMES	TOTAL FRAMES
1/05/44	373	1:20,500	2A401	ON008613	10185117	VV 6-13, VV 14-22, VV 29-36, VV 40-48, VV 49-55	41
2/16/49	145	1:20,000	N/A	ON29308	10237359	AXN-1F 140-150	11
2/16/49	145	1:20,000	N/A	ON29309	10237747	AXN-2F 35-45,	47

						AXN-2F 67-76, AXN-2F 118-127, AXN-2F 156-164, AXN-2F 213-217	
4/14/53	145	1:20,000	N/A	ON40591	10276387	AXN-10M 99-107, AXN-10M 14-22	17 (complete coverage with 5/17/53
4/14/53	145	1:20,000	N/A	ON40590	10276388	AXN-9M 72-76, AXN-9M 147-154	14 (complete coverage with 5/17/53
5/17/53	145	1:20,000	N/A	ON40584	10276394	AXN-3M 97-108	12 (see above, 4/14/53)
5/17/53	145	1:20,000	N/A	ON40594	10276384	AXN-14M 88-100	13 (see above, 4/14/53)
6/20/58	373	1:10,600	G5914	ON026347	153939836	V 25-29, V 12-14, V 40-45, V 57-63	21 (Western ¼)
7/10/58	373	1:7,000	C2087	ON003376	10212058	V 1-19, V 20-41, V 42-55, V 60-74, V 75-91	87 (Northern half)
8/22/58	373	1:14,500	C2163	ON003378	10212056	V 1-9, V 11-19	18

A.2.2 ASCS - U.S. DEPARTMENT OF AGRICULTURE

AERIAL PHOTOGRAPHY FIELD OFFICE
2222 WEST 2300 S
SALT LAKE CITY, UTAH 84119-2020
(801) 975-3503

CEMVS-ED-S used their in-house research source to identify and purchase the following aerial photography.

DATE	SCALE	TYPE	FRAMES	TOTAL FRAMES
06/15/02	1:40,000	NAPP-CIR	12475-84-87;14-15	6
06/05/02	1:40,000	NAPP-CIR	12502-49-53	5
06/15/02	1:40,000	NAPP-CIR	12513-79-83;67-69	8

A.2.3 U.S. GEOLOGICAL SURVEY
EROS DATA CENTER
SIOUX FALLS, SOUTH DAKOTA 57198
POC: KIMBERLY KRINGEN
(605) 594-6151 EXT. 2075

The research team reviewed photo-mosaics of available imagery using the installation's geographic coordinates. Photos in the years 1966, 1971, 1972, and 1982 were available; however none were acquired.

APPENDIX B

REFERENCES and ABSTRACTS

REFERENCES and ABSTRACTS

B1. CORPS OF ENGINEER REFERENCES

Corps of Engineers Safety Office (CESO)

2000 *ER 385-1-92, Safety - Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities*, 1 September 2000

Office of the Los Angeles District Engineer.

1963 Map of San Diego Missile Test Site, dated 23 August, showing real estate transactions. Record Group 291; Entry 1; Box 42; File: San Diego Missile Test Site. National Archives, College Park, MD.

U.S. Army Corps of Engineers, Los Angeles District.

1985 Findings and Determination of Eligibility for DERP-FUDS Project No. J09CA006701, Tierrasanta (Camp Elliott), San Diego County, CA, dated 17 September (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

1989 Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, Mission Trails Regional Park (Camp Elliott), San Diego, CA, Project No. J09CA006702, dated 16 February 1989 (excerpt of report from Rock Island District, on loan to St. Louis District, Corps of Engineers).

1992 Findings and Determination of Eligibility for DERP-FUDS Project Number J09CA104500, Linda Vista Mesa Field Bomb Site, San Diego County, CA, dated March 1992 (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

1993a Defense Environmental Restoration Program, Formerly Used Defense Sites, Findings and Determination of Eligibility, Carroll Canyon Demolition Area, San Diego County, CA, Site No. J09CA029900, dated 19 August (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

1993b Findings and Determination of Eligibility for DERP-FUDS Project Number J09CA065900, USAR Tank Training Miramar, San Diego County, CA, dated 6 August 1993. U.S. Army Corps of Engineer, Los Angeles District.

U.S. Army Corps of Engineers, Rock Island District.

1996a "Archives Search Report, Findings for Naval Air Station Miramar, San Diego, California, Final Report," dated November. Prepared for Naval Air Station Miramar, Staff Civil Engineer Department, San Diego, CA.

1996b "Archives Search Report, Conclusions and Recommendations for NAS Miramar, San Diego, California, Final Report," dated November. Prepared for Naval Air Station Miramar, Staff Civil Engineer Department, San Diego, CA (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

1996c "Archives Search Report, Findings for Naval Air Station Miramar, San Diego, California, Draft Report," dated May. Prepared for Naval Air Station Miramar, Staff Civil Engineer Department, San Diego, CA (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

1996d "Archives Search Report, Conclusions and Recommendations for Naval Air Station Miramar, San Diego, California, Draft Report," dated May. Prepared for Naval Air Station Miramar, Staff Civil Engineer Department, San Diego, CA (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

B2. HISTORICAL REFERENCES

Airways Engineering Corporation.

1951 "U.S. Naval Auxiliary Air Station, Miramar, California Master Plan," dated 26 January 1951. Record Group 71; File #1227-3-88. National Archives, Cartographic Branch, College Park, MD.

ASLA & Associates, Incorporated.

1985 "Master Plan, Naval Air Station Miramar, San Diego, California," for Department of the Navy, Western Division, Naval Facilities Engineering Command, San Bruno, California, dated 1985 (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

Assistant Secretary of Defense for Installations and Logistics.

1972 Installation Survey Report on Naval Air Station, Miramar, San Diego, California. Accession 291-80-0005; Box 12 of 16; File: Miramar Naval Air Station, San Diego, CA. Washington National Records Center, Suitland, MD.

Blasland, H. D.

1918 Letter: "Small Arms Ranges at Camp Kearny," dated 5 August 1918. Record Group 393; Entry 3: General Correspondence; Box 11. National Archives, Washington, D.C.

Board of Inspection.

1939 "Report on the Feasibility of Purchase of Certain Properties in the Camp Kearney Area," dated 25 August. Record Group 71; Entry 1001; Box 133; File: MC Training Area Camp Elliott. National Archives, College Park, MD.

Bomb Disposal Officer, Eleventh Naval District.

1945 Correspondence to the Chief of Naval Operations, dated 09 April, regarding the activities of Bomb Disposal Unit from 05 March 1945 to 04 April 1945. Record Group 181; Entry Eleventh Naval District, Formerly Classified Correspondence; Box 24; File: CF16-SF16 1946-47. National Archives, Pacific Region, Laguna Niguel, CA.

1946 Correspondence to the Chief of Naval Operations, dated 16 January, regarding the activities of Bomb Disposal Unit from 20 November 1945 to 10 January 1946. Record Group 181; Entry Eleventh Naval District, Formerly Classified Correspondence; Box 24; File: CF16-SF16 1946-47. National Archives, Pacific Region, Laguna Niguel, CA.

Bureau of Aeronautics.

1943 Telegram commissioning a heavy bombing squadron. Record Group 72; Entry 62B; Box 3381; File: NA 11 (6). National Archives, College Park, MD.

n.d. Listing of Public Works Projects Submitted for Approval. Record Group 72; Entry 62B; Box 4; File: A1-4 Vol. 3. National Archives, College Park, MD.

Bureau of Yards and Docks.

1941 Memorandum: "Assignment of Building Numbers at Camp Elliott, Marine Corps Base, San Diego, Calif.", dated 9 August 1941 and 1st Endorsement dated 13 August 1941; 2nd Endorsement dated 27 August 1941. Record Group 181; Entry 63A0589-63K0589; Box 379; File: KP104. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

1943a "Final Project Cost Report (Gas Chambers)," dated 17 March. Box: Contracts NOY 4175, 4186, and 4187. Command Historian's Office, Seabee Museum, Port Hueneme, CA.

1943b "Final Project Cost Report (Magazines)," dated 17 March. Box: Contracts NOY 4175, 4186, and 4187. Command Historian's Office, Seabee Museum, Port Hueneme, CA.

1943c "Final Project Cost Report (75 Target Rifle Range)," dated 17 March. Box: Contracts NOY 4175, 4186, and 4187. Command Historian's Office, Seabee Museum, Port Hueneme, CA.

Chief of the Bureau of Yards and Docks.

1941 Correspondence to the Bureau of Supplies and Accounts, dated 30 July, regarding the payment of a deficiency judgment. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1946 Correspondence to the Chief of Naval Operations, dated 01 July, regarding the U.S. Naval Training and Distribution Center at Camp Elliott. Record Group 71; Entry 1001; Box 134. National Archives, College Park, MD.

Chief Gas Officer.

1919 "Shipment of Empty Chlorine Cylinders," dated 6 January. Record Group 175; Entry: General Correspondence; Box 477. National Archives, College Park, MD.

Chief of Naval Operations.

1949 Correspondence to Chief, Bureau of Yards and Docks, dated 21 March, regarding excess Navy Land at Camp Elliott. Record Group 127; Entry 18B; Box 200; File: 1275/10. National Archives, College Park, MD.

Civil Aeronautics Authority.

1940 Correspondence to Major General Commandant Holcomb, dated 15 January, regarding the firing of anti-aircraft weapons near a civil airway. Record Group 127; Entry 18B; Box, 1982; File: 2400-10 (5). National Archives, College Park, MD.

Coletta, Paolo E., ed.

1985 *United States Navy and Marine Corps Bases*, *Domestic.* Westport, Connecticut: Greenwood Press.

Command History.

1969 "Command History, Chronological Record of Commanding Officers with Periods of Services." Navy Historical Center, Aviation History Branch, Washington Navy Yard, Washington, D.C.

Commandant, Eleventh Naval District.

1934 Correspondence to the Secretary of the Navy, dated 13 September, regarding the purchase of the combat training area. Record Group 127; Entry 140; Box 65; File: 198-4, San Diego. National Archives, Washington, DC.

1939 Correspondence to Chief of Naval Operations, dated 04 October, regarding the enlargement of the combat training area in the vicinity of San Diego. Record Group 127; Entry 18B; Box 213; File: 1275-65. National Archives, College Park, MD.

1941a Letter: "United States of America v. 19298.25 acres of land, more or less, in San Diego County, California, Lawrence Oliver, et al. No. 105 Civil - Southern Division." Record Group 71; Entry: 1001; Box 133; File: Marine Corps Training Area, Camp Elliott. National Archives, College Park, MD.

1941b Correspondence to the Judge Advocate General of the Navy, dated 27 January, regarding the acquisition of land for Camp Kearney Mesa. Record Group 71; Entry 1001; Box 132; File: C5-40-SD M.C. Training Area Camp Elliott. National Archives, College Park, MD.

1941c Correspondence to the Judge Advocate General of the Navy, dated 09 May, regarding the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1942 Correspondence to the Judge Advocate General of the Navy, dated 14 April, regarding offers to settle to landowners in condemnation hearings on the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1943 "Gas Defense Recommendations, Camp Elliott," dated 12 February. Record Group 181; Entry: General Correspondence; Box 382. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

1948 Correspondence to the Chief, Bureau of Yards and Docks, dated 18 June, regarding the modification of grazing leases. Record Group 71; Entry 1001; Box 49; File: Camp Elliott. National Archives, College Park, MD.

1956 Letter: "Permit to CONVAIR - A Division of General Dynamics Corporation, for use of land at U.S. Naval Retraining Command, Camp Elliott, San Diego, California," dated 21 February 1956. Record Group 71; Entry 1001; Box 49. National Archives, College Park, MD.

Commandant of the Marine Corps.

1942a Correspondence to Chief, Bureau of Yards and Docks, dated 12 February, regarding public works for the Marine Corps. Record Group 127; Entry 18B; Box 200; File: Acquiring Construction Contracts. National Archives, College Park, MD.

1942b Correspondence to Senior Member, Shore Station Development Board, dated 30 April, regarding additional facilities at various locations. Record Group 127; Entry 18B; Box 200; File: Acquiring Construction Contracts. National Archives, College Park, MD.

1943 Correspondence to Commanding Officer, Tank Battalion, Camp Elliott, dated 04 May, regarding experimental anti-aircraft firing at rocket targets. Record Group 127; Entry 18B; Box 1982; File: 2400-10 Artillery, Heavy and Light. National Archives, College Park, MD.

1945 Correspondence to the Secretary of the Navy, dated 19 April, regarding the dismantling of moving target range No. 2 at Camp Elliott. Record Group 127; Entry 18B; Box 211; File: 1275-65 Ranges, Target. National Archives, College Park, MD.

Commander Aircraft, BATTLE FORCE.

1939 Correspondence to Commander-in-Chief, U.S. Fleet, dated 29 December, regarding the Fleet Marine Force Combat Training Area. Record Group 127; Entry 18B; Box 1982; File: 2400-10 (5). National Archives, College Park, MD.

Commander, Naval Base, San Diego.

1984 "Final Report of Ordnance Clearance Operations in Tierrasanta, 16 January 1984 to 27 April 1984," dated 1984. San Diego County Sheriff's Department, CA.

Commander-in-Chief, United States Fleet.

1939 Correspondence to Commander Aircraft, Battle Force, dated 30 December, regarding the Combat Training Area east of Camp Kearney. Record Group 127; Entry 18B; Box 1982; File: 2400-10 (5). National Archives, College Park, MD.

1940 Correspondence to Commander Aircraft, Battle Force and Commanding General, Fleet Marine Force, dated 15 February, regarding the marine combat area east of Camp Kearney (Camp Holcomb). Record Group 127; Entry 18B; Box 213; File: 1275-65. National Archives, College Park, MD.

Commanding General, Fleet Marine Force.

1936 Correspondence to the Major General Commandant, dated 30 December, regarding a 1000" range. Record Group 127; Entry: 18A; Box 27; File 1275-65. National Archives, Washington, DC.

1937a Correspondence to the State Senator Ed Fletcher, dated 15 March, regarding the evaluation of land in the San Diego area. Record Group 127; Entry 140; Box 65; File: 198-4, San Diego. National Archives, Washington, DC.

1937b Correspondence to the Major General Commandant, dated 31 August, regarding the combat range, Camp Kearney. Record Group 127; Entry 18A; Box 27; File: 1275-65. National Archives, Washington, DC.

1939 Letter: "Combat Training Area, purchase of," dated 7 September 1939. Record Group 71; Entry 1001, Box 133, File: Marine Corps Training Area, Camp Elliott. National Archives, College Park, MD.

1940a Correspondence to the Chief of the Regulation and Enforcement Division, CAA, dated 20 January, regarding hazards to aircraft. Record Group 127; Entry 18B; Box 1982; File: 2400-10 (5). National Archives, College Park, MD.

1940b Correspondence to the Major General Commandant, dated 23 February, regarding the regulation of firing at Camp Holcomb. Record Group 127; Entry 18B; Box 1982; File: 2400-10 (5). National Archives, College Park, MD.

Commanding General, Marine Corps Base, San Diego.

1939 Correspondence to the Civil Aeronautics Authority, dated 20 December, regarding civilian aircraft in firing area. Record Group 127; Entry 18B; Box 1982; File: 2400-10 Artillery, Heavy and Light. National Archives, College Park, MD.

1940 Correspondence to Commander-in-Chief, U.S. Fleet, dated 04 January, regarding the coordination of firing at Camp Holcomb. Record Group 127; Entry 18B; Box 1982; File: 2400-10 (5). National Archives, College Park, MD.

Commanding General, Second Marine Division.

1941 Correspondence to the Major General Commandant, dated 22 April, regarding artillery and anti-aircraft ranges. Record Group 127; Entry 18B; Box 212; File: 1275-65. National Archives, College Park, MD.

Commanding Officer, First Battalion, Tenth Marines.

1941 Correspondence to Major General Commandant, dated 17 September, regarding service practice in August. Record Group 127; Entry 18B; Box 1981; File: 2400-10 Artillery Heavy and Light. National Archives, College Park, MD.

Commanding Officer, Fourth Battalion, Tenth Marines.

1941 Correspondence to Major General Commandant, dated 03 January, regarding service practice in December 1940. Record Group 127; Entry 18B; Box 1981; File: 2400-10 Artillery Heavy and Light. National Archives, College Park, MD.

Commanding Officer, Second Battalion, Tenth Marines.

1939 Correspondence to Major General Commandant, dated 22 December, regarding service practice. Record Group 127; Entry 18B; Box 1982; File: 2400-10 (5). National Archives, College Park, MD.

1941 Correspondence to Major General Commandant, dated 16 December, regarding service practice in November. Record Group 127; Entry 18B; Box 1981; File: 2400-10 Artillery Heavy and Light. National Archives, College Park, MD.

Commanding Officer, Sixth Marines.

1938 Correspondence to the Quartermaster, U.S. Marine Corps, dated 12 July, regarding the construction of an anti-aircraft marksmanship range. Record Group 127; Entry: 18A; Box 27; File 1275-65. National Archives, Washington, DC.

Commanding Officer, Tank Battalion, Camp Elliott.

1943 Correspondence to the Commandant, USMC, dated 29 March, regarding experimental anti-aircraft firing. Record Group 127; Entry 18B; Box 1982; File: 2400-10. National Archives, College Park, MD.

Construction General.

1918 "General Map of Camp Kearny, California, Main Cantonment, Base Hospital and Auxiliary Remount Depot," taken from Completion Report of Camp Kearny, dated 1918. Record Group 92; Entry 1974; Box 142; File: Camp Kearny. National Archives, College Park, MD.

1919 "Map Showing Relative Location of Camp Kearny, California, San Diego and Surrounding Country With Source of Water, Gas and Electricity," dated 1919. Record Group 92; Entry 1974; Box 142; File: Camp Kearny. National Archives, College Park, MD.

Dames and Moore Inc.

1997a "45% Submittal, MCAS Miramar Rifle/Pistol Range Relocation Study," dated 20 February. Prepared for Commander, Marine Corps Air Bases, Western Area (On file at St. Louis District, Corps of Engineers, CEMVS-D-P).

1997b "45% Submittal, Miramar Trap and Skeet Club, Site Relocation Study," Marine Corps Air Station Miramar, dated 17 October. Prepared for Commander, Marine Corps Air Bases, Western Area (On file at St. Louis District, Corps of Engineers, CEMVS-D-P).

1997c "Preliminary Draft Submittal, Integrated Natural Resources Management Plan for Marine Corps Air Station, Miramar," dated November. Prepared for Commander, Marine Corps Air Bases, Western Area (On file at St. Louis District, Corps of Engineers, CEMVS-D-P).

Davis, Edward J. P.

1955 *The United States Navy and U.S. Marine Corps at San Diego*, First Edition. Marine Corps Recruit Depot Museum, San Diego, CA.

Department of the Interior.

1941 Correspondence, dated 17 April, regarding land transfer to the Navy Department. Record Group 48; Entry 749B; Box 3220; File: 2-68 California. National Archives, College Park, MD.

Department of Justice.

1942 Correspondence to the Judge Advocate General of the Navy, dated 12 May, regarding the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

Department of the Navy.

1969 "U.S. Naval Air Station, Miramar, California, Activity Code No. 1452-606 Management Bureau, Real Estate Summary Map," Yards and Docks Drawings No. 945367, originally dated 25 March 1964, revised 11 August 1969. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1988 "Western Departures, Runways 24 Right/Left, Altitude 1500' - 200' M.S.L.," dated 10 June 1988. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

Department of the Navy, Southwest Division.

1965a "Construction of Fencing Ammunition Storage Area, Site Plans and Index Sheet," dated 17 November 1965. Yards and Docks Drawings No. 1073513. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1965b "Construction of Fencing Ammunition Storage Area, Group 1 Magazines, Plan and Profile," dated 17 November 1965. Yards and Docks Drawing No. 1073515. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1965c "Construction of Fencing Ammunition Storage Area, Group 2 Magazines - Plan," dated 17 November 1965. Yards and Docks Drawings No. 1073516. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1965d "Construction of Fencing Ammunition Storage Area, Group 3 Magazines, Plan and Profile," dated 17 November 1965. Yards and Docks Drawing No. 1073518. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1968 "Construction of Aircraft Boresight Range (P-095), List of Drawings and Vicinity Map," dated 10 October 1968. NAVFAC Drawing No. 1275423. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

Department of the Navy, Western Division.

1972a "Ready Magazines (P-135), Civil Plot Plan," dated 28 September 1972. NAVFAC Drawing No. 6005379, Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1972b "Ready Magazines (P-135), Location Plan and Sheet Index," dated 28 September 1972. NAVFAC Drawing No. 6005378, Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1973a "U.S. Naval Complex, San Diego, Cal., Miramar Naval Air Station, General Development Map, Existing Conditions," Sheet 4 of 13, dated December 1973. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

1973b "U.S. Naval Complex, San Diego, Cal., Miramar Naval Air Station, General Development Map, Existing Conditions," Sheet 5 of 13, dated December 1973. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

1973c "U.S. Naval Complex, San Diego, Cal., Miramar Naval Air Station, General Development Map, Existing Conditions," Sheet 9 of 13, dated December 1973. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

1975 "U.S. Naval Complex, San Diego, Cal., Miramar Naval Air Station, General Development Map Existing Conditions," Sheet 2 of 4, dated January 1975. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

1976 "Ammunition Handling Equipment Shed, Spec. Proj. C2-75, Title Sheet," dated 3 December 1976. NAVFAC Drawing No. 6082298. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1978a "Small Arms/Pyrotechnic Magazine, Title Sheet," dated 8 May 1978. NAVFAC Drawing No. 6081250. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1978b "U.S. Naval Complex, San Diego, Cal., Miramar Naval Air Station, General Development Map, Existing Conditions," NAVFAC Drawing No. 6102247, Sheet 8 of 13, dated February 15, 1978. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

1979a "Naval Air Station, Miramar, San Diego, California, General Development Map, Index of Structures, Existing Conditions," NAVFAC Drawing No. 6102257, Sheet 1 of 2, dated 13 September 1979. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1979b "Naval Air Station, Miramar, San Diego, California, General Development Map, Index of Structures, Existing Conditions," NAVFAC Drawing No. 6102258, Sheet 2 of 2, dated 13 September 1979. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

Depot Quartermaster.

1938 Correspondence to the Quartermaster, dated 14 March, regarding leases and renewals for FY 1939. Record Group 127; Entry 18A; Box 27. National Archives, Washington, DC.

Deputy Chief of Naval Operations (Logistics).

1983 "Installation Survey Report, Naval Air Station Miramar, San Diego, California," dated 19 May. Record Group 429; Entry UD/17; Box 9; File: NAS Miramar. National Archives, College Park, MD.

District Court of the United States for the Southern District of California.

1942 Civil Order 105SD: United States of America vs. 19,298.25 acres of land in San Diego County, California. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

District Fire Officers.

1950 Memorandum: "Naval Training and Distribution Center, Camp Elliott, San Diego Brush Fire of 3-4 November 1950," dated 7 November. Record Group 181; Entry: 11th Naval District Commandant's Office 1924-1955; Box 481. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

Division of Plans and Policies, USMC.

1941 Correspondence to the Major General Commandant, dated 13 November, regarding an inspection of the combat range at Camp Elliott. Record Group 127; Entry 18B; Box 211; File: 1275-65 Ranges, Target. National Archives, College Park, MD.

DJG, Inc. Williamsburg, VA; Dynamic Systems, Inc., Reston, VA; UXB International, Inc., Fairfax, VA.

1987 "Report of Ordnance Contamination, Risk Assessment, and Clearance Alternative Analysis on the Former Camp Elliott," dated September (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

DJG, Inc. Williamsburg, VA; Dynamic Systems, Inc., Reston, VA; UXB International, Inc., Washington, D.C.

1988 "Final Engineering Report and Environmental Impact Statement," dated 27 April. Submitted to U.S. Army Engineer District, Huntsville, AL (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

Eleventh Naval District.

1944a Correspondence to the Eleventh Naval District Bomb Disposal Officer, dated 31 May, regarding a Bomb Disposal Experimental Area, Camp Elliott. Record Group 181; Entry: Eleventh Naval District Formerly Classified Correspondence 1921-47; Box 24; File: CF16-SF16 1944. National Archives, Pacific Region, Laguna Niguel, CA.

1944b Memorandum: "Bombing Targets in Southern California Sector, Western Sea Frontier." dated 24 August 1944 (reference excerpt from Archives Search Report, Findings for Naval Air Station, Miramar, San Diego, California, dated November 1996, on loan from Rock Island District).

1945 Brochure: "Eleventh Naval District," dated 1 January 1945 (covers location, size and function of stations coming under the administration of the Commandant, Eleventh Naval District). Command Historian's Office, Seabee Museum, Port Hueneme, CA.

Environmental Chemical Corporation.

1995a "Final Ordnance Report, Tierrasanta, California," dated February. Explosive Ordnance Disposal Division, Burlingame, CA (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

1995b "Final Ordnance Report, Tierrasanta, California: Appendix (1) Site Specific Information," dated February. Explosive Ordnance Disposal Division, Burlingame, CA (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

Federal Works Agency.

1939 "Request for approval of lease." Record Group 127; Entry: 140; Box 29; File 132-37. National Archives, Washington, DC.

First Defense Battalion, Fleet Marine Force.

1940 Narrative Report for firing conducted during the period 07-18 October. Record Group 127; Entry 18B; Box 1977; File: 2400-10 Target Practice Supplementary. National Archives, College Park, MD.

Fleet Marine Force.

1940 Special Order: "Camp Holcomb, change of name," dated 20 June 1940. Record Group 181; Entry: 63A0589-63K0589; Box 379; File: KP104. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

Fortieth Division Engineer.

1918 "Eastern Sector, Camp Kearny, Calif. ," including Ranges Plotted by the 434th Engineers on 25 August 1918. Record Group 393 (Western Dept.); Posts; Camp Kearny, CA. National Archives, Cartographic Branch, College Park, MD.

General Services Administration.

1973 "Notice of Surplus Determination," dated 20 December, for Portion of Camp Elliott, CA. Accession 291-79-0020; Box 6 of 34; File: USN Retraining Command, Camp Elliott, CA. Washington National Records Center, Suitland, MD.

1974 "Determination of Surplus," dated 04 February, for Portion of Camp Elliott, CA. Accession 291-79-0020; Box 6 of 34; File: USN Retraining Command, Camp Elliott, CA. Washington National Records Center, Suitland, MD.

1975a "Supplemental Appraisal Report of 132 Acres of Parcel #38, Area 'D' U. S. Naval Retraining Command, Camp Elliott, San Diego, California." Accession 291-79-0020; Box 6 of 34; File: USN Retraining Command, Camp Elliott, CA. Washington National Records Center, Suitland, MD.

1975b Assessment of Portion of Camp Elliott, CA. Accession 291-79-0020; Box 6 of 34; File: USN Retraining Command, Camp Elliott, CA. Washington National Records Center, Suitland, MD.

Gillispie Delorenzo, ASLA and Associates, Incorporated.

1985 "Naval Air Station Miramar, San Diego, California Master Plan, dated 1985." Prepared for Engineering Services for Master Plan Update and Basic Facility Requirements for Naval Air Station Miramar, San Diego, CA. (On file at St. Louis District Corps of Engineers, CEMVS-ED-P).

Headquarters, Fleet Marine Force.

1940a Force Training Memorandum Number 2-40, dated 12 February, on instructions governing the use of training facilities at Camp Holcomb. Record Group 127; Entry 18B; Box 213; File: 1275-65. National Archives, College Park, MD.

1940b Addendum to Force Training Memorandum Number 4-40, dated 05 July, on a change of boundary for Camp Elliott. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

Headquarters, Marine Corps Base, San Diego.

1942 Correspondence, dated 13 January, concerning additional targets on Range F, Camp Elliott. Record Group 127; Entry 18B; Box 211; File: 1275-65 Ranges, Target. National Archives, College Park, MD.

Headquarters, Marine Training and Replacement Command.

1946 Correspondence to Commandant of the Marine Corps, dated 08 July, regarding the utilization of portions of U. S. Naval Training and Distribution Center Facility at Camp Elliott. Record Group 127; Entry 18B; Box 225; File: 1275/70-2050 Camp Elliott. National Archives, College Park, MD.

Headquarters, Ninth Corps Area.

1922 "Proceedings of a Board of Officers Convened at San Diego, California, November 14, 1922; Claim of William Fitzherbert West and Helen S. West," dated November 14, 1922. Record Group 92; Entry: 1891; Box 1016; File: 153 Camp Kearney, CA. National Archives, College Park, MD.

Headquarters, Tenth Marines, Camp Elliott.

1941 Report of Service Practice, September 1941. Record Group 127; Entry 18B; Box 1975; File: 2400-10. National Archives, College Park, MD.

1942a Narrative of Service Practice conducted in June 1941 through January 1942. Record Group 127; Entry 18B; Box 1981; File: 2400-10 Artillery-Heavy and Light. National Archives, College Park, MD.

1942b Correspondence to the Commanding General, Marine Corps Base, dated 17 February, regarding the placement of an electronically controlled anti-tank range. Record Group 127; Entry 18B; Box 211; File: 1275-65 Ranges, Target. National Archives, College Park, MD.

Headquarters, Tenth Marines, San Diego.

1940 Narrative of Service Practice conducted from January through June. Record Group 127; Entry 18B; Box 1979; File: 2400-10 Target Practice Supplementary. National Archives, College Park, MD.

1941 Narrative Report and comments on firing conducted during period 10-19 December 1940. Record Group 127; Entry 18B; Box 1977; File: 2400-10 Target Practice Supplementary. National Archives, College Park, MD.

1942 Narrative of Service Practice conducted from 1939 through 1942. Record Group 127; Entry 18B; Box 1982; File: 2400-10 Artillery, Heavy and Light. National Archives, College Park, MD.

Headquarters, 244th AAA Searchlight Battalion.

1944 Correspondence to the Commanding General, Fourth Air Force, dated 23 December, regarding the cancellation of a lease near Camp Elliott. Record Group 18; Entry 1A; Box 276; File: 601.53 Leases and Loans. National Archives, College Park, MD.

Headquarters, U.S. Marine Corps.

1941a Correspondence to the Major General Commandant, dated 13 November 1941 regarding Inspection of Combat Range at Camp Elliott with attached map titled, "U.S. Marine Corps Combat Range, Camp Elliott, California," dated October 3, 1941. Record Group 127, Entry 18B, Box 211, File: 1275-65 (Ranges, Targets). National Archives, College Park, MD.

1941b Map titled, "U.S. Marine Corps Combat Range, Camp Elliott, California," dated October 3, 1941. Attached to correspondence to the Major General Commandant, dated 13 November 1941 regarding Inspection of Combat Range at Camp Elliott. Record Group 127, Entry 18B, Box 211, File: 1275-65 (Ranges, Targets). National Archives, College Park, Maryland.

Hinds, James W.

1986 *San Diego's Military Sites*. U.S. Army Center of Military History. Washington, D.C.

Holzman, Ellen B.

1995 "Off to the Boondocks for Polishing Up, Thousands Trained for WW II at Camp Elliott," *Traditions, San Diego's Military Heritage,* Vol. 2 No. 7.

Human Factors Applications, Incorporated (HFA)

1999 "Draft Removal Report, Volume 1, Ordnance and Explosives (OE) Removal Action, East Elliott, San Diego California," dated March 10, 1999. Prepared for USACE Engineering and Support Center, Huntsville, AL. (Entire document is available through the Project Information Retrieval System (PIRS).

Interdepartmental Air Traffic Control Board.

1942 Minutes to IATCB Meeting No. 110, dated 30 June. Record Group 237; Entry 37; Box 2; File: IATCB 101-125. National Archives, College Park, MD.

1943 Minutes to IATCB Meeting No. 387, dated 16 December. Record Group 237; Entry 37; Box 3; File: IATCB 376-400. National Archives, College Park, MD.

1944 Minutes to IATCB Meeting No. 529, dated 22 September. Record Group 237; Entry 37; Box 3; File: IATCB 526-550. National Archives, College Park, MD.

1945a Minutes to IATCB Meeting No. 622, dated 29 May. Record Group 237; Entry 37; Box 4; File: IATCB 601-625. National Archives, College Park, MD.

1945b Minutes to IATCB Meeting No. 633, dated 29 June. Record Group 237; Entry 37; Box 4; File: IATCB 626-650. National Archives, College Park, MD.

Jones, Frederick Redway.

1943 "A Training Center Chronicle," dated August. U.S. Marine Corps History Center, Washington Navy Yard, Washington, D.C.

Judge Advocate General of the Navy.

1941a Correspondence, dated 07 January, regarding the acquisition of land for Camp Kearney Mesa. Record Group 71; Entry 1001; Box 132; File: C5-40-SD M.C. Training Area Camp Elliott. National Archives, College Park, MD.

1941b Correspondence to the Chief of Naval Operations, dated 29 May, regarding the acquisition of 19,298.25 acres by condemnation. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1942a Correspondence, dated 22 May, regarding the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1942b Correspondence to the Public Works Department, dated 24 May, regarding the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1942c Correspondence to the Public Works Department, dated 09 July, regarding the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1942d Correspondence to the Public Works Department, dated 14 July, regarding the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

Kawasaki, Theilacker, Ueno and Associates (KTU&A).

1997a "MCAS East Miramar Housing, Phase Two: Site Feasibility Report, Family Housing Site Alternative Study," dated May. Prepared for Southwest Division, Naval Facilities Engineering Command and COMCABWEST / MCAS Miramar BRAC (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1997b "1997 Master Plan, MCAS Miramar, Existing Conditions Report," dated October. Prepared for Commander, Marine Corps Air Bases, Western Area, Southwest Division (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

Kinman, Guy M.

1920 Letter: "Data on Camp Kearny, California," dated 17 June. Record Group 393; Entry 3: General Correspondence 1917-1920; Box 15: Construction Data. National Archives I, Washington, D.C.

Major General Commandant.

1934 Correspondence to the Assistant Secretary of the Navy, dated 18 December, regarding a lease in the Camp Kearney area. Record Group 127; Entry 140; Box 65; File: 198-4. National Archives, Washington, DC.

1936a Correspondence to the Secretary of the Navy, dated 11 September, regarding a lease in the Camp Kearney area. Record Group 127; Entry 18A; Box 27; File: 1275-70. National Archives, Washington, DC.

1936b Correspondence to the Commanding General, Fleet Marine Force, dated 25 November, regarding the lease of the combat range. Record Group 127; Entry 18A; Box 27; File: 1275-70. National Archives, Washington, DC.

1937 Correspondence to the Secretary of the Navy, dated 16 March, regarding the renewal of a lease. Record Group 127; Entry 18A; Box 27; File: 1275-70. National Archives, Washington, DC.

1938a Correspondence to the Secretary of the Navy, dated 22 March, regarding a lease in the Camp Kearney area. Record Group 127; Entry 18A; Box 27. National Archives, Washington, DC.

1938b Correspondence to the Secretary of the Navy, dated 30 August, regarding a lease in the Camp Kearney area. Record Group 127; Entry 18A; Box 27. National Archives, Washington, DC.

1939 Correspondence to the Chief of Naval Operations, dated 28 September, regarding the enlargement of combat training area in the vicinity of San Diego. Record Group 127; Entry 18B; Box 214; File: 1275-65. National Archives, College Park, MD.

1940a Correspondence to the Judge Advocate General, dated 14 February, regarding the leasing of real estate. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

1940b Correspondence to Secretary of the Navy, dated 21 March, regarding leases in the Camp Kearney area. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rents-Leases and Agreements. National Archives, College Park, MD.

1940c Correspondence to Secretary of the Navy, dated 07 June, regarding a lease in the Shepard Canyon area. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

1940d Correspondence to Secretary of the Navy, dated 13 June, regarding leases in the Camp Kearney area. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

1941a Correspondence to the Secretary of the Navy, dated 19 March, regarding lease renewals. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rents-Leases and Agreements. National Archives, College Park, MD.

1941b Correspondence to the Secretary of the Navy, dated 19 March, regarding lease renewals. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

1941c Correspondence to Commanding General, Second Marine Division, dated 21 June, regarding a firing range at Camp Elliott. Record Group 127; Entry 18B; Box 212; File: 1275-65. National Archives, College Park, MD.

Marine Corps Air Station (MCAS), Miramar.

1946 Letter: "Historical Report of MCAS, Miramar, from 1942 to present date, submision of," dated 20 May 1946. Record Group 181; Entry 63A600; Box 39; File: NJ-9 / KV-1946. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

Marine Corps Base, San Diego.

1938 Telegram, dated 05 October, regarding the combat range, Camp Kearney. Record Group 127; Entry 18A; Box 27; File: 1275-65. National Archives, Washington, DC.

1939 Letter: "Combat Training Area East of Camp Kearny," dated 20 December. Record Group 127; Entry 18B; Box 1982; File 2400-10. National Archives, College Park, MD.

Miramar Jet Journal.

1965 "Elliott Property Becomes Part of NAS Miramar," dated 12 March 1965. Geographic Files - Miramar. Command Historian's Office, Seabee Museum, Port Hueneme, CA.

Montgomery Watson.

1995 "Draft Archives Search Report, Former Camp Elliott (East Elliott) Engineering Evaluation/Cost Analysis (EE/CA), San Diego, CA," dated January. Prepared for U.S. Army Corps of Engineers, Huntsville Division, Huntsville, AL.

1999 "Final Engineering Evaluation/Cost Analysis (EE/CA) Formerly Used Defense Site Camp Elliott (East Elliott), San Diego, CA," dated August 1999. Prepared for USACE Engineering and Support Center, Huntsville, AL. (Entire document is available through the Project Information Retrieval System (PIRS).

n.a.

1942a Listing of parcels set for trial on 09 April for the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

1942b Listing of parcels, dated 16 April, for the acquisition of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

c1955 Map showing Camp Elliott area (and acreage of Miramar Magazine Storage, Miramar Target 31, Leases to Dept. of Air Force). MCAS, Miramar.

c1960 "Sycamore Canyon Site and Location Plan," dated c1960, Map 4PEM-2-222. Record Group 291; Box 16. National Archives-Pacific Sierra Region, San Bruno, CA.

1967 "Parcel Map of Camp Elliott, San Diego, Calif," dated 18 January 1967. Real Estate Division, Naval Facilities Engineering Command, Southwest Division, San Diego, CA.

n.d.a "*Marine Corps Activity at Camp Elliott*." Command Historian's Office, Seabee Museum, Port Hueneme, CA.

n.d.b Attachment 2, "Navy Sites in DERPMIS also containing Low Level Radioactive Contamination (B5)."

n.d.c Map of northern Miramar showing Camp Elliott, 30 Caliber Rifle Range, Linda Vista Tent Camp, Anti-Tank Range, District Bomb Disposal Area, no date. Record Group 127, Entry 18B, Box 225, File: 1275/70-2050 Camp Elliott. National Archives, College Park, MD.

n.d.d "Camp Elliott Property Map," no date. Record Group 71, Entry 1001, Box 49. National Archives, College Park, MD.

n.d.e List of Installations to be declared surplus. Record Group 127; Entry 18B; Box 204; File: 1275-10. National Archives, College Park, MD.

Naval Air Bases.

1956 "Naval Air Station, Miramar, Vicinity Map," originally dated February 13, 1953, revised June 17, 1956. Accession 181-71A-157; Roll #19. Federal Records Center, Los Angeles, CA.

Naval Air Station (NAS), Miramar, Command Historian's Office.

1995 "Naval Air Station Miramar CY 95 Command History." Navy Historical Center, Aviation History Branch, Washington Navy Yard, Washington, D.C.

Naval Air Station (NAS), Miramar, Marine Public Affairs Office.

c1994 "MCAS Miramar -- A Homecoming for the Corps," dated c1994. U.S. Marine Corps History Center, Reference Section, Geographic Files. Washington Navy Yard, Washington, D.C.

Naval Operating Base, San Diego, California.

1940 "Marine Corps Rifle Range, Contour Map," dated March 13, 1940. Naval Facilities Engineering Command, Western Division, San Bruno, CA (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1941 "Map of Marine Corps Combat Training Area (Camp Elliott on Kearny Mesa), Naval Operating Base, San Diego, Calif., Showing Conditions on June 30, 1941." Reel 869, Frame 23. Port Hueneme, CA.

1942 "Camp Elliott, Master Plan Showing Existing & Proposed Development," dated 23 March 1942. Naval Facilities Engineering Command, Western Division, San Bruno, CA.

1943a "Map of Fleet Marine Force, Camp Elliott, Naval Operating Base, San Diego, Calif., Showing Conditions on June 30, 1943." Reel 869; Frame 78. Port Hueneme, CA.

1943b "Marine Barracks, Camp Elliott, Anti-Tank Range," originally dated February 16, 1942, revised June 15, 1943. Accession 181-71A-157; Roll #5. Federal Records Center, Los Angeles, CA.

1945 "Map of Naval Training and Distribution Center, Fleet Marine Force, Camp Elliott, Naval Operating Base, San Diego, California, Showing Conditions on June 30, 1945." Record Group 127, Entry 18B, Box 225, File: 1275/70-2050 Camp Elliott. National Archives, College Park, MD.

Navy Department.

1944 Correspondence to the 11th Naval District Public Works Officer, dated 10 June, regarding outdoor gunnery ranges for NAAS Camp Kearney. Record Group 72; Entry 62B; Box 3068; File: N12/NA11. National Archives, College Park, MD.

Naval Training Center.

1951 "Map of Elliott Annex, Naval Training Center, San Diego, Calif. ," dated March 31, 1951. Accession 181-71A-157; Roll #5. Federal Records Center, Los Angeles, CA.

Office of the Base Quartermaster.

1936 Memorandum for the Commanding General, dated 16 March, regarding land for an artillery range in Cleveland National Forest. Record Group 127; Entry: 140; Box 65; File 198-4. National Archives, Washington, DC.

1939 Correspondence from the Board to the Commanding General, Marine Corps Base, dated 09 October, regarding the extension of the present camp at Camp Holcomb. Record Group 127; Entry: 140; Box 29; File 132-37. National Archives, Washington, DC.

Office of the Chief of Naval Operations.

n.d. "Compilation of Naval Air Targets, Gunnery and Bombing Areas," undated. Record Group 127; Entry 18B; Box 1983: General Correspondence; File: Aviation Bombing. National Archives, College Park, MD.

Ogden Environmental and Energy Services.

1996a "Environmental Impact Statement, Realignment of NAS Miramar, Preliminary Final Submittal," dated January. Prepared for Department of the Navy, Commander, Marine Corps Air Bases, Western Area, Marine Corps Air Station El Toro, Santa Ana, CA (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

1996b "Environmental Impact Statement, Realignment of NAS Miramar, Final Submittal," dated February. Prepared for Department of the Navy, Commander, Marine Corps Air Bases, Western Area, Marine Corps Air Station El Toro, Santa Ana, CA (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

Public Works Department, Land Acquisition.

1942 Correspondence regarding settlements with former owners of 19,298.25 acres of land. Record Group 71; Entry 1001; Box 133; File: C5-40-SD File #2. National Archives, College Park, MD.

Public Works Officer.

1943 "Map of Landing Fields, Camp Kearny, Eleventh Naval District, San Diego, Calif., Showing Conditions on June 30, 1943." Reel 862; Frame 183. Port Hueneme, CA.

1944a "Map of Naval Training and Distribution Center, Fleet Marine Force, Camp Elliott Naval Operating Base, San Diego, Calif., Showing Conditions On June 30, 1944." NAVFAC, Port Hueneme, CA.

1944b "Map of Naval Training and Distribution Center, Fleet Marine Force, Camp Elliott Naval Operating Base, San Diego, Calif., Showing Conditions On June 30, 1944," (map shows Linda Vista Tent Camp, Retraining Station for West Coast, Greens Farm Camp, and Jacques Farm Camp). NAVFAC, Port Hueneme, CA.

1944c "Marine Corps Air Depot, Miramar, California, Eleventh Naval District, San Diego, Calif., Showing Conditions On June 30, 1944," Reel 869; Frame 116. Port Hueneme, CA.

1944d "Map of Auxiliary Air Station, Camp Kearney, California, Eleventh Naval District, San Diego, Calif., Showing Conditions On June 30, 1944," NAVFAC, Port Hueneme, CA.

1946 "Marine Corps Air Station, Miramar, California, Eleventh Naval District, San Diego, Cal., Showing Conditions On June 30, 1946." Reel 869; Frame 124. Port Hueneme, CA.

1947a "Map of Auxiliary Air Station, Miramar, California, Eleventh Naval District, San Diego, Cal., Showing Conditions on June 30, 1947." Reel 869; Frame 133. Port Hueneme, CA.

1947b "Map of Auxiliary Air Station, Miramar, California, Eleventh Naval District, San Diego, Cal., Showing Conditions on June 30, 1947." Reel 869; Frame 134. Port Hueneme, CA (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1948 "Map of Naval Training & Distribution Center, Camp Elliott, Naval Operating Base, San Diego, Calif., Showing Conditions On June 30, 1948." NAVFAC, Port Hueneme, CA.

1949 "Map of Auxiliary Air Station, Miramar, California, Eleventh Naval District, San Diego, Calif., Showing Conditions On June 30, 1949." NAVFAC, Port Hueneme, CA.

1951a "Map of Auxiliary Air Station, Miramar, California, Eleventh Naval District, San Diego, Calif., Showing Conditions On June 30, 1951." NAVFAC, Port Hueneme, CA.

1951b "Map of Auxiliary Air Station, Miramar, California, Eleventh Naval District, San Diego, Cal., Showing Conditions on June 30, 1951" (map shows area of Skeet/Shotgun Range, Boresight Range, WWII Magazines, San Clemente Canyon Dump). NAVFAC, Port Hueneme, CA.

Public Works Officer, Eleventh Naval District.

1954 Correspondence to the Chief, Bureau of Yards and Docks, dated 16 November, regarding the outlease of U.S. Naval Retraining Command, Camp Elliott. Record Group 71; Entry 1001; Box 48; File: Camp Elliott. National Archives, College Park, MD.

Real Estate Service.

1919 Memorandum: "Amey L. Bryson Lease of Land, Camp Kearny, Calif.," dated March 22, 1919. Record Group 92; Entry 1998; Box 274. National Archives, College Park, MD.

Rimer, Theodore M.

1946 Memorandum: "District Bomb Disposal Area, Hazard to Use for Grazing," dated 11 February 1946. Record Group 181; Box 481. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

SCS Engineers, Inc.

1984 "Initial Assessment Study of Naval Air Station Miramar, San Diego, California," dated September. Prepared for Navy Assessment and Control of Installation Pollutants (NACIP) Department, Port Hueneme, CA.

Second Battalion, Fifteenth Marines, San Diego.

1939 Report of Annual Target Practice. Record Group 127; Entry 18B; Box 1982; File: 2400-10 Artillery, Heavy and Light. National Archives, College Park, MD.

Second Chemical Co., Second Marine Division.

1941 "Defective Ammunition, 4.2 Chemical Mortar Ammunition," dated 28 February. Record Group 175; Entry 1; Box 235. National Archives, College Park, MD.

Second Defense Battalion, Fleet Marine Force.

1940 Narrative Report for firing conducted on 07 October. Record Group 127; Entry 18B; Box 1978; File: 2400-10 Target Practice Supplementary. National Archives, College Park, MD.

Second Engineer Company, F.M.F.

1937 "Camp Kearney Artillery and Combat Range,", dated 15 June 1937. Record Group 127; Entry 140; Box 65. National Archives I, Washington, D.C.

The Secretary of the Interior.

1940 Correspondence to the Secretary of the Navy, dated 31 December, regarding the transfer of land to the Navy Department. Record Group 48; Entry 749B; Box 3220; File: 2-68 California. National Archives, College Park, MD.

1941 Correspondence to the President, dated 31 January, regarding the use of public lands in California by the Navy. Record Group 48; Entry 749B; Box 3220; File: 2-68 California. National Archives, College Park, MD.

The Secretary of the Navy.

1943 Correspondence to the Governor of California, dated 08 July, regarding land for the expansion of Camp Kearney Auxiliary Field. Record Group 72; Entry 62B; Box 2828; File: N1-9/NA11 (6). National Archives, College Park, MD.

Shettle, M. L., Jr.

1997 *United States Naval Air Stations of World War II*. Bowersville, Georgia: Schaertel Publishing Co.

South Coastal Information Center

2003 "California Historical Resources Information System Site Files Record Search," dated 29 July 2003.

Systems, Science and Software.

n.d. Company Brochure on the Green Farm Test Site, cover letter dated May 11, 1978. U.S. Marine Corps History Center, Reference Section, Geographic Files. Washington Navy Yard, Washington, D.C.

U.S. Army Topographic Engineering Center.

2004 "Former Camp Elliott, California, Examination of Historical Photography – Selected Sites, Final Report," dated May 2004. Prepared for the U.S. Army Corps of Engineers, Huntsville Engineering and Support Center, AL.

U.S. Geological Survey.

1934 "La Jolla, California," Quadrangle. Record Group 127; Entry 140; Box 65. National Archives I, Washington, D.C. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1940 "La Jolla, California," Quadrangle, showing Camp Kearny Airfield and Target, OLF Miramar and Target, and other bombing targets. USMC Historical Center, Washington Navy Yard, Washington, D.C.

1953 "La Mesa, California," Quadrangle. U.S. Geological Survey.

1971 "San Vicente Reservoir, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1955; photorevised 1971.

1975a "Del Mar, California," Quadrangle, photorevised 1975. U.S. Geological Survey (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1975b "La Jolla, California," Quadrangle, photorevised 1975. U.S. Geological Survey (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1975c "La Mesa, California," Quadrangle, photorevised 1975. U.S. Geological Survey (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1975d "Poway, California," Quadrangle, photorevised 1975. U.S. Geological Survey (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1975e "El Cajon, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1967; photorevised 1975.

1994a "Del Mar, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1994 (on file at CEMVS-ED-P).

1994b "La Mesa, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1994 (on file at CEMVS-ED-P).

1996a "El Cajon, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1996 (on file at CEMVS-ED-P).

1996b "Jolla, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1996 (on file at CEMVS-ED-P).

1996c "Poway, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1994 (on file at CEMVS-ED-P).

1996d "San Vicente Reservoir, California," 7-1/2 minute Series (topographic) Quadrangle, 1:24,000, dated 1994 (on file at CEMVS-ED-P).

n.d.a "Overlay No. 1, To Accompany Report of Board on Feasibility of Purchase of Land in Camp Kearney Area for Training Purposes," no date. Record Group 127; Entry 140; Box 65. National Archives I, Washington, D.C.

n.d.b "Overlay No. 2, To Accompany Report of Board on Feasibility of Purchase of Land in Camp Kearney Area for Training Purposes," no date. Record Group 127; Entry 140; Box 65. National Archives I, Washington, D.C.

U.S. Marine Corps.

1939 Correspondence, dated 09 August, regarding the possibility of purchasing land in the eastern portion of Camp Kearney. Record Group 127; Entry 140; Box 65; FileL F198-4 San Diego, Vol. 4. National Archives, College Park, MD.

1940 Target Practice Reports and Report of Service Practice for October through December. Record Group 127; Entry 18B; Box 1977; File: 2400-10. National Archives, College Park, MD.

1941a Target Practice Reports and Report of Service Practice for April through July. Record Group 127; Entry 18B; Box 1977; File: 2400-10. National Archives, College Park, MD.

1941b Report of Service Practice (Light Artillery) from August, November, and December. Record Group 127; Entry 18B; Box 1976; File: 2400-10. National Archives, College Park, MD.

U.S. Marine Corps, 2nd Engineer Battalion, F.M.F.

1941a Terrain Map of Camp Elliott Reservation, showing ranges and primary purposes, dated August 1941. Record Group 71; Entry ACA4758; Box 3; File: Drawings, Plans, Specifications, Sheet No. 1. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

1941b Terrain Map of Camp Elliott Reservation, showing ranges and primary purposes, dated August 1941. Record Group 71; Entry ACA4758; Box 3; File: Drawings, Plans, Specifications, Sheet No. 2. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

U.S. Marine Corps, 2nd Marine Division, F.M.F.

1940 Map titled, "Camp Elliott Combat Area", dated January 1940, revised July 1940. Attached to correspondence to the Major General Commandant, dated April 22, 1941 regarding artillery and antiaircraft ranges. Record Group 127, Entry 18B, Box 212, File: 1275-65 (Ranges, Targets). National Archives, College Park, MD.

1941 Correspondence to the Major General Commandant, dated April 22, 1941 regarding artillery and antiaircraft ranges, with attached map titled, "Camp Elliott Combat Area", dated January 1940, revised July 1940. Record Group 127, Entry 18B, Box 212, File: 1275-65 (Ranges, Targets). National Archives, College Park, MD.

U.S. Naval Air Station (NAS), San Diego.

1937 Correspondence to the Commandant, Eleventh Naval District, dated 03 May, regarding renewal of leases and agreements. Record Group 71; Entry 19; Box 1083; File: NA11/N1-13. National Archives, Washington, DC.

1941 "Report of Board of the Development of the Existing Outlying Landing Fields," dated 11 October. Record Group 181; Box 38. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

U.S. Naval Auxiliary Air Station (NAAS) Miramar.

1947 Station General Order: "U.S. Marine Corps Air Station, Miramar, California - Redesignation of, as U.S. Naval Auxiliary Air Station," dated 30 June 1947. Record Group 181; Entry: 63A0589-63K0589-32; Box 377; File: KK. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

1950 "Long Range Development Plan for NAAS Miramar," dated 8 March. Record Group 181; Entry 63A600; Box 38; File: N1-9 1947-50. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

B3. REFERENCES FOR CLIMATIC DATA, GEOLOGY AND SOILS, AND HYDROLOGY

Bowman, Roy H.

1973 *Soil Survey of the San Diego Area, California, Part I.* US Department of Agriculture, Soil Conservation Service and Forest Service.

Federal Climate Complex.

2000 Air Force Combat Climatology Center, Asheville, NC. Climatic Data Summaries from*:* http://www.afccc.af.mil/ and http://www.ncdc.noaa.gov/oa/ncdc.html, dated June 2000.

Planert, Michael and Williams, John S.

1995 *Ground Water Atlas of the United States, Segment 1; California, Nevada*. Hydrologic Investigations Atlas 730-B, US Geological Survey, Reston, VA. (information from this source not included in this appendix).

Sharp, Robert P.

1976 *Southern California*. K/H Geology Field Guide Series, California Institute of Technology, Kendall/Hunt Publishing Company, Dubuque, IA.

U.S. Geological Survey.

n.d.c http://waterdata.usgs.gov/nwis/annual

B4. REFERENCES FOR DEMOGRAPHICS

U.S. Census Reports

2000 State and County Quick Facts, San Diego County, California
http://quickfacts.census.gov/qfd/states/06/06073.html

B5. STILL PHOTOGRAPH REFERENCES

c1918 "Artillery Range, Camp Kearny," c1918. No. 81-9644. San Diego Historical Society, San Diego, CA. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

c1918 "Artillery Range, Camp Kearny," c1918. No. VT340. San Diego Historical Society, San Diego, CA. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1918 "Gun Practice, Camp Kearny, Cal.," dated 1918. MCAS, Miramar, CA. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1941 Aerial View of Camp Elliott, dated 23 March 1941. No. 79: 741-646. San Diego Historical Society, San Diego, CA.

1942 Photo of Transporting Troops to Field Maneuvers, dated 1942. No. 3327-2. San Diego Historical Society, San Diego, CA. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1943 Oblique View of Marine Corps Air Depot, dated 8 June 1943. Record Group 80; G-75037. National Archives-Still Pictures Branch, College Park, MD. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1943 Oblique View of Marine Corps Air Depot and Camp Kearny, dated 14 September 1943. Record Group 80; G-357001. National Archives-Still Pictures Branch, College Park, MD. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1944 Aerial View of Camp Elliott, dated 26 June 1944. Record Group 80; G-235752. National Archives-Still Pictures Branch, College Park, MD.

1945 Aerial View of OLF Miramar, dated 2 January 1945. Record Group 80; G-302755. National Archives-Still Pictures Branch, College Park, MD.

1951 Anti-Aircraft Gun, dated 11 June 1951. Record Group 80; G-432059. National Archives-Still Pictures Branch, College Park, MD. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1951 Range Practice on 200 Yard Firing Line, dated 11 June 1951. Record Group 80; G-432060. National Archives-Still Pictures Branch, College Park, MD. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1952 Aerial View of NAS Miramar, dated 14 April 1952. Record Group 80; G-482094. National Archives-Still Pictures Branch, College Park, MD.

1954 Aerial View of NAS Miramar and Camp Elliott, dated August 1954. Record Group 80; G-654502. National Archives-Still Pictures Branch, College Park, MD. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

1957 Aerial View of Rifle Range, East Miramar, dated 19 January 1957. MCAS, Miramar, CA. (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

APPENDIX C

ABBREVIATIONS, ACRONYMS, AND BREVITY CODES

ABBREVIATIONS, ACRONYMS AND BREVITY CODES

The following list contains abbreviations, acronyms and brevity codes within this ASR, as well as typical others.

AAF*	Army Air Field
AA	Anti-Aircraft
ACGIH	American Conference of Governmental Industrial Hygienist
AEC	Army Environmental Center
AFB	Air Force Base
ACGIH	American Conference of Governmental Industrial Hygienist
ANSI	American National Standards Institute
AP	Armor Piercing
APDS	Armor Piercing Discarding Sabot
APERS	Anti-Personnel
AP-T	Armor Piercing-Tracer
ASR	Archive Search Report
AT	Anti-Tank
BD	Base Detonating
BD/DR	Building Demolition/Debris Removal
BLM	Bureau of Land Management
BRAC	Base Realignment and Closure
CADD	Computer-Aided Drafting and Design
CAIS	Chemical Agent Identification Set
cal	Caliber
CBDCOM	Chemical and Biological Defense Command
CE	Corps of Engineers
CEHNC	Corps of Engineers, Huntsville Engineering and Support Center
CEMVS	Corps of Engineers, Mississippi Valley-St. Louis District
CEMVK	Corps of Engineers, Mississippi Valley-Vicksburg District
CEP	Circular Error of Probability
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COE	Chief of Engineers
ctg	Cartridge
CWM	Chemical Warfare Materials
CWS*	Chemical Warfare Service
CX	Center of Expertise
DA	Department of the Army
DEET	Diethyltoluamide
DERP	Defense Environmental Restoration Program
DOD	Department of Defense

DOI	Department of Interior
EE/CA	Engineering Evaluation/Cost Analysis
EIS	Environmental Impact Statement
EM	Engineer Manual
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ETL	Engineering Technical Letter
FGDC	Federal Geographic Data Committee
FM	Field Manual
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
GIS	Geographic Information System
GPM	Gallons Per Minute
GPS	Global Positioning System
GSA	General Services Administration
HAZWOPER	Hazardous Waste Operations
HBX	high blast explosives; mixtures of RDX, TNT and aluminum
HE	High Explosive
HEAT	High Explosive Anti-Tank
HEI	High Explosive Incendiary
HEP	High Explosive Plastic
HMX	cyclotetramethylenetetranitramine (a type of high explosive)
HTRW	Hazardous Toxic and Radioactive Waste
HTW	Hazardous and Toxic Waste
IAS	Initial Assessment Study
IATCB	Interdepartmental Air Traffic Control Board
INPR	Inventory Project Report
IRP	Installation Restoration Program
LD	Lyme Disease
MCX	Mandatory Center of Expertise
MT	Mechanical Time
MTSQ	Mechanical Time Super Quick
NARA	National Archives and Records Administration
NAVSEA	Naval Sea Systems Command
NAAS*	Naval Auxiliary Air Station
NAS*	Naval Air Station
NCP	National Contingency Plan
n.d.	No Date
NEW	Net Explosive Weight
NGVD	National Geographic Vertical Datum
NIMA	National Imagery and Mapping Agency
NIOSH	National Institute for Safety and Health
NMAS	National Map Accuracy Standards

NPL	National Priorities List
NOAA	National Oceanic and Atmospheric Administration
NOFA	No Further Action
NPRC	National Personnel Records Center
NRC	National Records Center
NWS	National Weather Service
OCE	Office Chief of Engineers
OE	Ordnance and Explosives
OP	Ordnance Pamphlet
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PD	Point Detonating
PE	Professional Engineer
PETN	pentaerythritol tetranitrate (a type of high explosive)
PIBD	Point Initiating, Base Detonating
PM	Project Manager
PPE	Personal Protective Equipment
QASAS	Quality Assurance Specialist, Ammunition Surveillance
RAC	Risk Assessment Code
RDX	cyclotrimethylenetrinitramine; also known as cyclonite or hexogen (a type of high explosive)
RG	Record Group
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
SEP	Spherical Error of Probability
SOP	Standing Operating Procedures
SPB*	Surplus Property Board
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TCRA	Time Critical Removal Action
TEU	United States Army Technical Escort Unit
TM	Technical Manual
TNT	Trinitrotoluene
TP	Target Practice
USACE	US Army Corps of Engineers
USADACS	US Army Defense Ammunition Center and School
USAFHRA	US Air Force Historical Research Agency
USATCES	US Army Technical Center for Explosive Safety
USATHMA	US Army Toxic and Hazardous Materials Agency
USC	United States Code
USCG	Untied States Coast Guard
USDA	US Department of Agriculture

USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
UXO	Unexploded Ordnance
WAA*	War Assets Administration
WAGE	Wide Area GPS Enhancement
WGS	World Geodetic System
WNRC	Washington National Records Center
WW I	World War I
WW II	World War II

* designates an historic acronym

APPENDIX D

ORDNANCE TECHNICAL DATA SHEETS

ORDNANCE TECHNICAL DATA SHEETS

MUNITION CATEGORY	MUNITION
SMALL ARMS	SMALL ARMS
HAND GRENADES (INCENDIARY, SMOKE)	M18, SMOKE GRENADE
HAND GRENADES, PRACTICE	M21, PRACTICE HAND GRENADE
BOMBS, HIGH EXPLOSIVE	BOMBS, HIGH EXPLOSIVE
BOMBS, PRACTICE	AN-MK 5, AN-MK 23, AN-MK 43, PRAC
	SIGNAL, PRACTICE BOMB, MK 4
	BOMB, PRACTICE, BDU 33
GROUND ROCKETS, LIVE	M28, ROCKET, HEAT, 3.5-INCH
	M6A1, ROCKET, HEAT, 2.36-INCH
	M6A3, ROCKET, HEAT, 2.36-INCH
RIFLE GRENADES, LIVE	M9A1, RIFLE GRENADE, ANTI-TANK
GROUND ROCKETS, RIFLE GRENADES, PRACTICE	M11A2, PRACTICE RIFLE GRENADE
	M29, PRACTICE ROCKET, 3.5-INCH
	M7A1, PRACTICE ROCKET, 2.36-INCH
	M7A3, PRACTICE ROCKET, 2.36-INCH
GROUND ROCKETS, RIFLE GRENADES (WP)	M19A1, RIFLE GRENADE, SMOKE, WP
AERIAL ROCKETS (PRACTICE)	3.25-INCH, TARGET ROCKET, M2
MEDIUM CALIBER (20MM, 25MM, 30MM), HE	1.1-INCH AA, MK I
LARGE CALIBER (37MM AND LARGER), HE	105MM, FIXED, HE, M38
	105MM, HEAT, M67
	155MM, SHRAPNEL, MKI
	3-POUNDER, MK4
	3-INCH, AP. M62
	3-INCH, AP. M79
	3-INCH, HE. MKIX
	37MM, AP, M74
	37MM, AP, M80
	37MM, APC, M59
	37MM, CANISTER, M2
	37MM, HE, M54
	4.7-INCH, HE, M73
	57MM, RECOILLESS, HEAT, M307
	6-INCH, AP (SHELL), M1911
	6-INCH, AP (SHOT), M1911
	6-INCH, AP, MK XXXIII
	6-INCH, AP, MODEL 1911
	6-INCH, HE, MK IIA2
	75MM, AP, M72
	75MM, AP-C, M61
	75MM, GUN, HE, M48

MUNITION CATEGORY	MUNITION
	75MM, HOW, HE, M41A1
	75MM, HOWITZER, HE, M48
	75MM, SHRAPNEL, MKI
	COAST ARTILLERY EARLY 1900S
	90MM, AP M77
LARGE CALIBER (37MM AND LARGER), (INCENDIARY, SMOKE)	105MM, SMOKE, M84 SERIES
	75MM, SHELL, CHEMICAL, SMOKE, MKII
LARGE CALIBER (37MM AND LARGER), PRACTICE	105MM, FIXED, PRACTICE, M38
	3-INCH, PRACTICE. M42B2
	37MM, TP, M63
	37MM, TP, M92
MORTARS, HE	4.2-INCH, MORTAR, HE, M3A1
	60MM, HE, M49
	81MM, HE, M43
	81MM, HE, M56
MORTARS, (INCENDIARY, ILLUMINATION, SMOKE)	60MM, ILLUM, M83
MORTARS, (WP)	4.2-INCH, MORTAR, WP, M2A1
	81MM, SMOKE, WP, M57
MORTARS, PRACTICE	60MM, PRACTICE, M50A2
	81MM, TP. M43A1
LANDMINES, ANTI-PERSONNEL	M2, MINE, ANTI-PERSONNEL
LANDMINES, PRACTICE (WITH SPOTTING CHARGES)	M8, MINE, PRACTICE, ANTI-PERSONNEL
DEMOLITION MATERIALS	BANGALORE TORPEDO
	EXPLOSIVES, DETONATING CORD
	EXPLOSIVES, TNT
DETONATORS	DETONATORS
BLASTING CAPS	BLASTING CAPS, ELEC & NONELEC, M6 & M7
FUZES, BOOSTERS, OR BURSTERS	FUZE, BD, PRAC, M38
	FUZE, BASE DETONATING, M62
	FUZE, BASE DETONATING, M66
	FUZE, COMBINATION, M1907M
	FUZE, POINT DETONAING, M52
	FUZE, POINT DETONAING, M56
	FUZE, POINT DETONATING, M46
	FUZE, POINT DETONATING, M48
	FUZE, POINT DETONATING, M54
	FUZE, POINT DETONATING, M557
PRACTICE ORDNANCE (WITHOUT SPOTTING CHARGES)	20MM, DUMMY, M51A2
	3-INCH, DRILL, M9 & M10

MUNITION CATEGORY	MUNITION
	37-MM, TP-T, M51A2
	60MM, TRAINING, M69
	81MM, TRAINING, M68
FLARES, SIGNALS, SIMULATORS OR SCREENING SMOKE (OTHER THAN WHITE PHOSPHOROUS)	M48, TRIP FLARE
	M49A1, FLARE, SURFACE

SMALL-ARMS AMMUNITION

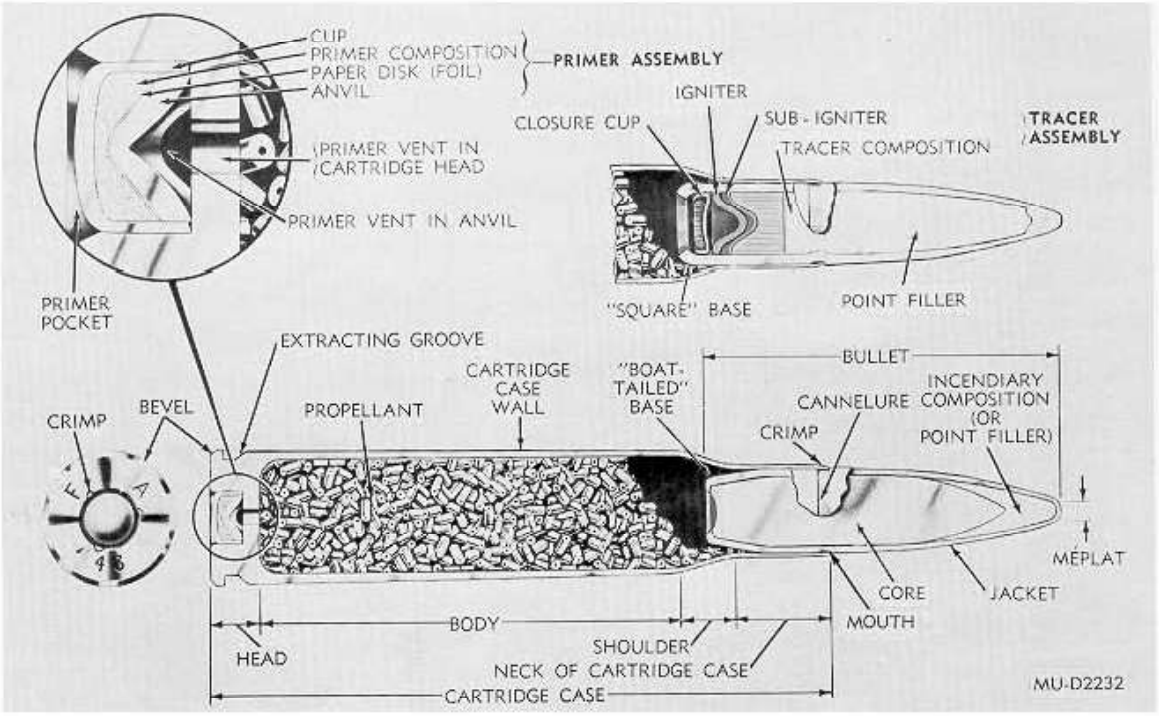


Figure 1. Typical cartridge (sectional)

General. Small-arms ammunition, as used herein, describes a cartridge or families of cartridges intended for use in various types of hand-held or mounted weapons through 30 millimeter. Within a caliber designation, these weapons may include one or more of the following: rifles (except recoilless), carbines, pistols, revolvers, machineguns and shotguns. For purposes of this publication, small-arms ammunition may be grouped as cartridges intended primarily for combat or training purposes (API, HEI, tracer or ball); for training purposes only (blank or dummy); or for special purposes (rifle grenade or spotter-tracer). Refer to TM 9-1306-200 for more detailed information on small-arms ammunition.

Cartridges. In general, a small-arms cartridge is identified as an assembly of a cartridge case, primer, a quantity of propellant within the cartridge case, and a bullet or projectile. Blank and rifle grenade cartridges are sealed with paper closure disks in lieu of bullets. Dummy cartridges are composed of a cartridge case and a bullet. Some dummy cartridges contain inert granular materials to simulate the weight and balance of live cartridges. A typical cartridge and the terminology of its components are shown in figure 1.

Case. Although steel, aluminum, zinc and plastic materials have been used experimentally, brass, a composition of 70 percent copper and 30 percent zinc, is the most commonly used material for cartridge cases. Steel, as well as brass, is an approved material for caliber .45 cartridge cases. Brass, paper and plastic are used for 12 gage shotshell bodies. Aluminum is used for military-type .410 gage shotshell bodies. Configurations of cartridges and bullets are illustrated in figures 2 through 9.

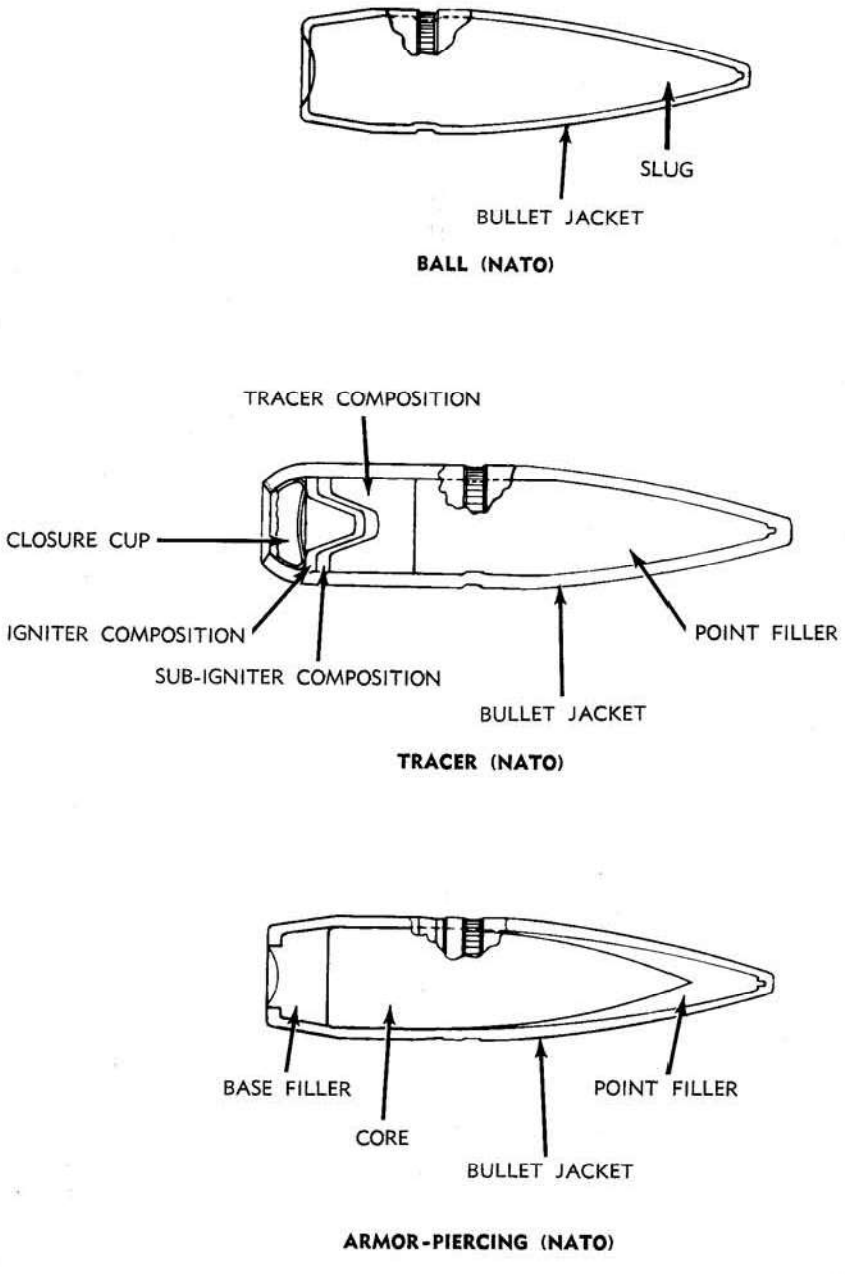


Figure 2. 7.62 mm bullets (sectional)

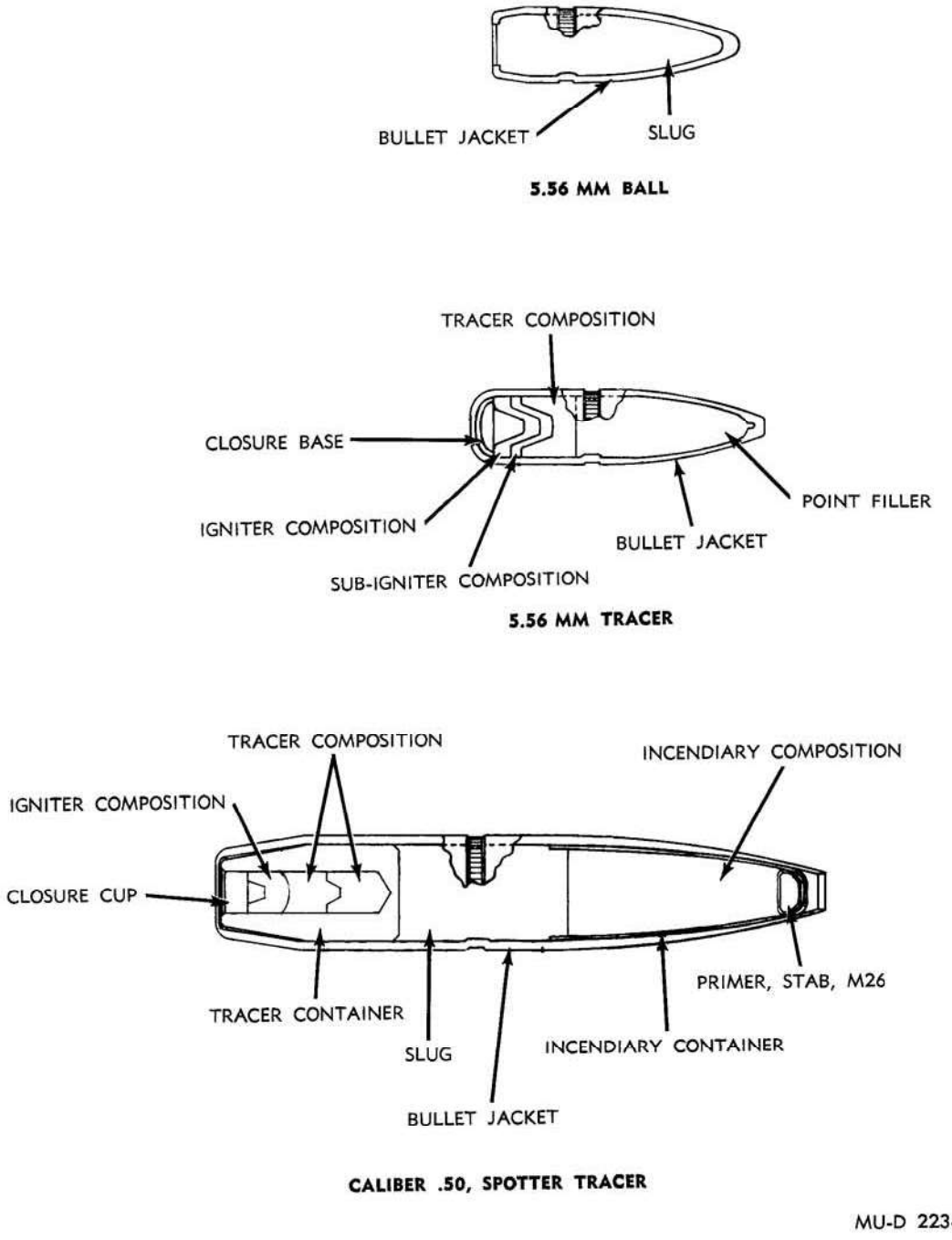


Figure 3. 5.56mm and caliber .50 spotter tracer bullets (sectioned)

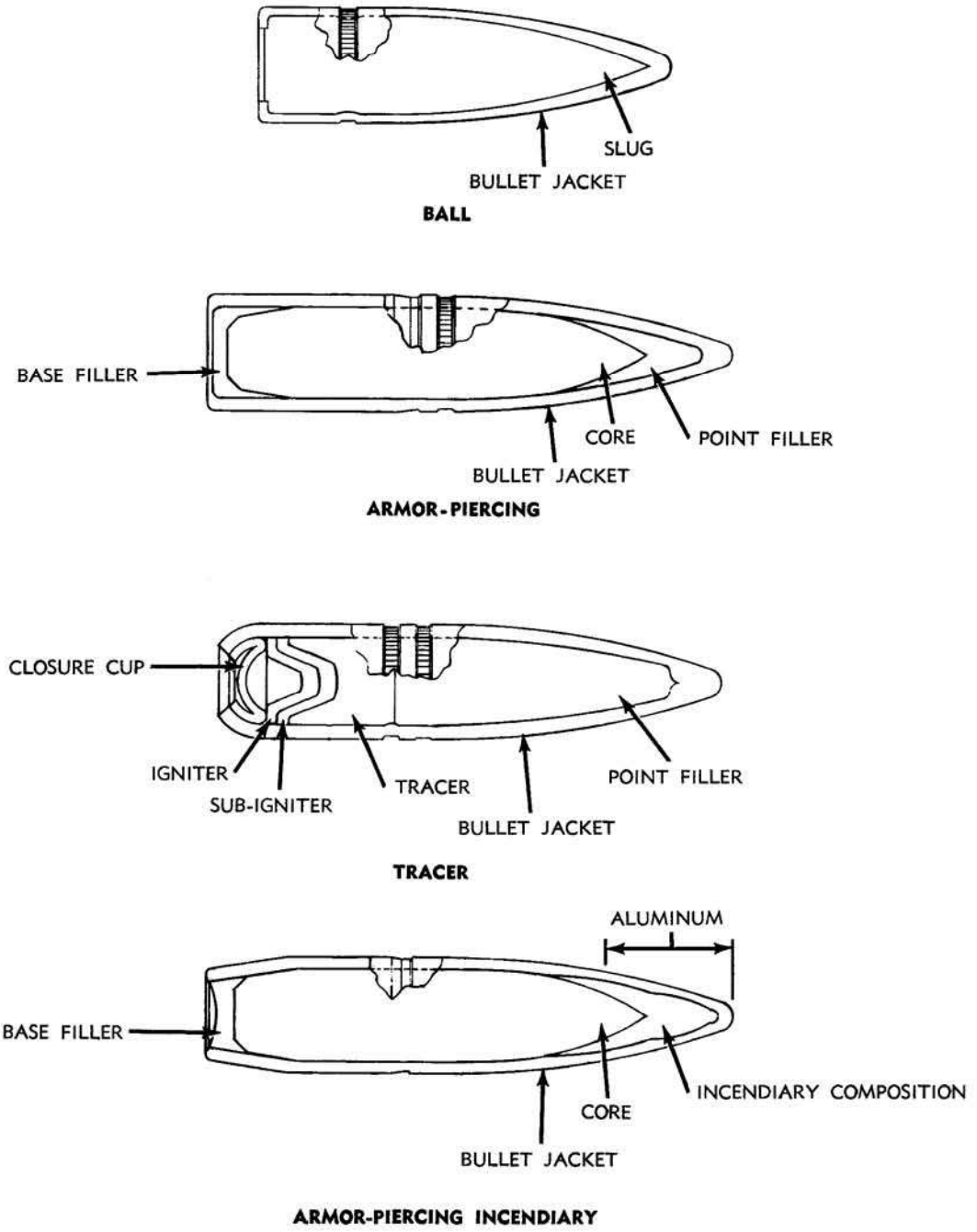


Figure 4. Caliber .30 bullets (sectional)

Figure 5. 7.62mm cartridges

Figure 6. 5.56mm cartridges

Propellant. Cartridges are loaded with varying weights of propellant. This is to impart sufficient velocity (within safe pressures) to the projectile to obtain the required ballistic performance. These propellants are either of the single-base (nitrocellulose) or double-base (nitrocellulose and nitroglycerine) type. The propellant grain configuration may be cylindrical with a single, lengthwise perforation, spheroid (ball) or flake. Most propellants are coated with a deterrent (to assist in controlling the rate of combustion) and with a final coating of graphite (to facilitate flow of propellant and eliminate static electricity in loading cartridges).

Primer. Small-arms cartridges contain either a percussion or electric primer. The percussion primer consists of a brass or gilding metal cup that contains a pellet of sensitive explosive material secured by a paper disk and a brass anvil. The electric primer consists of an electrode button in contact with the priming composition, a primer cup assembly and insulator. A blow from the firing pin of the weapon on the center of the percussion primer cup base compresses the primer composition between the cup and the anvil. This causes the composition to explode. The function of the electric primer is accomplished by a firing pin with electrical potential, which contacts the electrode button. This allows current to flow through the energy-sensitive priming composition to the grounded primer cup and cartridge case, exploding the priming composition. Holes or vents in the anvil or closure cup allow the flame to pass through the primer vent in the cartridge case and ignite the propellant. Rimfire ammunition, such as the caliber .22 cartridge, does not contain a primer assembly. Instead, the primer composition is spun into the rim of the cartridge case and the propellant is in intimate contact with the composition. On firing, the firing pin strikes the rim of the cartridge case, compressing the primer composition and initiating its explosion.

Bullet. With few exceptions, bullets through caliber .50 are assemblies of a jacket and a lead or steel core. They may contain other components or chemicals which provide the terminal ballistic characteristics of the bullet type. The bullet jacket may be either gliding metal, gliding-metal clad steel, or copper plated steel. Caliber .30 and 7.62mm frangible bullets are molded of powdered lead and a friable plastic which pulverizes into dust upon impact with the target. The pellets used in the shotgun shells are spheres of lead alloys varying from 0.08 inch to 0.33 inch in diameter.

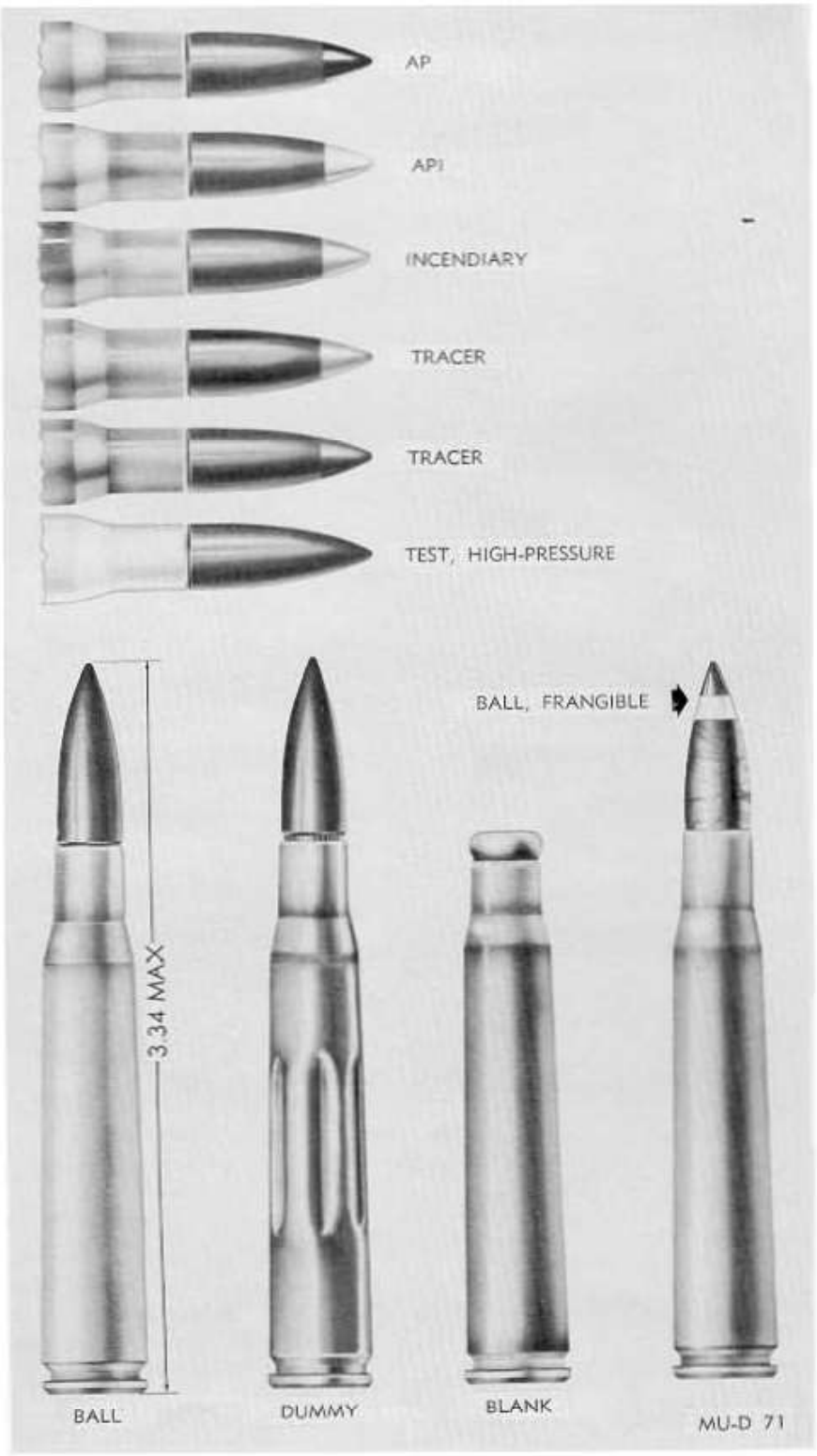


Figure 7. Caliber .30 cartridges

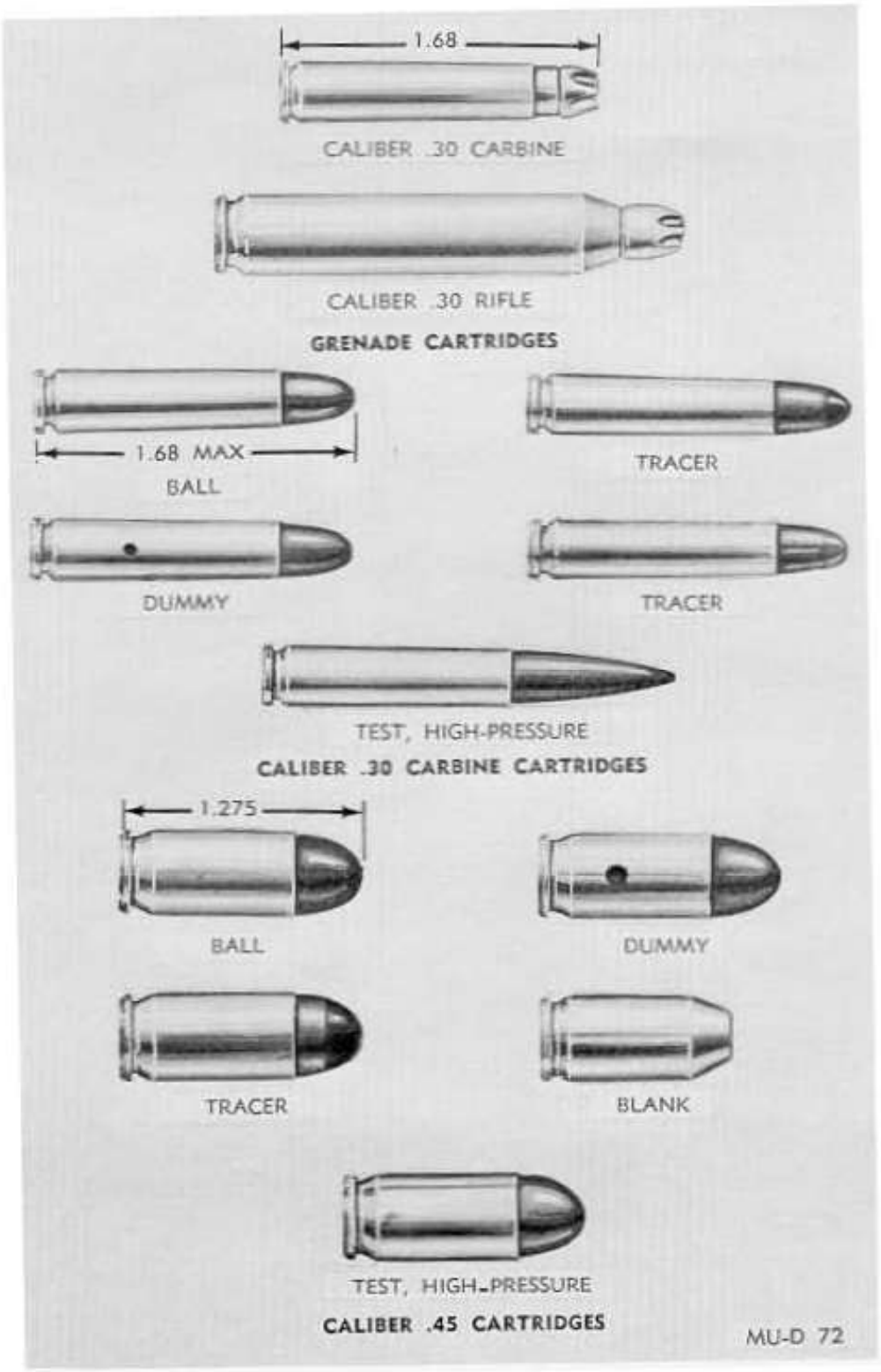


Figure 8. Caliber .30 carbine and caliber .45 cartridges

Figure 9. Caliber .50 cartridges

Ball Cartridge. The ball cartridge is intended for use in rifles, carbines, pistols, revolvers and/or machineguns against personnel and unarmored targets. The bullet, as designed for general purpose combat and training requirements, normally consists of a metal jacket and a lead slug. Caliber .50 ball bullet and 7.62-mm, Ball M59 bullet contain soft steel cores.

Tracer Cartridge. By means of a trail of flame and smoke, the tracer cartridge is intended to permit visible observation of the bullet's in-flight path or trajectory and the point of impact. It is used primarily to observe the line of fire. It may also be used to pinpoint enemy targets to ignite flammable materials and for signaling purposes. The tracer element consists of a compressed, flammable, pyrotechnic composition in the base of the bullet. This composition is ignited by the propellant when the cartridge is fired. In flight, the bullet emits a bright flame which is visible to the gunner. Trace burnout occurs at a range between 400 and 1,600 yards, depending upon the caliber of ammunition.

Match Cartridge. The match cartridge is used in National and International Match Shooting competitions. The bullet consists of a gliding-metal jacket over a lead slug. The cartridges are identified on the head face with the designation NM (National Match) or Match.

Armor-Piercing Cartridges. The armor-piercing cartridge is intended for use in machine-guns or rifles against personnel and light armored and unarmored targets, concrete shelters, and similar bullet-resisting targets. The bullet consists of a metal jacket and a hardened steel-alloy core. In addition, it may have a base filler and/or a point filler of lead.

Armor-Piercing-Incendiary Cartridge. The armor-piercing-incendiary cartridge is used in rifles or machineguns as a single combination cartridge in lieu of separate armor-piercing and incendiary cartridges. The bullet is similar to the armor-piercing bullet, except that the point filler is incendiary mixture instead of lead. Upon impact with the target, the incendiary mixture burst into flame and ignites flammable material.

Armor-Piercing-Incendiary Tracer Cartridge. The bullet of the armor-piercing- incendiary-tracer cartridge combines the features of the armor-piercing, incendiary, and tracer bullets and may be used to replace those cartridges. The bullet consists of a hard steel core with compressed pyrotechnic mixture in the cavity in the base of the core. The core is covered by a gilding-metal jacket with incendiary mixture between the core point and jacket. This cartridge is for use in caliber .50 weapons only.

Duplex Cartridge. The duplex cartridge contains two special ball type bullets in tandem. The front bullet is positioned partially in the case neck, similarly to a standard ball bullet. The rear bullet, positioned completely within the case, is held in position by a compressed propellant charge. The base of the rear bullet is angled so that in flight, it follows a path slightly dispersed from that of the front bullet.

Spotter-Tracer Cartridge. The spotter-tracer cartridge is intended for use in coaxially mounted caliber .50 spotting rifles. The bullet trajectory closely approximates that of

106mm projectiles. Thus, this cartridge serves as a fire control device to verify weapon sight settings before firing 106mm weapons. The bullet contains an impact detonator and incendiary composition which identify the point of impact by flash and smoke.

Blank Cartridge. The blank cartridge is distinguished by absence of a bullet. It is used for simulated fire, in training maneuvers, and for saluting purposes. It is fired in rifles and machineguns equipped with blank firing attachments.

Grenade Cartridge. The grenade cartridge is used to propel rifle grenades and ground signals from launchers attached to rifles or carbines. All rifle grenade cartridges are distinguished by the rose petal (rosette crimp) closure of the case mouth.

Frangible Cartridge. The caliber .30 frangible cartridge, designed for aerial target training purposes, is also used in rifles and machineguns for target shooting. Caliber .30 and 7.62mm frangible cartridges are used in tank machineguns, firing single shot, for training in tank gunnery. At its normal velocity, the bullet, which is composed of powdered lead and friable plastic, will completely disintegrate upon striking a 3/16-inch aluminum alloy plate at 100 yards from the muzzle of the gun. These cartridges are not to be used on any but well ventilated indoor ranges to preclude buildup of toxic bullet dust. Inhalation of bullet dust may be injurious to health.

Incendiary Cartridge. The incendiary cartridge was designed for aircraft and ground weapon use to ignite combustible targets (e.g., vehicular and aircraft fuel tanks). The bullet contains a compressed incendiary mixture which ignites upon impact with the target. The incendiary cartridge has been superseded by the API and APIT cartridges because of their improved terminal ballistic effects.

Special Purpose Cartridge

Cartridges of various calibers. (figures. 10 through 12), which consist of different types of projectiles and bullets, are used for training and special purposes. They include the following:

(1) Caliber .22 long rifle and caliber .38 and .45 wad-cutter cartridge for target shooting.

(2) Caliber .45 blank cartridges fired in exercises to condition dogs to gun fire.

(3) Caliber .22 hornet and .410 shotgun cartridges for firing in Air Force combination (survival) weapons for hunting purposes.

(4) Caliber.45 line-throwing cartridges for firing in caliber .45 line-throwing rifles. The Navy uses these for throwing lines from ship-to-ship. The Army Signal Corps uses these for projecting signal wires over elevated terrain.

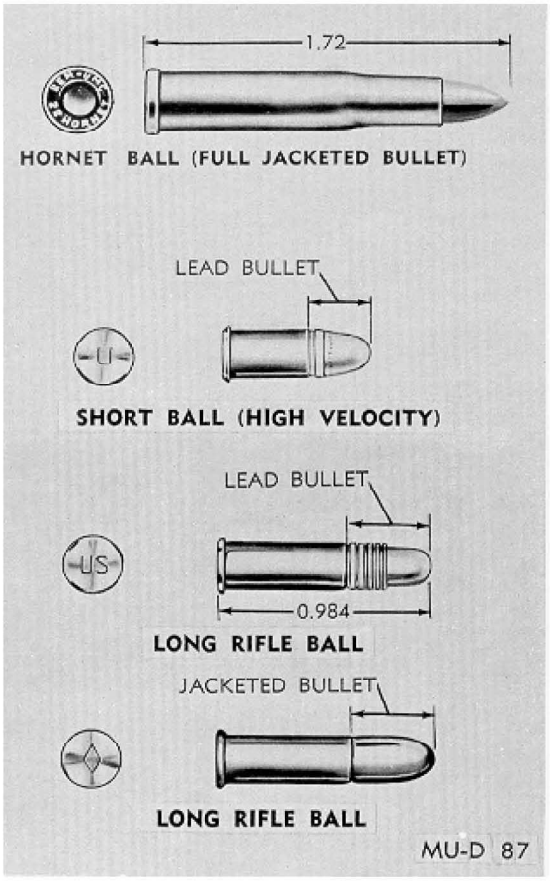


Figure 10. Caliber .22 cartridges

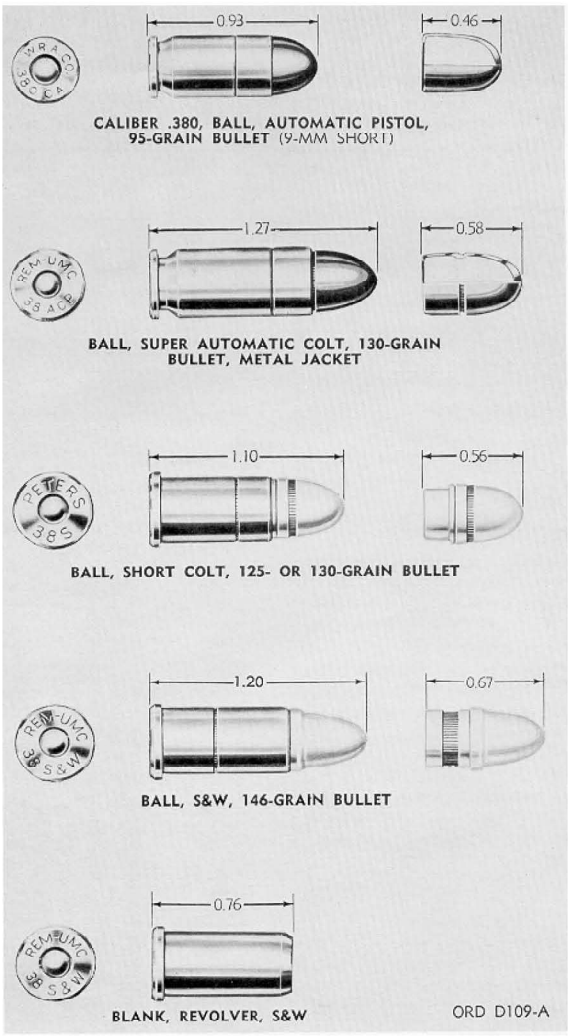


Figure 11. Caliber .38 cartridges

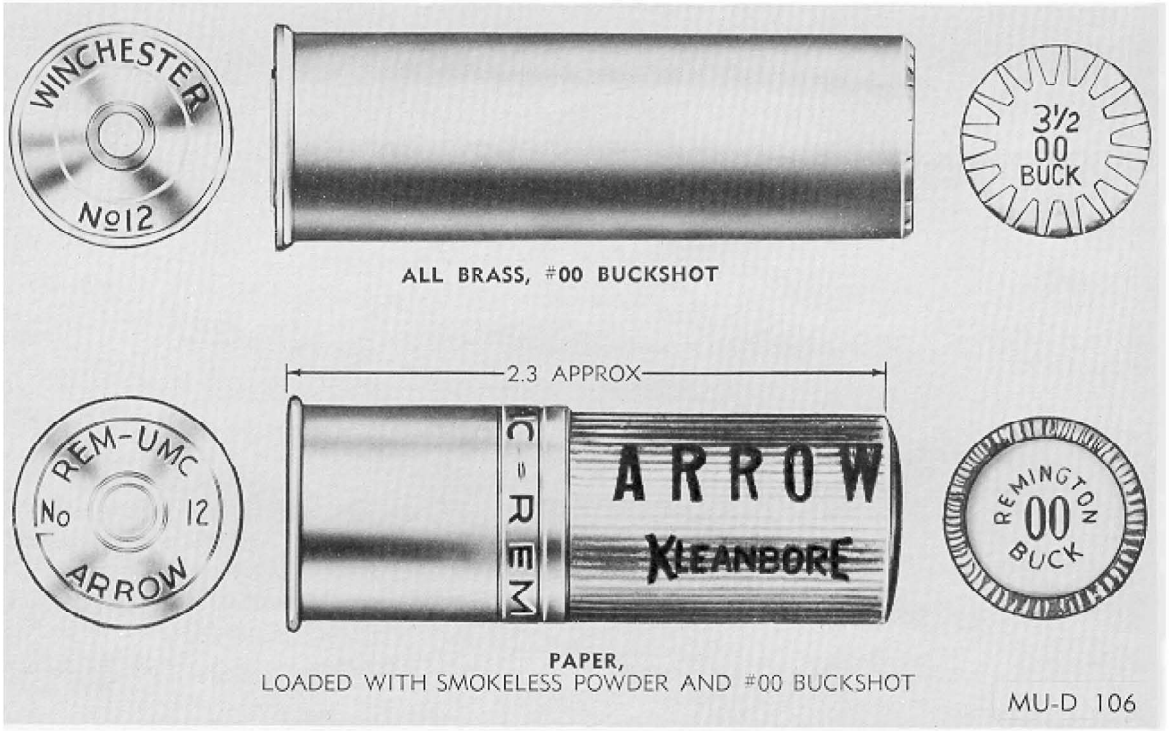


Figure 12. 12 gage shotgun shells

(5) Shotshells containing the designated shot sizes as required for the following:

12 gage #00 Buck for guard duty
12 gage #4 Buck for guerrilla purposes.
12 gage #6, 7½ and 8 shot for clay target shooting for training purposes.
.410 gage #7 shot for caliber .22/.410 survival weapons maintained by aircraft

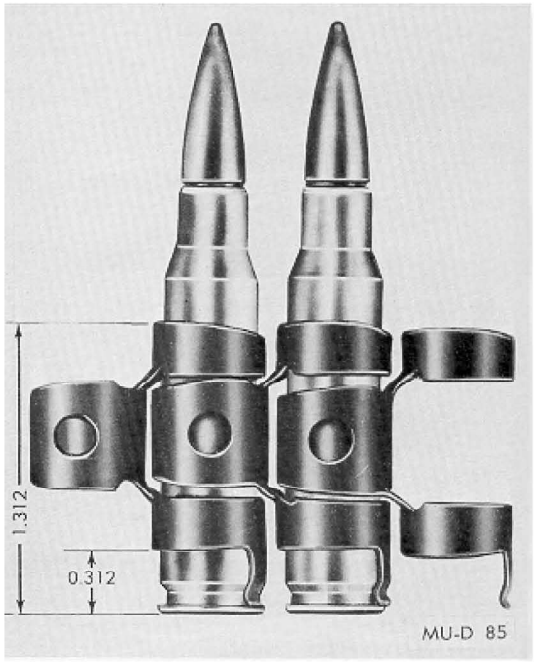


Figure 13. Linked 7.62-mm cartridges

Special purpose cartridges also include the following types of military cartridges:

(1) Dummy. The dummy cartridge is used for practice in loading weapons and simulated firing to detect flinching of personnel when firing weapons. It consists of a cartridge case and a ball bullet. Cartridge identification is by means of holes through the side of the case or longitudinal corrugations in the case and by the empty primer pocket.

(2) Dummy inert-loaded. This cartridge consists of a cartridge case, a ball bullet and inert granular material in the case simulating the weight and balance of a live cartridge. The exterior of the cartridge is identified by a black chemical finish and by the absence of a primer. This cartridge is used by installations for testing weapon function, linkage and feed chutes.

(3) High-pressure test. High-pressure test ammunition is specially loaded to produce pressures substantially in excess of the maximum average or individual pressures of the corresponding service cartridge. This cartridge is not for field issue. It is used only by armorers and weapons mechanics for proof firing of weapons (rifles, pistols, machine guns) at place of manufacture, test and repair. Because of excessive pressures developed by this type of ammunition, and the potential danger involved in firing, proofing of weapons is conducted only by authorized personnel from fixed and shielded rests by means of a lanyard or other remote control methods.

Metallic Links and Clip

Metallic links. (figures. 13 and 14) are used with caliber .30, caliber .50, 5.56mm, 7.62mm and 20mm cartridges in machine guns. The links are made of steel, surface treated for rust prevention. They are used to assemble cartridges into linked belts of 100 to 750 cartridges per belt. The links must meet specific test and dimension requirements to assure satisfactory ammunition feed and functioning in the machine gun under all training and combat service conditions.

Different configurations of cartridge clips. These permit unitized packages of ammunition. This facilitates transfer of cartridges to appropriate magazines for caliber .30, 7.62mm and 5.56mm rifles. The caliber .30 eight-round clip feeds eight cartridges as a unit into the receiver of the rifle. The caliber .45 clip feeds three cartridges as a unit into the revolver cylinder. Five-round and eight-round clips are used with caliber .30 cartridges; five-round clips with 7.62mm cartridges; ten- round clips with caliber .30 carbine and 5.56-mm cartridges; and three-round clips with caliber .45 cartridges.

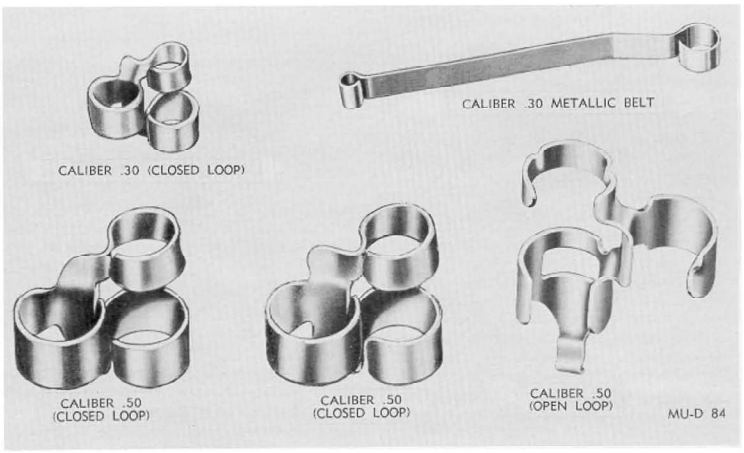


Figure 14. Links for caliber .30 and caliber .50 ammunition

Identification Markings. Each outer shipping container and all inner containers are fully marked to identify the ammunition. Wire- bound boxes are marked in black and ammunition boxes are painted olive drab, with markings in yellow. When linked ammunition is functionally packed, component lot numbers are replaced by a functional lot number. Typical packing and identification markings are illustrated in figures 15 through 17.

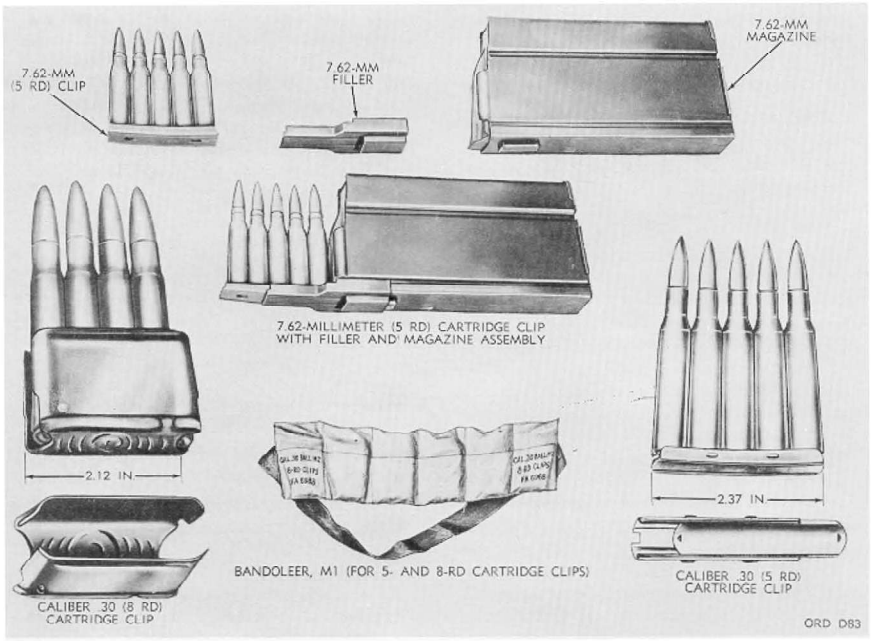


Figure 15. Cartridges, links, belt, cartons, bandoleers and ammunition box

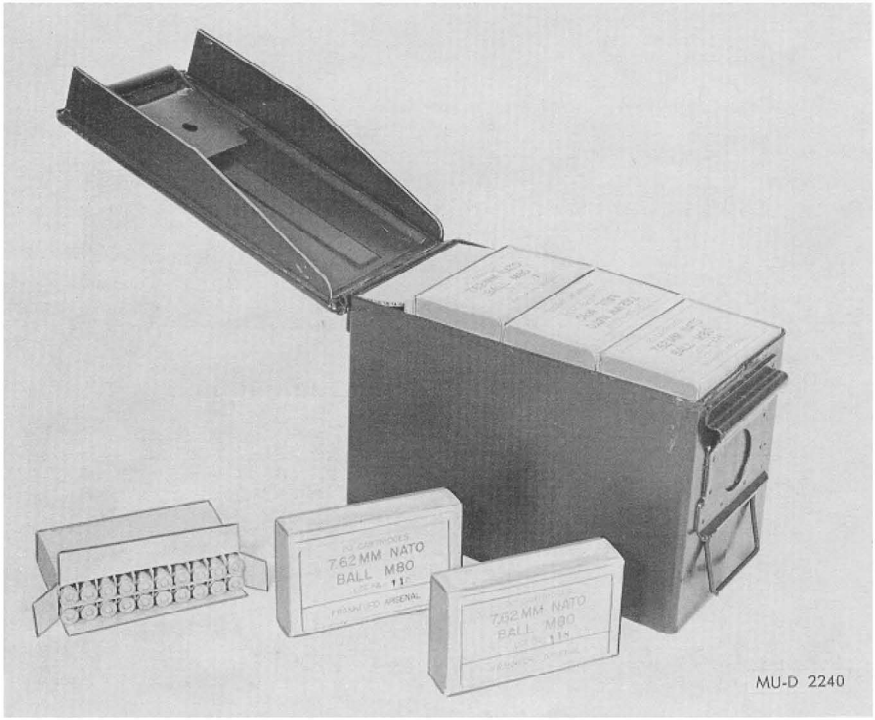


Figure 16. Cartridges, link belt, cartons, bandoleers and ammunition box

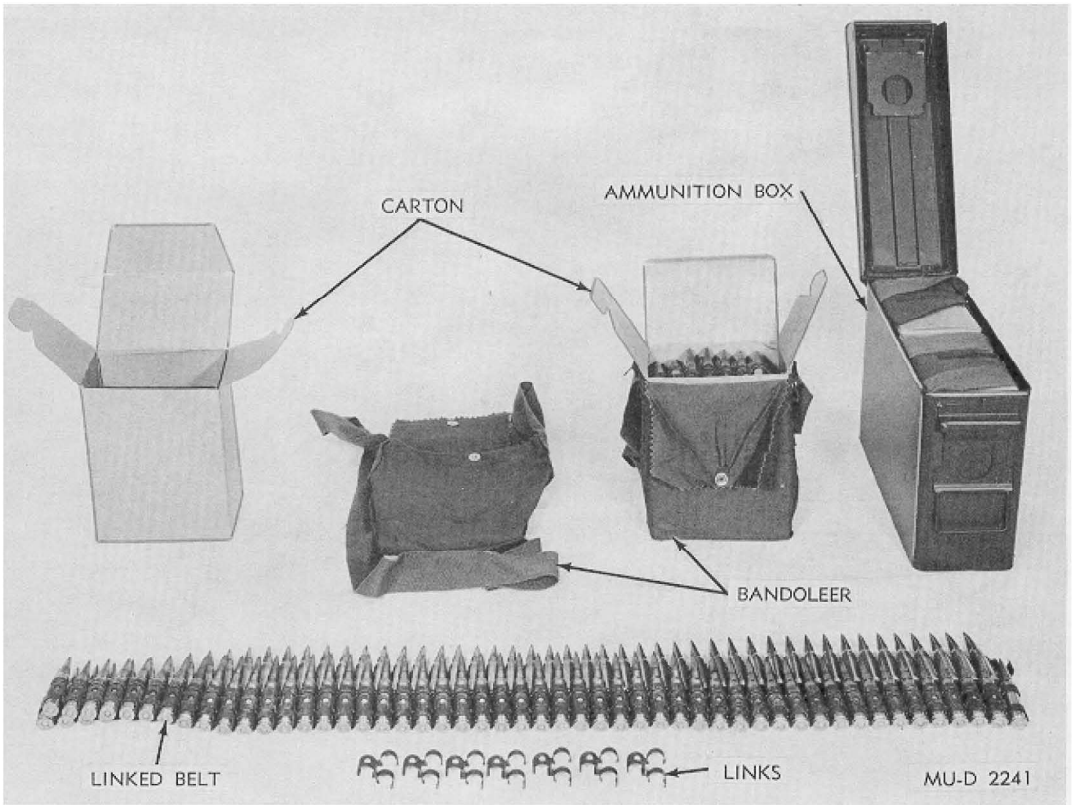


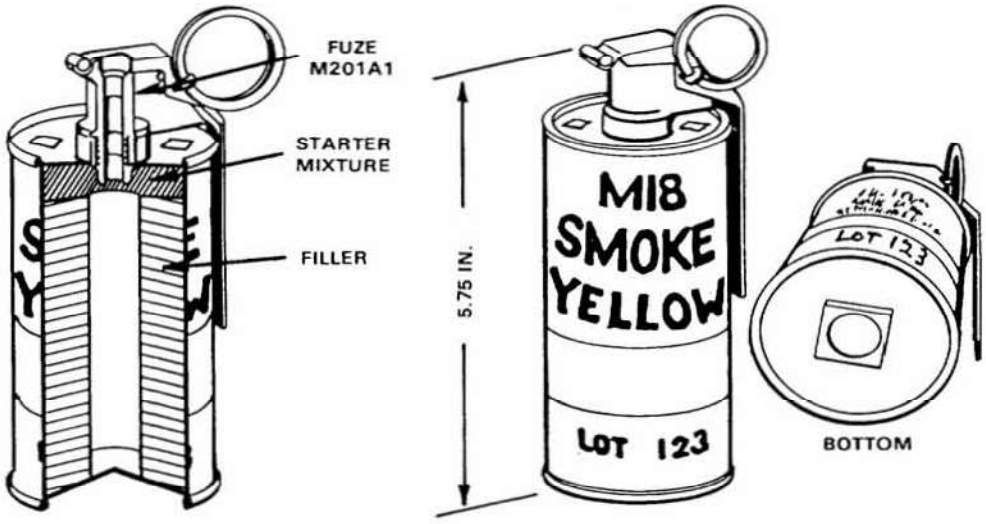
Figure 17. Cartridges, link belt, cartons, bandoleers and ammunition box

Care, Handling and Preservation

Small-arms ammunition is comparatively safe to handle. It is packed to withstand transportation, handling and storage conditions normally encountered in the field. However, consideration should be given to general handling precautions pertaining to ammunition and explosives.

Reference: This data is a reprint of Chapter 3, TM 9-1300-200, *Ammunition General,* October 1969

GRENADE, HAND, SMOKE, M18, WITH FUZE, M201, M201A1



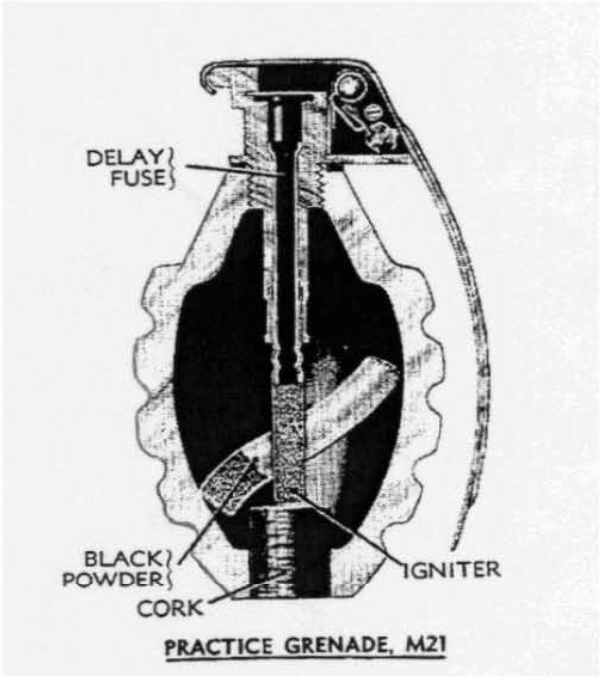
Description. These grenades may be filled with any one of seven smoke colors; red, orange, blue, green, black, violet, and yellow. The grenade body is of thin sheet metal and filled with a smoke composition. Emission ports are covered with small squares of adhesive tape and vary in quantity and location depending on the year of manufacturing.

The Fuze M201 and M201A1 is a pyrotechnic delay-igniting fuze. The body contains a primer, first fire mixture, pyrotechnic delay column, and ignition mixture

Length .....5.75 inches
Diameter .....2.5 inches
Color.....Blue gray or light green with black markings
Weight.....19 ounces
Filler .....Smoke composition
Weight of filler.....11.5 ounces
Fuze.....M201A1

Reference: TM 43-0001-29 w/change 11, *Ammunition Data Sheets for Grenades*, October 1977; NAVSEA OP 1664, *U.S. Explosive Ordnance*, May 47

GRENADE, HAND, PRACTICE, M21



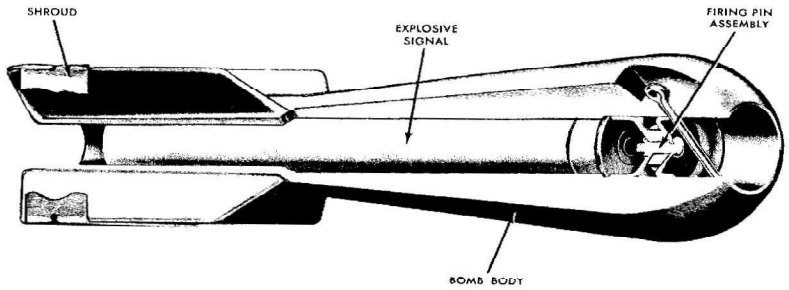
Description and Use. The M21 practice grenade is made of cast iron and is the same shape, size, and weight as a loaded fragmentation Hand Grenade Mk II. The fuze for the grenade has a primer, a combustible time-delay train and igniter. When the grenade is thrown, the safety lever is pushed off by the striker, allowing the striker to impact against the primer. The primer ignites the time-delay train and, after 4 or 5 seconds, the igniter initiates the black powder. The black powder contained in a cloth tube and is inserted into the filling hole, which is closed with a cork.

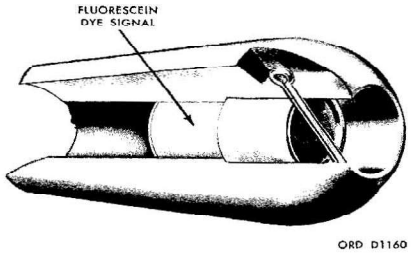
This grenade is later known as the Grenade, Practice, Mk11.

Length .....4.5 inches
Diameter .....2.25 inches
Weight.....21 ounces
Filler .....Black powder

Reference: TM 9-1900, *Ammunition General*, June 1945; FM 23-30, *Hand and Rifle Grenades*, April 1949

MINIATURE PRACTICE BOMBS
AN-Mk 5 Mod 1, AN-Mk 23, AN-Mk 43



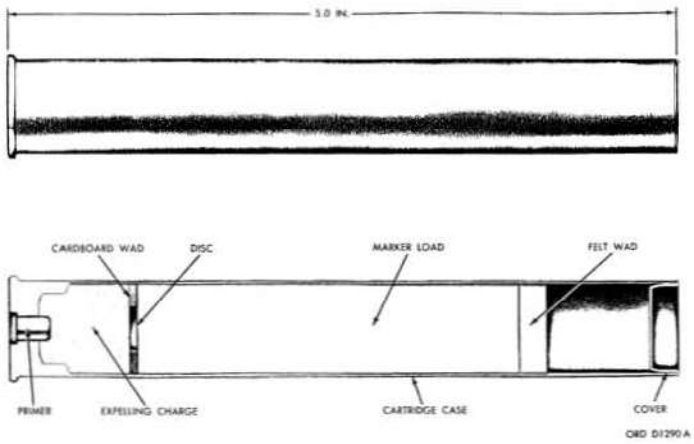


Description. These bombs are used for low-altitude horizontal, or dive-bombing practice. The three bombs are similar in physical appearance, but differ basically in the metal used to cast the body. Bombs are used with the AN-Mk 4 practice bomb signal that is a blank 10-gauge shotgun shell (extended length). Signals contain a black powder expelling charge and a red phosphorous pyrotechnic mixture. These bombs also are used with the MK5 signal that contains a fluorescein dye and is actuated by impact on water. When the Mk5 signal is installed, the firing pin assembly is not used.

Over-all length	8.25 inches
Body Diameter	2.18 inches
Fin Dimension	2.5 inches
Weight	AN-Mk 5 Mod 1 - 2 lb. 11 oz. + 1 oz AN-Mk 23 -3 lb. + 2 oz AN-Mk 43 - 4 lb. 7 oz. + 2 oz.
Signal	AN-Mk 4, Black powder/pyro-Technic charge Mk 5, Fluorescein dye

Reference: OP 1280, *Aircraft Bombs*, February 1945; TM 9-1325-200, *Bombs and Bomb Components*, April 1966

SIGNAL, PRACTICE BOMB, Mk 4 Mod 3 & 4



Description. Practice Bomb signals Mk 4 Mods 3 and 4 are essentially 10-gauge shotgun shells. They contain an expelling charge of smokeless powder and are primed with a commercial primer. A pyrotechnic or inert marker load is separated from the expelling charge by a disc and cardboard gun wad. Felt gun wads that are cemented to the cover close the end of the shell.

Use. The signals are used in either the miniature or the larger practice bombs. However, installed in the miniature practice bombs, the signals do not consistently produce a visible signal when dropped from an altitude of 10,000 feet or higher. Released from that heigh, the bomb enters the water or earth so quickly that the signal frequently does not have time to function.

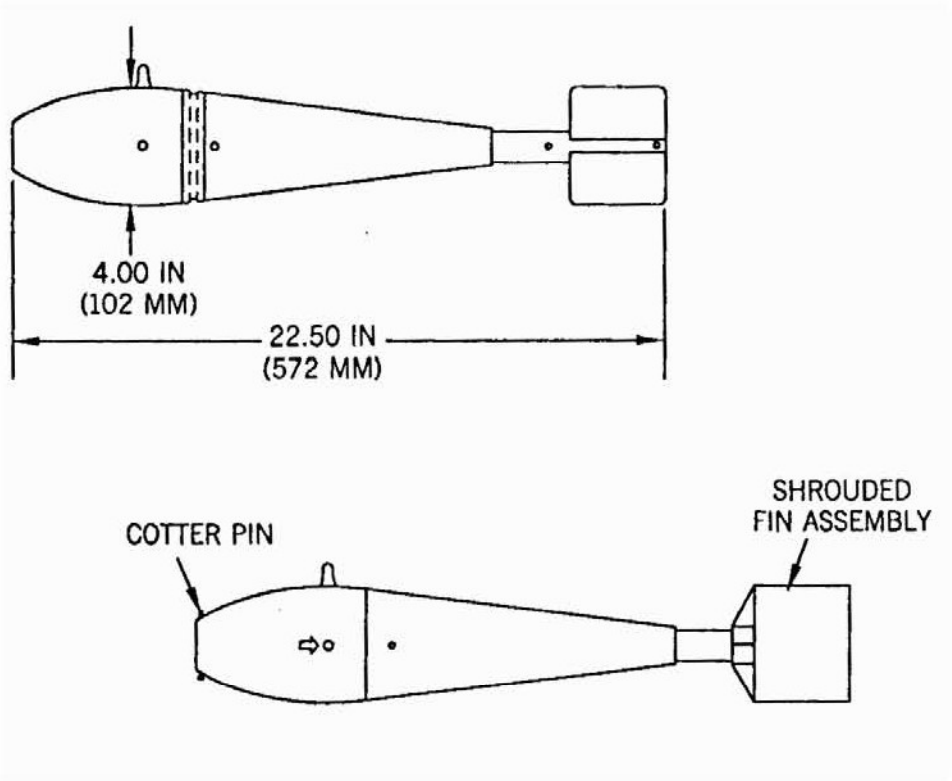
Functioning. When the practice bomb in which the signal is installed strikes water or the earth, impact causes the firing pin in the nose of the bomb to impinge upon the primer of the signal. The primer ignites the expelling charge, forcing the marker load out through an opening in the bomb. The resulting flash and puff of white smoke permit observation of bombing accuracy.

Differences. Signals Mk 4 Mod 0 was the first of this type developed. Mods 1 and 2 were procured later for issue to activities limited by environment to performing practice bombing in the vicinity of flammable areas. These signals contain inert materials that produce very little flash and are markedly inferior to the Mod 0. Mod 3 is similar to the Mod 0 but differs in that the cartridge case of the Mod 3 is extruded aluminum instead of paper; a primer mixture with improved storage characteristics has been used, a new pyrotechnic load has been incorporated. The Mod 4 signal is similar to the Mod 3 with the exception of an inert marker load of zinc oxide. In both Mods, the cover and cartridge case are cemented together; in Mod 3 the assembly also is staked in four equally spaced places.

Length and diameter.....6.0 in by 0.85 in
Expelling charge.....Smokeless powder
Marker load.....Mod 3 Stabilized Red Phosphorous
Mod 4 Zinc Oxide

Reference: TM 9-1325-200, *Bombs and Bomb Components*, April 1966

PRACTICE BOMB, BDU-33 series

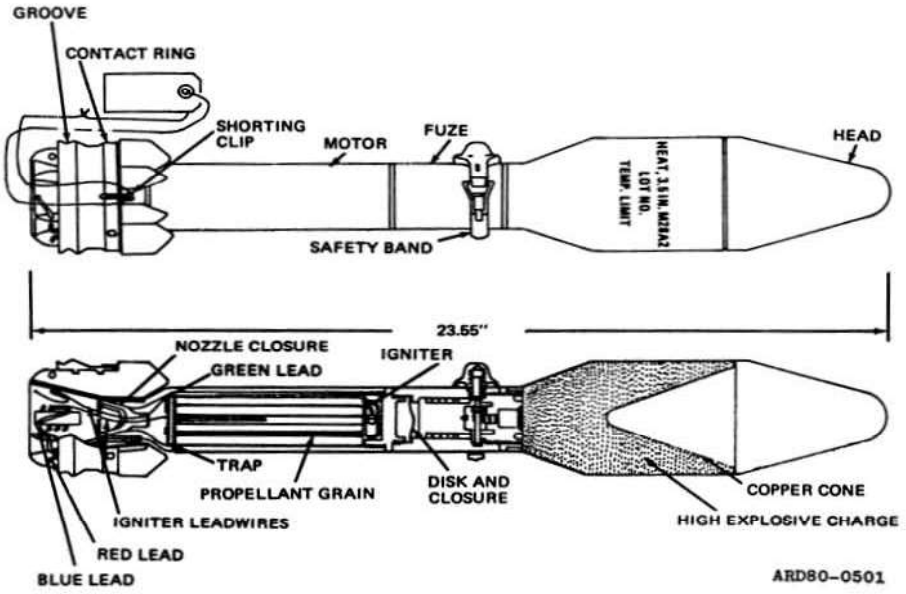


Description. These bombs are signal generating, impact-or impact-inertia-fired practice/simulated bombs. The BDU-33-series bombs are painted light blue; additionally, the BDU-33/B has white arrowheads and white-stenciled markings. The BDU-33A/B, 33B/B, and 33D/B have white stenciled markings only. The bombs contain a signal cartridge or spotting charge. The BDU-33-series bombs are cast iron with sheet steel fin assemblies.

Over-all length.....22.5 inches
Body Diameter.....4.0 inches
Weight 25 pounds
Signal .....MK 4 Mod 3 & 4
Filler
Mod 3 .....Smokeless powder /Red Phosphorous
Mod 4 .....Smokeless powder / Zinc Oxide

Reference: Department of Defense ORDATA II Version 1.0

ROCKET, HEAT, 3.5 INCH, M28A2



Description. This is a high-explosive antitank rocket. The complete round is an assembly consisting of a head, fuze, motor, nozzle and fin assembly.

Head. The head, which contains the explosive charge (composition B, 1.82 lb.), is of light steel construction. It is cylindrical in shape, 3.5 inches in diameter, with a conically shaped ogive, and tapers to 2 inches in diameter at the rear. It contains an internal cone, which provides for shaping the explosive charge. The rear of the head is threaded internally for attachment of base detonating fuze.

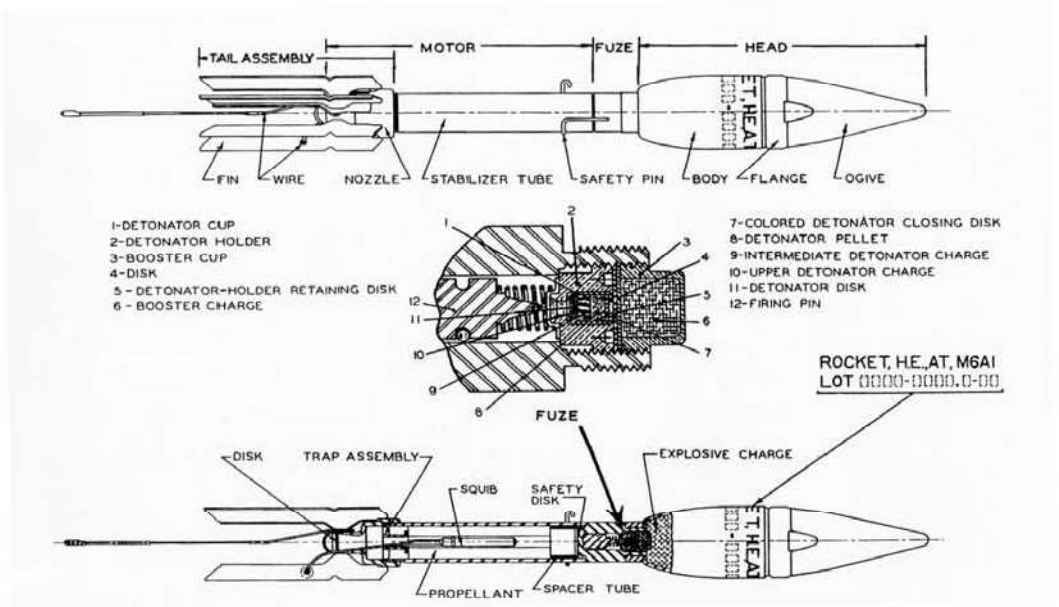
Fuze. The base-detonating fuze is of the simple inertia type which functions with non-delay action upon impact. The explosive train includes a detonator and a booster. An ejection pin, which passes through the fuze body and prevents movement of the internal parts, is provided to preclude accidental functioning during shipment, handling, and firing. The safety band covers the head of the ejection pin and prevents it from moving shipping and handling.

Motor. The motor consists of a body, closure, trap and spacer assembly, propellant, igniter with electric squib and leads, nozzle closure, and nozzle and fin assembly.

Over-all length.....23.67 inches
Diameter .....3.5 inches
Weight.....8.61 pounds
Filler .....Comp B
Filler weight.....1.82 pound
Propellant .....M7 propellant powder
Propellant weight.....12 grains
Igniter.....M20

Reference: TM 9-1950, Rockets, July 1950, TM 43-0001-30, Army Data Sheets, Rockets, Rockets Systems, Rocket fuzes, Rocket Motors, December 1981

ROCKET, 2.36-INCH ANTITANK, M6A1



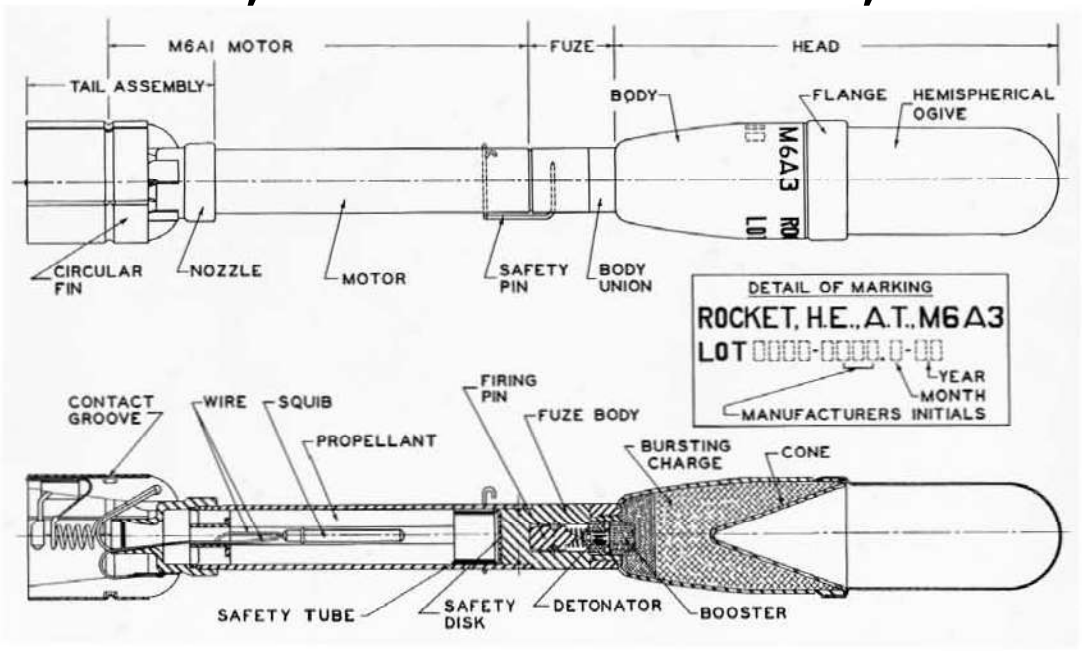
Use. Pill boxes, tanks, and armored vehicles are prime targets. The rocket can also be used in a stationary emplacement for demolition or as an anti-tank mine or booby trap.

Description. The Rocket is 21½ inches long and weighs 3½ pounds. The rocket consists of the high-explosive head, the stabilizer tube and the fin assembly. The head contains a shape-charge containing a composition, which is mainly 50/50 pentolite with a 10/90 pentolite booster surround. The stabilizer tube consists of the fuze body, which contains the fuze mechanism, and the powder tube contains the propellant charge. The fuze consists of a steel firing pin, which slips into the central cavity of the fuze body, where it is held in a rearward position by the firing-pin spring. When the safety pin is removed, the firing pin will overcome the spring and detonate the rocket if dropped over four feet. The fin assembly consists of the nozzle, the trap and six metal fins. The rocket is painted lusterless olive drab and stenciled in yellow.

Over-all Length	21.6 inches
Diameter (body)	2.23 inches
Total Weight	3.5 pounds
Filler	Pentolite
Propellant	ballistite
Fuze	M400
Painting and markings	M6A1- olive drab w/ yellow markings, M7A1- black w/ white markings

References: TM 9-1904, *Ammunition Inspection Guide*, March 1944; OS 9-69, *Ordnance School Text, Rockets & Launchers*, February 1944

ROCKET, 2.36-INCH ANTITANK, M6A3



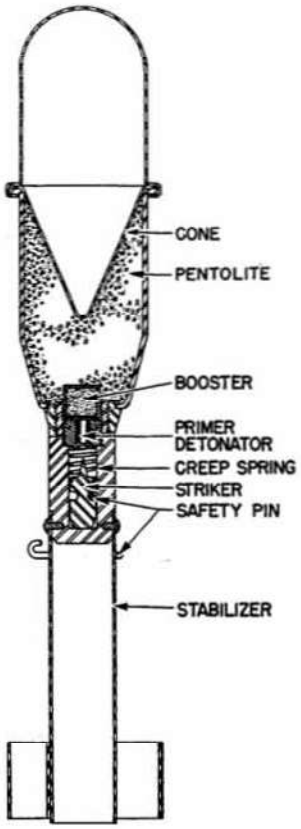
Use. Pill boxes, tanks, and armored vehicles are prime targets. The rocket can also be used in a stationary emplacement for demolition or as an anti-tank mine or booby trap. The M6A3 is a replacement for the M6A1 rocket.

Description. The rocket consists of the high-explosive head, the stabilizer tube and the fin assembly. The head contains a shape-charge containing a composition, which is mainly 50/50 pentolite with a 10/90 pentolite booster surround. The stabilizer tube consists of the fuze body, which contains the fuze mechanism, and the powder tube contains the propellant charge. The fuze consists of a steel firing pin, which slips into the central cavity of the fuze body, where it is held in a rearward position by the firing-pin spring. When the safety pin is removed, the firing pin will overcome the spring and detonate the rocket if dropped from as little as 4 feet. The fin assembly consists of the nozzle, the trap and six metal fins. The rocket is painted lusterless olive drab and stenciled in yellow.

Over-all Length.....21.6 inches (approx.)
Diameter (body).....2.245 inches
Total Weight.....3.5 pounds (approx.)
Filler.....Pentolite
Propellant.....Ballistite
Fuze.....M400
Painting and markings.....Olive drab w/ yellow markings,

References: TM 9-1904, Ammunition Inspection Guide, March 1944; OS 9-69, Ordnance School Text, Rockets & Launchers, February 1944

RIFLE GRENADE, ANTI-TANK, M9A1



Description. Anti-Tank Grenade M9A1 consists of a body, a stabilizer assembly, and a fin. The body is cylindrical, the two pieces joined in the middle with rounded ends. The stabilizer is a hollow tube that screws into the base of the body and fits over the launcher. The body is made of cast metal. The impact fuze, which consists of a striker held away from the detonator by a creep spring and a safety pin, is assembled integrally with the stabilizer assembly. The safety pin projects through the fuze body and clamps around the stabilizer tube. When the pin is withdrawn, a drop of two feet, nose first, to a hard surface will cause the fuze to function.

Length .....11.24 inches
Diameter .....2.25 inches
Color.....Olive drab
Weight.....1.23 pounds
Filler .....Pentolite or TNT
Weight of filler.....4 ounces

Reference: NAVSEA OP 1664 Volume 1&2, U.S*. Explosive Ordnance*, February 1954

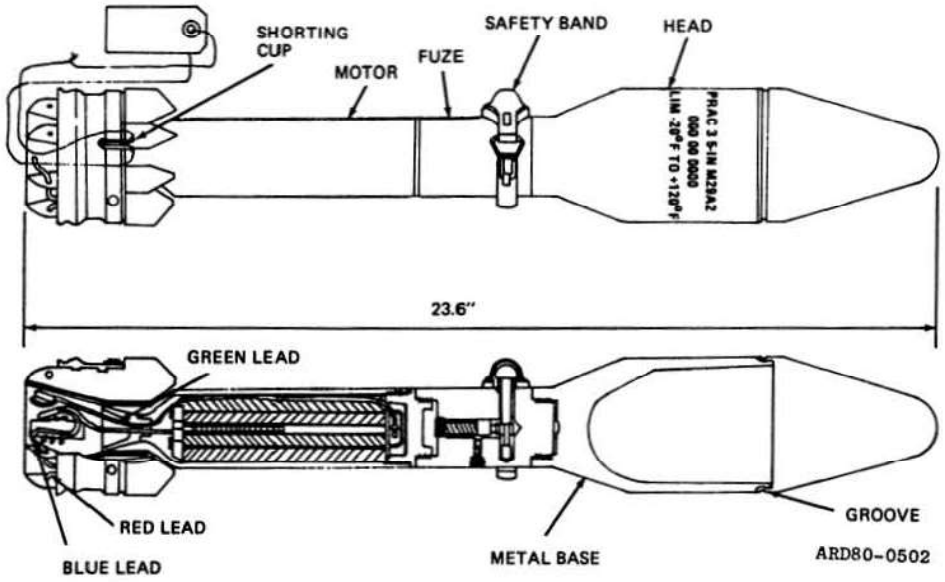
RIFLE GRENADE, PRACTICE, M11A2

Description and Use. This grenade simulates the Anti-Tank Grenade M9A1. The grenade consists of a body, a stabilizer assembly, and a fin. The body is cylindrical, the two pieces joined in the middle with rounded ends. The stabilizer is a hollow tube, which screws into the base of the body and fits over the launcher. The body is made of cast metal. It was so constructed that the fin and the ogive (upper body assembly), which are most liable to damage in use, may be replaced and the grenade used repeatedly. It is for training in marksmanship. This item is inert and contains no explosives. Except for color and filler, the grenade is identical to the tactical M9A1.

Length .....11.18 inches
Diameter .....2.25 inches
Filler .....INERT
Color.....Black

Reference: NAVSEA OP 1664, *U.S. Explosive Ordnance*, May 47

ROCKET, PRACTICE, 3.5-INCH, M29

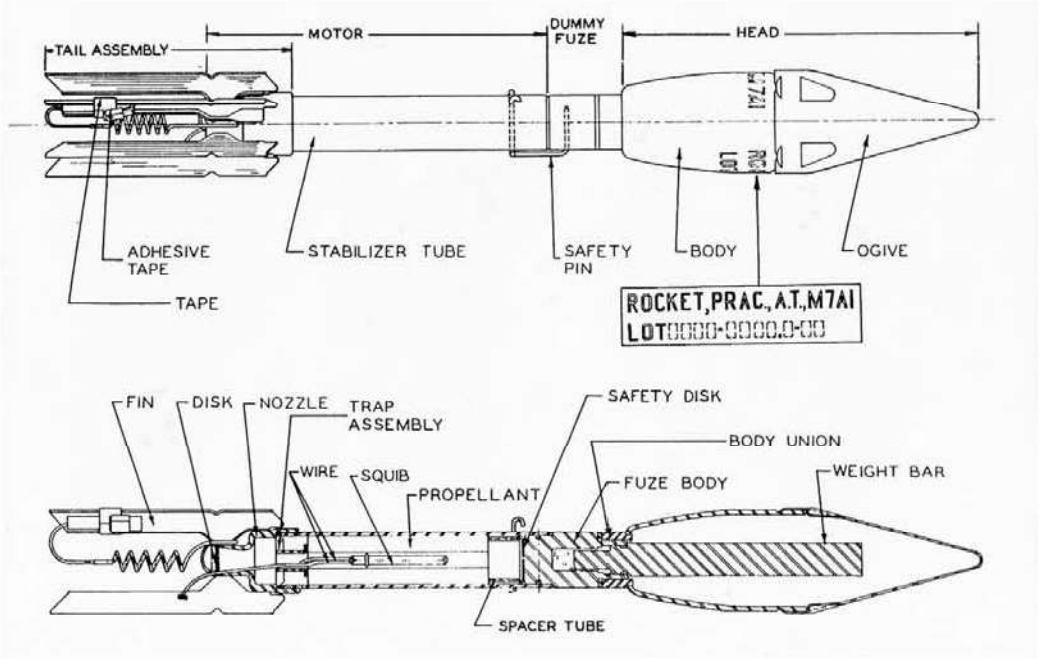


Description. This rocket generally is similar to the M28 High-explosive rocket except that it is provided with an inert bursting charge and the inert dummy fuze M405. The head is of light steel construction. It is cylindrical in shape, 3.5 inches in diameter, with a conically shaped ogive, and tapers to 2 inches in diameter at the rear. The rear of the head is threaded internally for attachment of dummy fuze M405. The rear of the fuze is threaded internally to receive the motor. The inert charge (plaster of paris and stearic acid) weighs 1.82 pounds. The motor consists of a body, closure, trap and spacer assembly, propellant, igniter with electric squib (cap) and leads, nozzle closure (blow out plug), and nozzle and fin assembly. Other characteristics are the same as for the M28.

Over-all Length.....23.67 inch
Diameter.....3.5 inch
Weight.....8.61 pound
Filler.....Plaster of paris/stearic acid
Propellant.....M7 propellant powder
Propellant weight.....12 grains
Igniter.....M20

Reference: TM 9-1950, Rockets, July 1950, TM 43-0001-30, Army Data Sheets, Rockets, Rockets Systems, Rocket fuzes, Rocket Motors, December 1981

ROCKET, 2.36-INCH, PRACTICE, M7A1

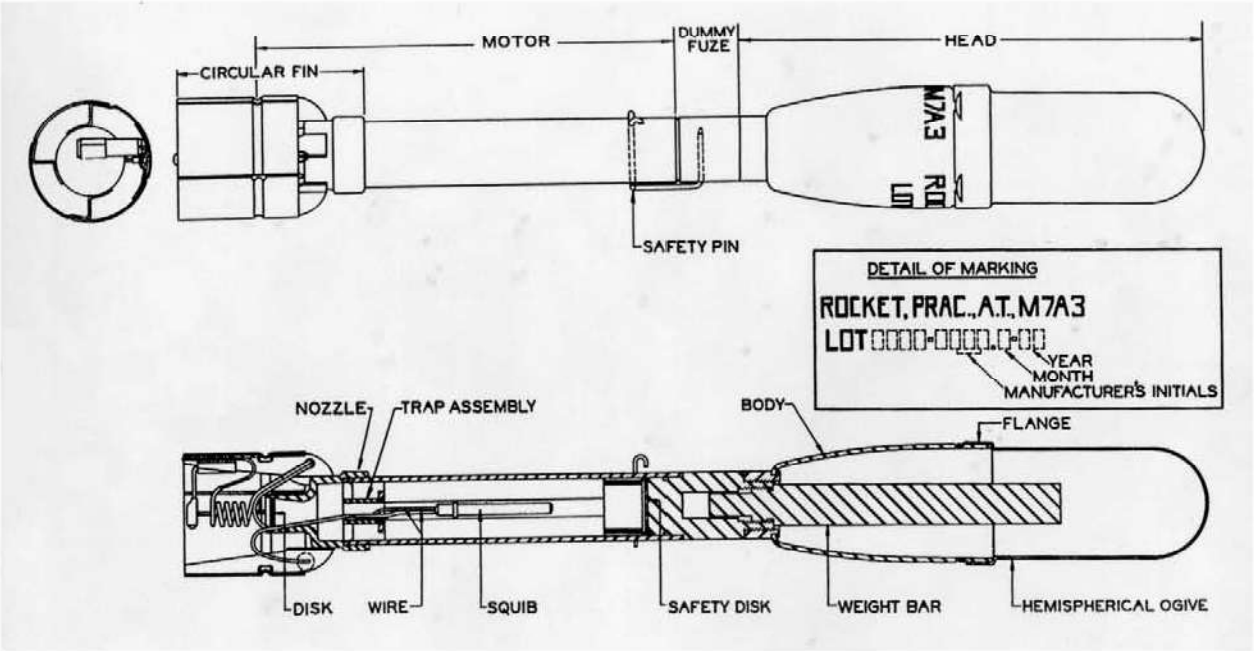


Description. The M7A1 rocket is similar in design and construction to the M6A1 rocket, lacking only an explosive charge. The head is inert and no fuze is provided, however it is provided with a live propellant. It has the same dimensions, weight, and trajectory as the service round. A steel rod, fitted into the fuze body, makes up for the weight of the explosive charge and fuse present in the M6A1 rocket. All other components of the M7A1 practice round are similar to the components of the M6A1 rocket. A safety pin passes through the stabilizer to simulate realism during training. The rocket is painted blue and stenciled in white.

Over-all Length.....21.6 inches
Diameter (body).....2.23 inches
Total Weight.....3.5 pounds (approx.)
Filler.....None
Propellant.....5 sticks of ballistite
Weight (average).....61.5 grams
Fuze.....None
Painting and markings.....Blue w/ white markings

References: TM 9-1904, Ammunition Inspection Guide, March 1944; OS 9-69, Ordnance School Text, Rockets & Launchers, February 1944

ROCKET, 2.36 INCH PRACTICE, M7A3, M7A4, M7A6

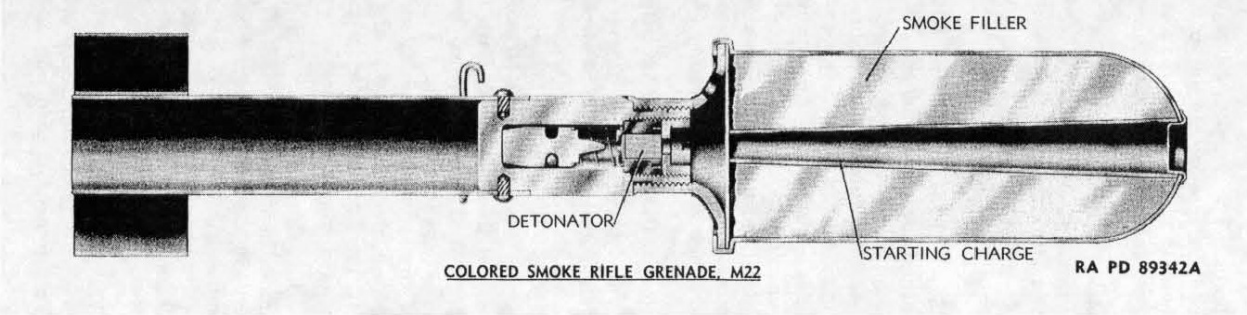


Description. The rockets are similar in design and construction to the service rounds, lacking only the explosive charge. The heads are inert and no fuzes are provided, however they are provided with live propellant. Each rocket has the same dimensions, weight, and trajectory as the H.E.. A weight bar, fitted into the fuze body, makes up for the weight of the explosive charge and fuse. All other components of the practice round are similar to the service round. A safety pin passes through the stabilizer to simulate realism during training. The rockets are painted blue and stenciled in white.

Length 21.6 inches (approx.)
Ogive Diameter (at flange) 2.245 inches
Filler None
Fuze Inert
Propellant
M7A3, M7A4.....Ballistite, 5 sticks
M7A6 M7 Powder
Weight (average) 63.5 grams
Color Blue with white markings

Reference: OS 9-69, *Ordnance School Text, Rockets & Launchers*, February 1944; NAVSEA OP 1664, *U.S. Explosive Ordnance*, January 1969

RIFLE GRENADE, SMOKE, WP, M19A1

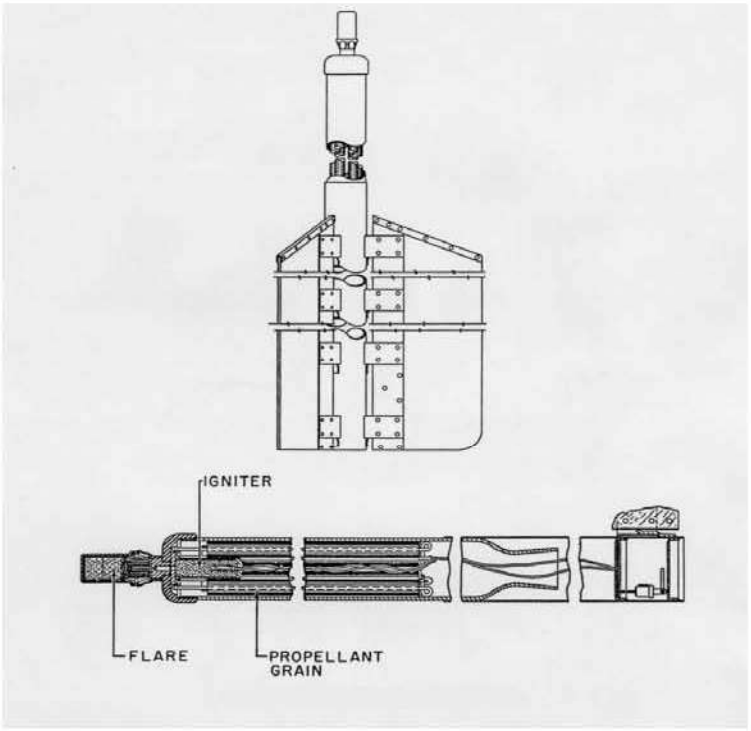


Description and Use. The grenade consists of a body, a stabilizer assembly, and a fin. The body is in one piece, cylindrical, with rounded ends. The stabilizer is a hollow tube, which screws into the base of the body and fits over the launcher. The impact fuze of the Anti-Tank Grenade M9A1 has been modified so that a long detonator that extends into the body of the grenade acts as a burster when the fuze operates. The fuze is an impact type, with the striker held off the detonator by a safety pin and a creep spring. The safety pin projects through the fuze body and clamps around the stabilizer tube. The explosion of the burster tube breaks the grenade and scatters burning white phosphorous over an area of 25 square yards.

Length .....11.31 inches
Diameter .....2.0 inches
Color.....Blue Grey
Weight.....1.57 pounds
Filler .....White Phosphorous

Reference: NAVSEA OP 1664, *U.S. Explosive Ordnance*, May 1947

ROCKET, TARGET, 3.25", M2



3.35-inch Target Rocket M2A2

Description. This rocket, target, A.A., 3.25", M2, was designed for use as a high-speed target for firing practice with automatic antiaircraft weapons. The rocket consists of a motor, a motor extension, a nose, and three plywood fins. The propellant is a solvent-extruded double-base powder (40% nitrocellulose) extruded into cylindrical sticks 5" long and 7/8" in diameter with a 5/16" hole through the center. The propelling charge is ignited by an electric squib assembled within the rocket.

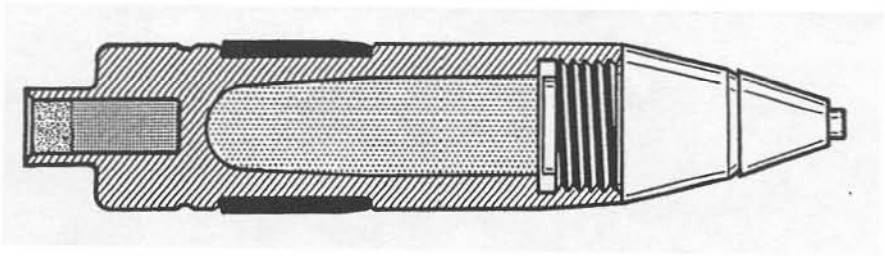
M2A1 When a flare is added to the rocket for antiaircraft target practice at night, the projectile is designated as M2A1. The flare burns for 30 seconds from the beginning of flight.

M2A2: This design has a flat nose, to which is threaded a yellow flare for both day and night tracking.

Length .....59 inches
Diameter .....3.25 inches
Width across fins.....24 inches
Weight.....37.5 pounds
Propelling charge .....3.2 pounds
Igniter (black powder).....0.78 ounces

Reference: NAVSEA OP 1664, Volume 1, *US Explosive Ordnance*, May 1947

1.1-INCH ANTI-AIRCRAFT, MK 1 MOD 0-28; and MK S.D. 1



The 1.1-inch A.A. gun is not being further developed in the Navy (per reference).

The 1.1-inch Mk 1 is not self-destroying. This is the primary difference between the two projectiles.

The Mk S.D. 1 consists of a Mk 1 projectile body modified for self-destruction by drilling through the wall between the tracer and H.E. cavities.

The Mk 1 projectile may also be issued B.L. & T (Blind Loaded & Tracer). The B.L. means the round is inert loaded.

The 28 Mods are to distinguish among contractors.

	Over-all length
With nose fuze	5.8 inches
Without nose fuze	4.1 inches
Diameter at bourrelet	1.095 inches
Filling	Explosive D
Weight of filling	
Mk 1	0.037 pound
Mk S.D. 1	0.034 pound
Weight of loaded projectile	0.917 pound
Primer	Mk 19 Mod 1, 2, and 3
Fuze	Modified Mk 12 Mods 2 & 3 (P.D.F.) Mk 34 all Mods (P.D.F.)

Reference: NAVSEA OP 1664 Volume I, *U.S. Explosive Ordnance*, March 1947

SHELL, 105mm, FIXED, HE, M38 & M38A1
SHELL, 105mm, FIXED, PRACTICE, M38 & M38A1

No Photos available

Guns The 105mm AA Gun M3 on the Mount M1

Shell, Fixed, H.E., M38

General In 1944 the M38 Round was the standard for issue. This was due to the fact that it used the older M2 Mechanical Time Fuze and an adapter rather than the M43 Fuze series. The M2 Fuze required a nose opening of 2.2 inches, and had a booster embodied in its makeup.

Projectile The M38 Projectile is streamlined in shape and is of forged steel construction. It is adapted to take a fuze that continues this streamline effect. The rotating band on the shell is 1.42 inches wide. A base plate of steel is found welded on the base. A cavity large enough to hold 4 pounds of TNT as a bursting charge is also provided.

Components A complete round of H.E., M38 consists of a loaded fuzed (M.T. M2 Fuze) projectile firmly attached to the M6 Cartridge Case with is propellant of NH or FNH powder, a distance wad, an igniter, and an M28A2 Percussion Primer.

Shell, fixed, H.E., M38A1

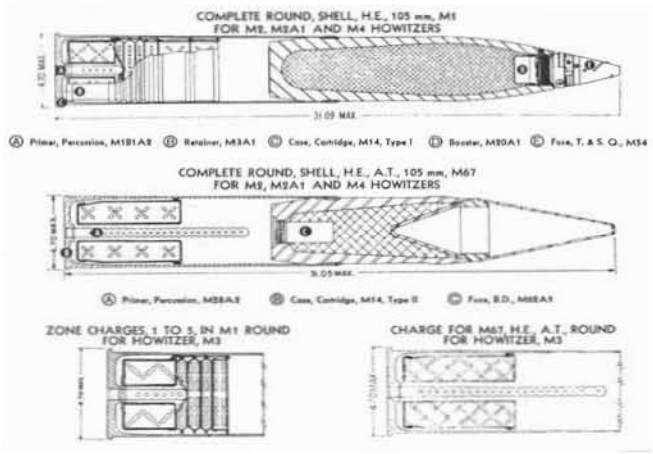
General This high-explosive round is the same in every respect as the M38 mentioned above, with one exception: The nose of the Projectile M38A1 is modified to receive an M43-series Mechanical Time Fuze in conjunction with the M20 Booster.

Shells, fixed, Practice, M38 & M38A1

General These two practice rounds differ from the high-explosive rounds in regard to filler only. The filler consists of 3.09 pounds of an inert filler made of lead oxide, paraffin, and barium carbonate accompanied by a black powder charge. This black powder charge is 8 ounces in the M38A1 Round, while it is only 5 ounces in the M38 round. The components are the same as those in the high-explosive rounds.

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, SEMI-FIXED, 105mm, HEAT, M67



Use. It is effective against either face-hardened or homogeneous armor plate and is designed for use against tanks. Use with the M2, M2A1,M3, M4 Howitzers.

Description. The projectile consists of three major parts; the ogive, the cone, and the body. The ogive has two purposes: to set up an effective distance between hollow charge and plate to be penetrated, and to streamline the round. It is a straight-sided hollow cone which threads into the body and is maintained in position by three set screws which pass through the body. **The cone is held in position between the ogive and the shell body and is designed to form a hollow in the charge, which will provide the "hollow charge" or "Munroe effect".**

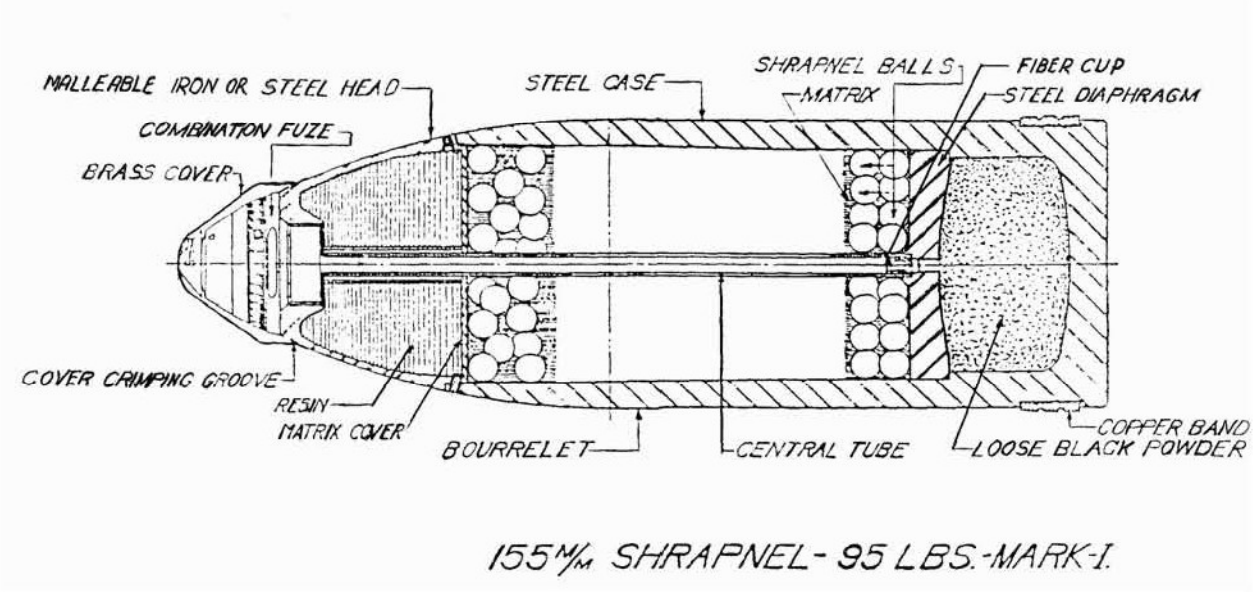
The body or the rear portion of the projectile is made of forged steel. The base of the body is boat-tailed with an approximate 9° taper and is provided with a threaded opening to take the M62 B.D. fuze.

Components. A complete round of M67 H.E., A.T. Ammunition consists of a loaded and fuzed projectile, assembled loosely to an M14 Cartridge Case with its propelling charge of approximately 3 pounds in one bag, and an M1B1A2 Primer. Originally, the round was designed as a fixed round, with a loose propelling charge of smokeless powder in an M14, Type II, Cartridge Case. The change back to semifixed class is to facilitate packing and shipping in accordance with existing standards. This round is adapted for firing from the M3 Airborne Howitzer.

Weight (projectile)..... 29.22 lb
Filler ..... Pentolite, 2.93 lb
Fuze..... M62A1
Propellant ..... FNH (1.20 –1.50 lb)
Primer M28A2
Maximum Range..... 8590 yd

Reference: TM 9-1904, Ammunition Inspection Guide, March 1944; Catalogue of Standard Ordnance Item, Volume III, 1944

PROJECTILE, 155mm, SHRAPNEL, MK I

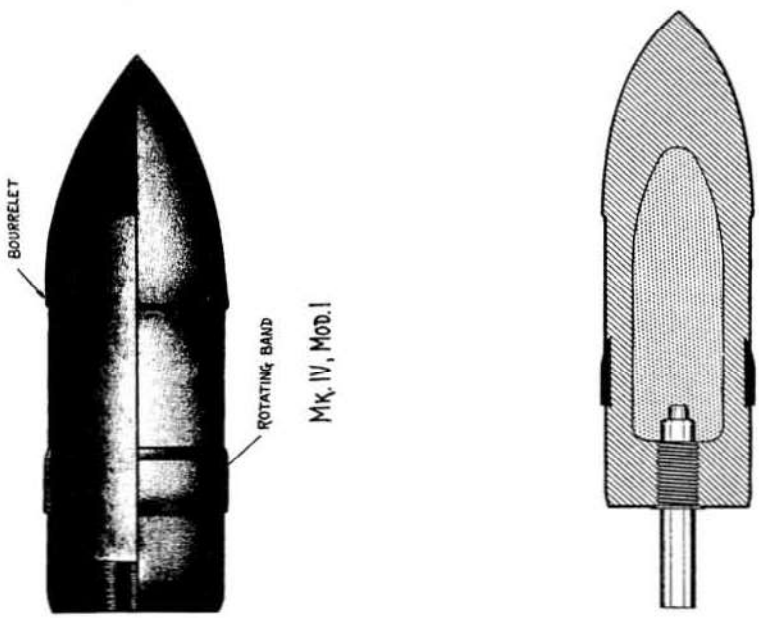


The round was developed during World War I and used against aircraft at that time. By 1944, however, due to added armament on aircraft, shrapnel served no effective service use, and was therefore classified limited standard. Existing stocks were used for target practice.

Length without fuze.....16.9 inches
Length, Overall.....18.74 inches
Diameter.....155 mm
Weight, loaded & fuzed.....95 pounds
Expelling Charge.....1.35 pounds Black Powder
Filler.....800+ Lead Balls
Fuze.....45 sec Combination Fuze

Reference: TM 9-1904, *Ammunition Inspection Guide*, 2 March 1944
Complete Round Chart, No. 5981, January 1940

PROJECTILE, 3-POUNDER COMMON, MK 4 MOD 1



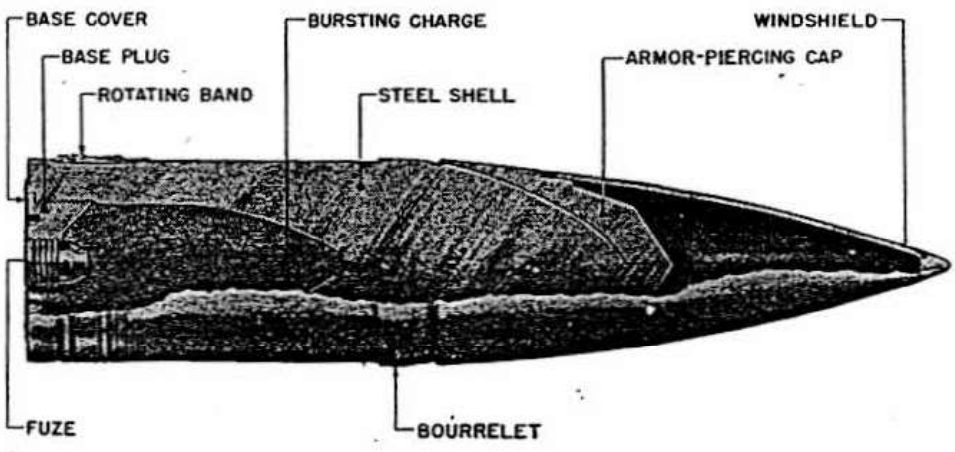
Use. This projectile was used in coastal defense guns and landing forces. It is typical of the 3-pounder guns of the turn-of-the-century era, but not the exact projectile fired by the field gun.

Description. This projectile is base-fuzed and contains an explosive charge of black powder and TNT. This round can also be issued blind-loaded and plugged (BL&P) or with just a tracer for target practice.

Projectile Length .....6.681 in.
Diameter .....1.845 in.
Weight.....3.30 lbs
Filler .....Black Powder and TNT, 0.13 lbs

Reference: NAVSEA OP 1664 Vol. 1*, U.S. Explosive Ordnance*, 28 May 1947; U.S. Navy Bomb Disposal School, *Projectiles and Fuzes*, April 1943

PROJECTILE, ARMOR PIERCING
3 INCH, M62



Description. This projectile consists of a heat-treated, hardened steel body which has a softer steel A.P. cap sweated on its forward end. The RP cap is threaded to receive a cast aluminum windshield or false ogive. Markings on projectile will say "With fuze and with tracer" if the base cavity is filled with explosives and "With Tracer" if the cavity is empty and only a tracer element will be installed.

Diameter .....3 inches
Weight.....14.91 pounds
Filling .....Explosive D
Weight of filling.....0.17 pounds
Fuze.....M66 or M66Al Base Detonating Fuze

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, 3-INCH, FIXED, ARMOR PIERCING, M79

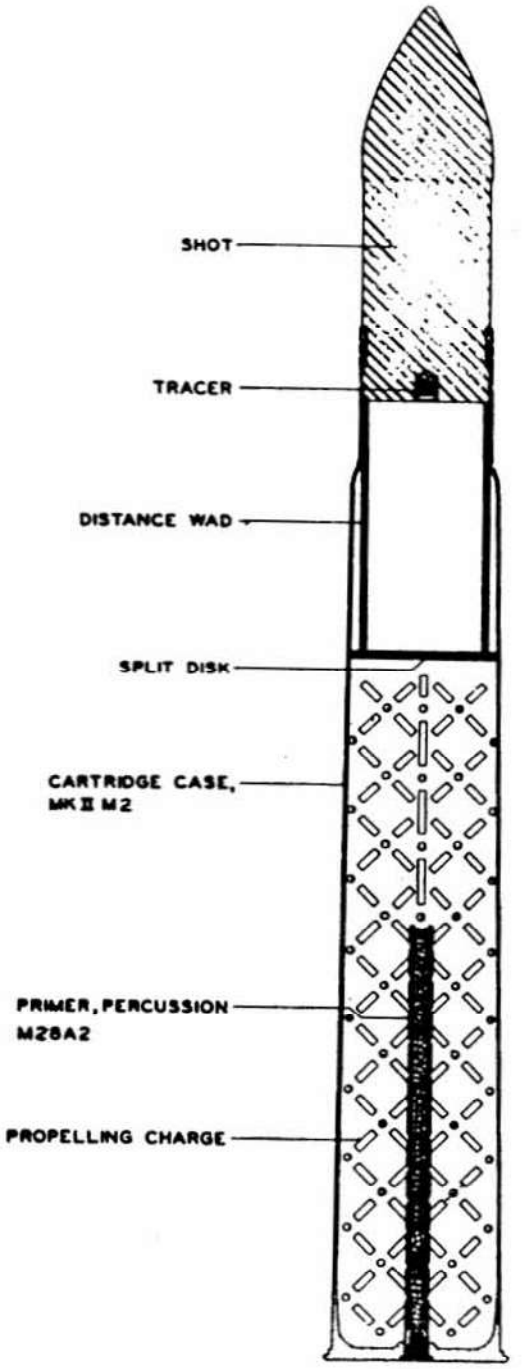
General. As a direct outcome of World War II, some of the weapons designed originally for AA work entirely have been converted into dual-purpose weapons simply by adding rounds that serve an entirely different purpose. This is the case with regard to this armor-piercing round. The AA weapon can, with this type of ammunition, be used against tanks and armored vehicles as well as against aircraft. These new AP rounds are provided only for weapons on the mobile mount.

Projectile. The projectile consists of a heat-treated, hardened steel, solid shot which has a cavity in its base to hold the tracer element which is ignited by the propellant charge. The rotating band is of gliding metal, and is approximately 1 inch wide.

Components. The complete round consists of the Shot M79, with its tracer composition in the base, crimped firmly to the Mk. IIM2 Cartridge Case containing 4.38 pounds of flashless FNH smokeless powder, a distance wad, and the Primer M28A2.

Guns. The Shot, AP, M79, can be used only in models of guns on the mobile mount.

Reference: TM 9 -1904, *Ammunition Inspection Guide*, March 1944



SHELL, 3-INCH, HE, MK IX

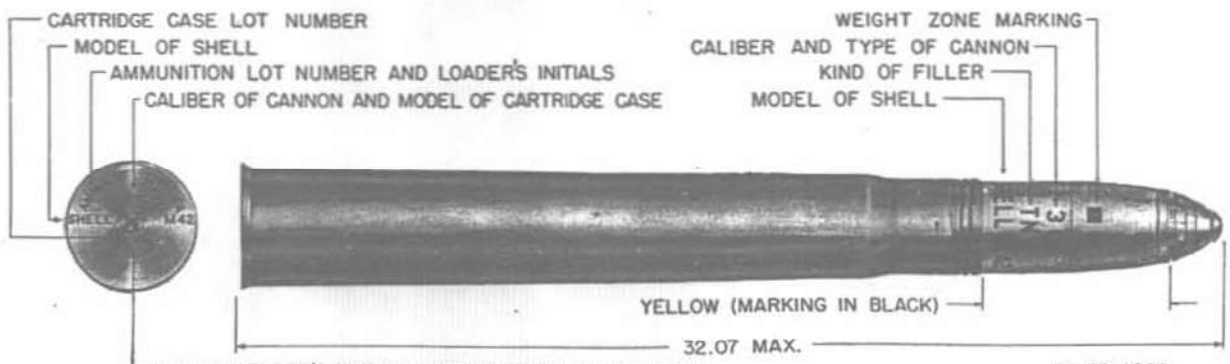


FIGURE 21.—Antiaircraft 3-inch high explosive projectile.

General. In order to increase the life of the 3-inch AA gun, the twist of the rifling in all late models and relined or retubed guns was reduced to one turn in forty calibers. This change in rifling, however, caused the Mk I High Explosive Shell to become unstable in flight, and it was therefore necessary to design a new HE shell. The shell designed to supersede the Mk I is known as the Mk IX.

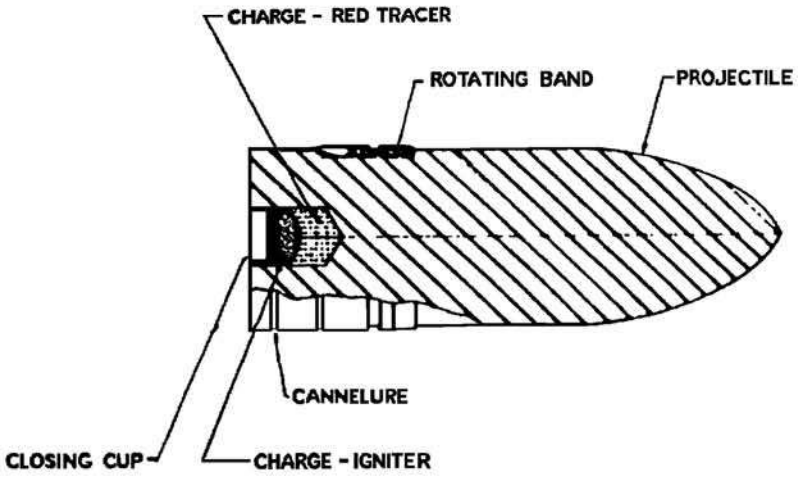
Projectile. The Projectile, Mk. IX is of steel construction, and is shorter and lighter in weight than the Mk I. It has a radius of ogive of 7 calibers, and it continues its cylindrical shape from the rotating band to the base. The rotating band is 1 inch wide. The filler is 0.91 pound of TNT. This shell has a steel base plate and an adapter.

Components. The complete round consists of the Mk IX Projectile with its adapter, fuzed with the MIIIA1 Time Fuze, (earlier Mk I Projectile used the M1907, 21-second, Combination Fuze). This loaded, boostered, and fuzed projectile is assembled to the Mk IM2 or the Mk IIM2 Cartridge Case with its propelling charge of NH smokeless powder, distance wad, and M28A2 Primer.

Overall Length .....3.07 inches
Diameter .....3 inches
Weight.....12.7 pounds
Explosive Filler .....TNT
Weight of filler.....0.91 pounds
Propellant .....NH or FNH smokeless powder
Propellant Weight .....78 ounces
Fuze.....Mk IIIA1 Time Fuze
Color.....Yellow w/ black markings

References: TM 9-1904, *Ammunition Inspection Guide*, March 1944; No. 5891, *Complete Round Chart, Issued,* August 1924

PROJECTILE, 37mm, ARMOR PIERCING, M74 WITH TRACER



Complete round. As indicated by the nomenclature, this round does not include an armor-piercing cap. It was designed as "Substitute Standard" for SHOT, APC, M59.

Cartridge cases. M17 and M17B1 are "Standard" and "Substitute Standard" respectively.

Primer. M23A2, 20 grain, Percussion Primer is "Standard". Some rounds may contain M23A1 primer.

Propelling charge. 4 ounces of FNH powder impact a muzzle velocity of 2,050 feet per second.

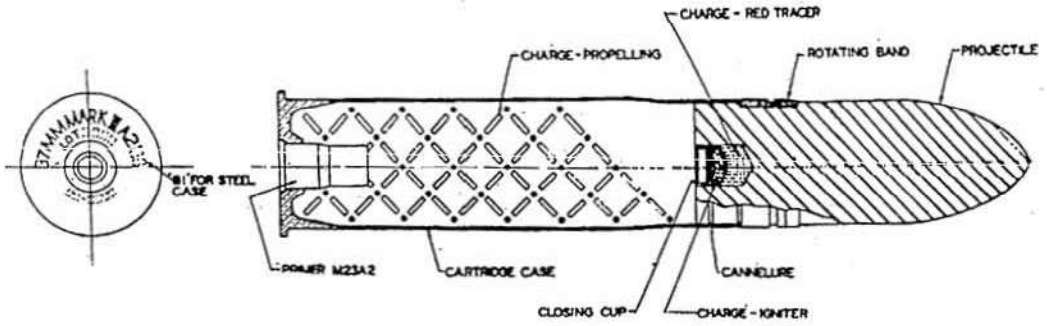
Projectile. The projectile is exactly the same as the M74 used for 37-mm Tank and Antitank Guns M5, M6, M3, and M3A1.

Identification. The extracting groove on the cartridge case, and size of the round identify it as belonging to 37-mm antiaircraft group. The black painting with white stencil and the stubby nose distinguish it as SHOT, AP, M74. The complete round is 13.01 inches long and weighs 3.07 pounds.

Projectile Length .....4.84 inch
Diameter .....1.44 inch
Color .....Black with white markings
Weight.....1.92 pounds
Filler .....None
Fuze .....None

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

CARTRIDGE, 37mm, ARMOR PIERCING, FIXED, M80



Complete round. As indicated by the nomenclature, this round does not include an armor-piercing cap.

Cartridge cases. M17 and M17B1 are "Standard" and "Substitute Standard" respectively.

Primer. M23A2, 20 grain, Percussion Primer is "Standard". Some rounds may contain M23A1 primer.

Propelling charge. 0.56 pound of FNH powder.

Projectile. The projectile is in the form of a solid steel slug. It has a comparatively blunt nose. A cavity is machined into the base for a tracer.

Identification. The Round M80 may be distinguished as 37-mm ammunition by its size, and for the aircraft group by the length and flange of its cartridge case. The projectile is painted black with white stencil

Projectile Length .....4.23 inch
Diameter .....2.35 inch
Length of complete round .....5.69 inch
Weight of complete round .....2.25 pound
Color .....Black with white markings
Fuze .....None

References: TM 9-1904, *Ammunition Inspection Guide*, March 1944; *Department of Ordnance, Complete Round Chart, N0 5981*, December 1940

CARTRIDGE, 37mm, APC, FIXED, M59

Complete round. This round is "Standard" for use against any type of armor plate. It is very similar to the SHOT, APC, M51, used in the 37-mm Antitank and Tank Guns M3, M3A1, M5, and M6. The main differences are in the cartridge cases and in the fact that the M59 Shot does not have a windshield to extend the ogive.

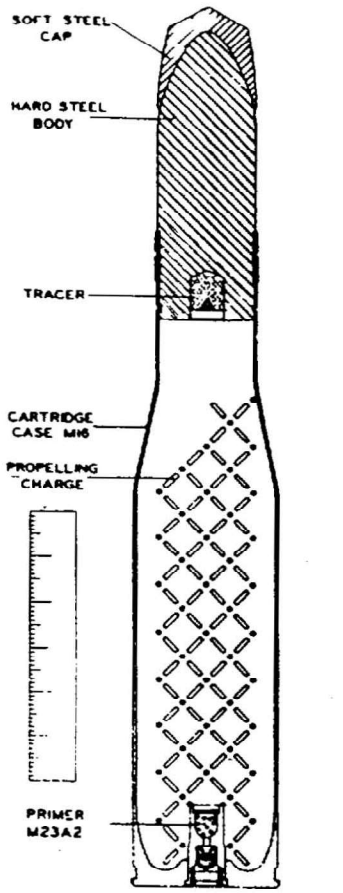
Cartridge cases. M17 is "Standard", M17B1 is "Substitute Standard".

Primer. M23A2, 20-grain, Percussion Primer is "Standard". Some rounds may incorporate the M23A1 Primer.

Propelling charge. A propelling charge of 0.31 pounds of FNH powder gives the projectile a muzzle velocity of 2,050 feet per second.

Projectile. Aside from the following differences, the projectile is the same as the SHOT, APC, M51, used in the Tank and Antitank Guns M3, M3A1, M5, and M6. The chambering of the Antiaircraft Gun M1A2 does not permit the use of a windshield. The M59 Antiaircraft round contains more tracer composition in the base than does the M51 Antitank round. The M59 projectile is a trifle lighter than the M51.

Identification. The complete round may be identical for the antiaircraft group by the size and extracting groove of the cartridge case. The black painting with white stencil and the armor-piercing cap distinguishes it as SHOT, APC, M59. The complete round is 12.76 inches long and weighs 3.12 pounds.



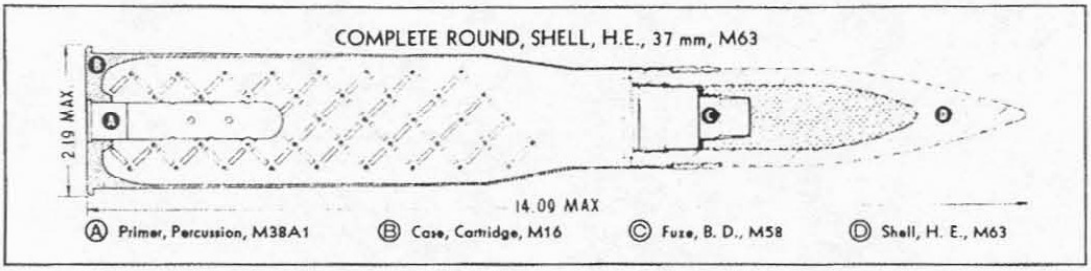
SHOT, A.P.C. M59.

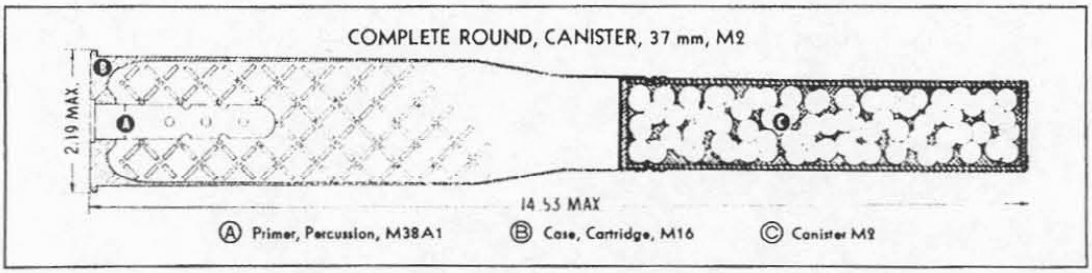
Length .....12.76 inch
Diameter .....1.44 inch
Weight.....3.12 pound
Color.....Black with white markings
Filler .....None
Fuze.....None

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, HIGH-EXPLOSIVE, 37 MM, M63— STANDARD
CANISTER, 37 MM, M2—STANDARD

ROUNDS FOR ANTITANK GUN, M3A1; TANK GUNS, M5A1 AND M6





HIGH-EXPLOSIVE, 37 mm, M63—STANDARD—This shell has superseded the Mk. II high-explosive shell, now used only as subcaliber ammunition. The bursting charge is 0.085 pound of TNT, functioned by the base detonating fuze, M58. Weights of the cartridge case, M16, and propelling charge of FHN powder are 0.93 pound and 0.49 pound, respectively. The steel cartridge case, M16B1, is substitute standard for use in the M3A1, M5A1 and M6 guns.

The complete round uses the M38A1 percussion primer and a propelling charge of M1 powder with single perforation grains and 0.027 inch web.

CANISTER, 37 mm, M2—STANDARD—Canister, M2, as the designation implies, is little more than a can filled with approximately 122 lead balls which are imbedded in a resin matrix.

The canister is used primarily as tank armament against personnel. The shock of discharge ruptures the case and the canister leaves the gun with a muzzle velocity of 2,500 feet per second. The case bursts within 100 feet after discharge.

The weight of the complete round is 3.49 pounds of which 1.94 pounds is the canister load. Weight of the propelling charge of FNH powder is 0.52 pound.

The propelling charge is an M1 class powder having an 85-10-5 formula, seven perforations per grain with a web of 0.019 inch.

CHARACTERISTICS

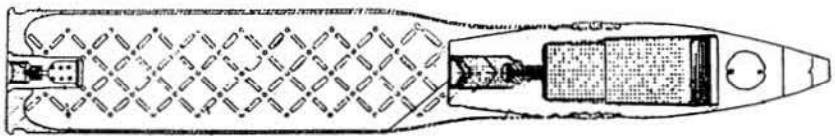
	Shell, H.E., M63	Canister, M2
Caliber	37 mm	37 mm
Model of Gun	M3A1, M5A1, and M6	M3A1, M5A1, and M6
Proj. Weight	1.61 lb.	1.94 lb.
Proj. Charge and Weight	TNT, 0.085 lb.	122 balls
Fuze	B.D., M58	——
Primer	M38A1†	M38A1†
Cartridge Case	M16*	M16*
Propelling Charge and Weight	FNH powder, 0.49 lb.	FNH powder, 0.52 lb.
Complete Round Weight	3.13 lb.	3.49 lb.
Muzzle Velocity	2,600 f/s**	2,500 f/s
Maximum Range	9,500 yards***	——
Chamber Capacity	19.19 cu. ins.	19.35 cu. ins.
Rated Max. Pressure, p.s.i.	40,000	——

†Or M38B2 substitute standard.
*The steel cartridge case, M16B1, is substitute standard for use in the M3A1, M5A1 and M6 guns for training only.
**2,565 f/s in M5A1 gun.
***9,485 yds. in M5A1 gun.

Reference: *Catalogue of Standard Ordnance Items, Volume III,* 1944

CARTRIDGE, 37mm, HE, FIXED, M54

WITH SELF DESTRUCT TRACER



Cartridge case. The M17 Case is "standard", the M17B1 is "Substitute Standard".

Primer. The M23A2 is "Standard",. Some rounds on hand may be primed with the M23A1.

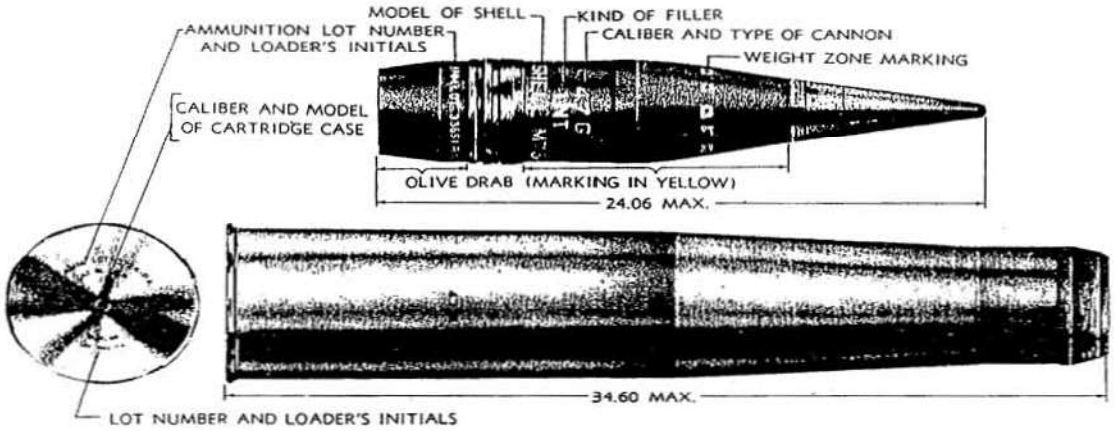
Propelling charge. A muzzle velocity of 2,600 feet per second is imparted to the projectile by 6 ounces of FNH powder.

Projectile. The projectile M54, as fired, weighs 1.34 pounds and is about 5.9 inches long. It is the same projectile as the M54 fired from the M4 Antiaircraft Gun. The projectile consists of three components: the body itself protrudes from the cartridge case. The base of the projectile is very thick (over 1 1/2 inches) and is tapered for streamlining purposes. The cavity for the shell-destroying tracer is machined into this heavy base. The bursting charge of 0.10 pound of tetryl is pressed into the body in two increments: a base pellet and a main charge. The shell destroying tracer assembly consists of a quantity of tracer composition, an ignited charge, a celluloid closing cup, a relay igniting charge and a relay pellet. When the tracer composition is almost completely burned, it initiates the relay pellet and in turn detonates the tetryl base pellet of the bursting charge , and finally the main bursting charge itself.

Fuze. Point Detonating, M56. Since the High-explosive Round M54 is required to function on impact with light materials such as those used in planes, a supersensitive fuze is needed. A super- sensitive fuze is one which will detonate on very slight impact such as with a double thickness of airplane fabric. The M56 is both supersensitive and superquick because the firing pin is protected only by a very thin aluminum closing cup and rests, at the time of impact, right on the detonator which initiates an almost uninterrupted train of detonating explosives. The body of the fuze is divided into three parts; the body loading assembly, the head assembly, and cap. The booster of tetryl is pressed into a cavity in the lower part of the body. The complete round of M54, HE Shell can be identified by the presence of the M56 Fuze.

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, 4.7-INCH, HE, M73



Use. The 4.7-inch AA Gun M1 on the 4.7" gun mount M1 is a weapon designed for protection of large rear areas against fast-flying bombers at altitudes of approximately 30,000 feet, with a maximum range of 60,000 feet. The only type of ammunition provided for the 4.7" AA gun include high explosive

General. In this round the shell has a distinctive conical, long, graceful ogive beginning just ahead of the bourrelet and extending the length of the elongated fuze. The shell alone weighs approximately 50 pounds and is 24.06 inches long.

Projectile. The shell body is of forged steel construction. It has a boat-tail base and a base plate of steel. The rotating band is 2.25 inches wide, and is made of gliding metal. The shell cavity is designed to hold 5.26 pounds of TNT, 4.8 pounds of 50/50 amatol and TNT surrounds, or 5.42 pounds of trimonite as a bursting charge.

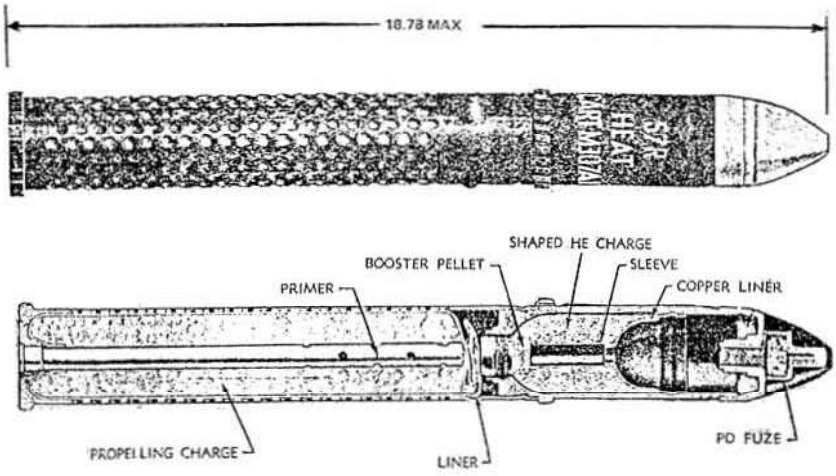
Fuze. The fuze, Time, Mechanical, M61 is "standard".

Propelling Charge. Consists of loose NH powder contained in a brass cartridge case which is closed by a cork plug. An igniter of 8 ounces of black powder is placed around the primer to insure ignition. The primer is the M1B1A2 100-grain percussion type.

Length (projectile)	24.06 inches
Diameter	4.69 inches
Color	Olive Drab w/ yellow marking
Weight	50 pound (approximately)
Filler	TNT; Amatol 50/50 and TNT; or Trimonite
Weight of filler	5.26 pounds TNT; 4.8 pounds of Amatol 50/50 and TNT; or 5.42 pounds Trimonite
Fuze	M61 Mechanical Time Fuze

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

CARTRIDGE, 57mm, RECOILLESS RIFLE, HEAT, M307 & M307A1



Use. This cartridge is employed against armored targets and used with 57-mm rifles M18 and M18A1.

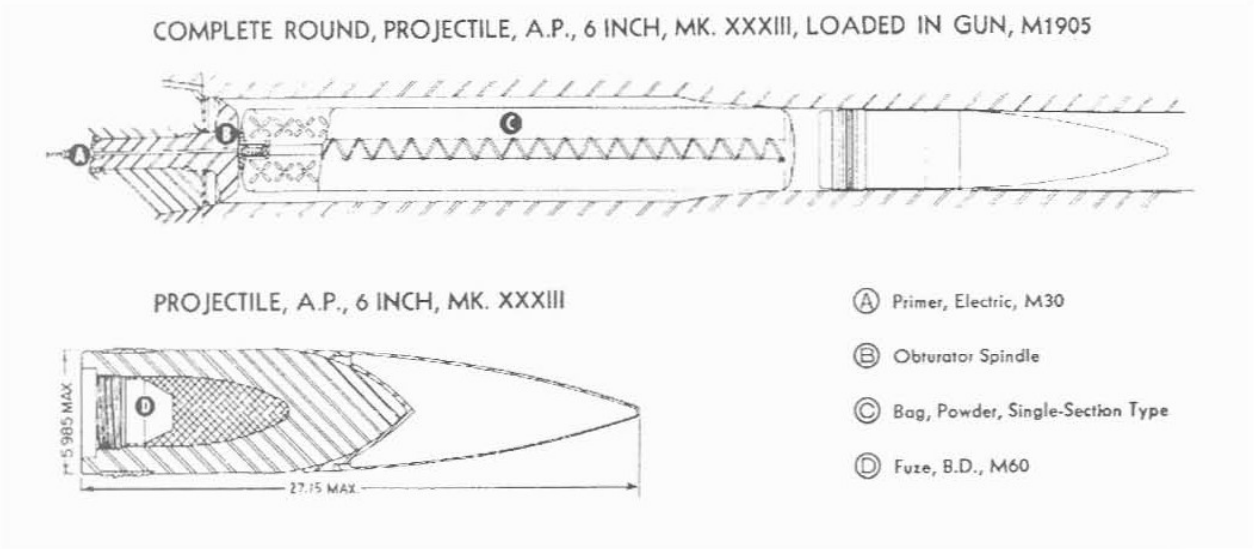
Description. HEAT cartridge M307A1 includes a perforated metal cartridge case containing a plastic liner and a percussion primer and is crimped to the projectile just behind the pre-engraved rotating band of the projectile. The projectile forward cap is threaded to receive a point detonating fuze. A hemispherical copper liner crimped to the interior of the projectile forms a shaped charge to the rear and space forward to provide the standoff necessary for penetration. A steel sleeve brazed to the neck of the copper liner provides a passage from the fuze to a booster pellet in the base of the projectile. The booster pellet extends into the high explosive charge.

Functioning. The primer ignites the propellant when struck by the weapon firing pin, and the burning propellant generates gases to propel the projectile through the barrel. Recoil is eliminated because the design of the cartridge case permits controlled escape of some gas pressure through apertures in the rifle breechblock. The rotating band engages the rifling in the barrel to spin the projectile for stability in flight. The fuze functions on impact and fires through the steel sleeve to the booster pellet. Detonation of the explosive charge collapses the copper liner and creates a focussed, high velocity shock wave containing a jet of metal particles that penetrates the interior of the target.

Over-all Length (Max).....18.78 inch
Weight of complete round.....5.43 pound
Filler and weight.....Comp B or 50-50 Pentolite, 0.40 pound
Propelling charge.....M10
Color.....Olive Drab with yellow markings

Reference: TM 43-0001-28, Army Ammunition Data Sheets, Artillery Ammunition, April 1977

SHELL, A.P., 6-INCH, MK XXXIII



Use: This, the only standard combat ammunition for the 6-inch seacoast guns, is a Navy design projectile. Guns - M1900A2; M1903A2, M1905A2

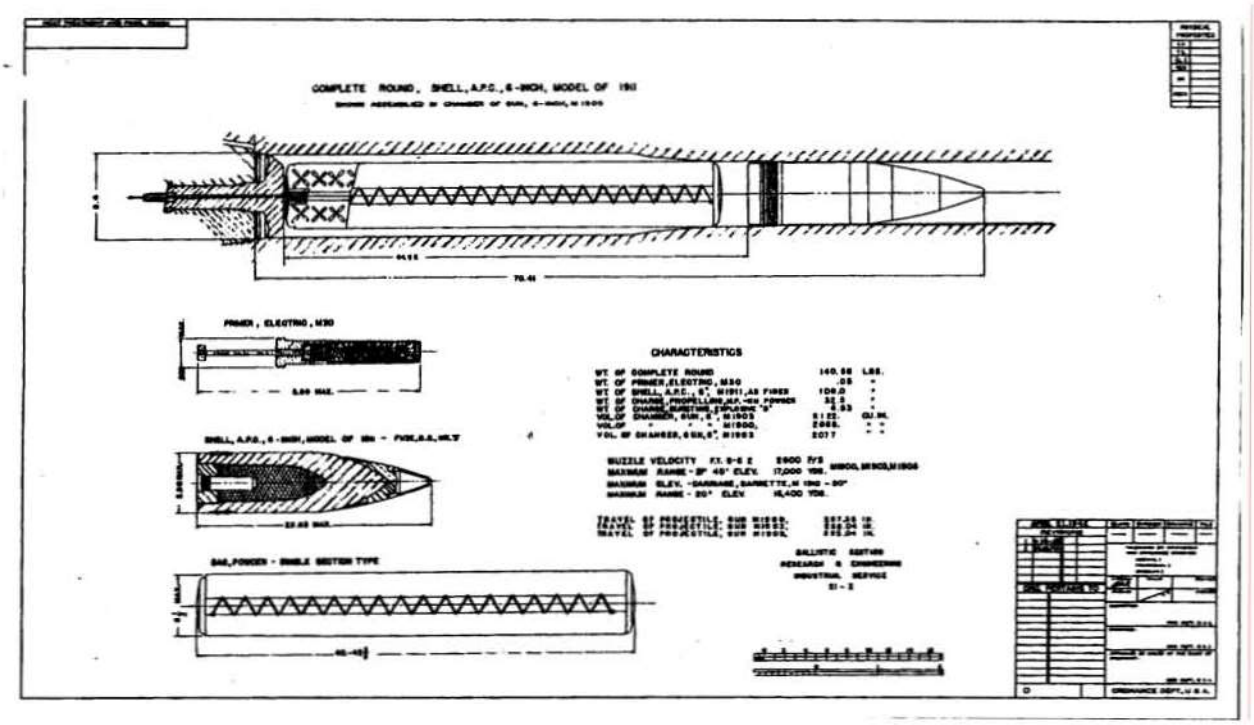
Description: The projectile is identical in design with the Projectile, APC, 155mm, M112. A bursting charge of 2.17 pounds of explosive D is detonated by the M60 base-detonating fuze. To improve the flight characteristics a ballistic windshield is attached to the projectile body. This windshield is screwed onto an adapter, which is soldered and crimped in five places to the projectile body. A single section type powder bag contains the propelling charge – 37 pounds of NH powder. This charge gives the 105 pound projectile a muzzle velocity of 2,800 f/s. The propellant is an M1 class powder, 87-10-3 formula. The web size is 0.068 inch and the grains have seven perforations. The electric primer, M30, is used to ignite the propelling charge.

The projectile measures 27 inches in length and the powder bag a maximum of 42 3/8 inches by 6 ½ inches in diameter.

Weight of Projectile as fired.....105 pounds
Length of Projectile w/fuze.....27.0 inches
Filler and Weight.....2.17 lb, Exp D
Fuzes.....BD, M60
Propelling charges.....37.0 pounds
Maximum Range.....27,150 yards

Reference: Catalogue of Ordnance Items, Second Edition 1944

COMPLETE ROUND, AP, 6-INCH, Model 1911



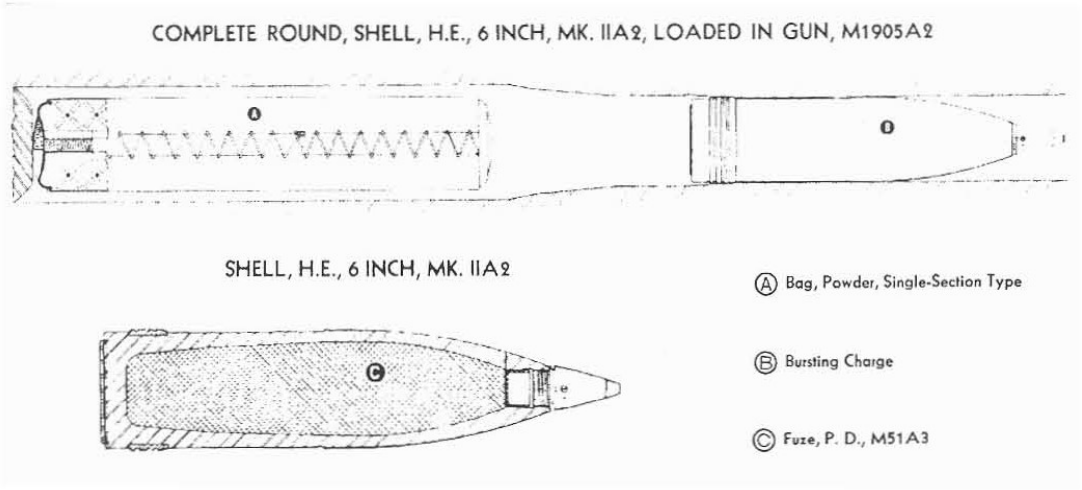
Use: This is the armor piercing used with the 6-inch Coast Artillery.

Description: The MK II is a separate loaded, armor piercing munitions, which is used by the Coast Artillery against ship targets. A single rotating band is located near the base of the projectile.

Weight of Projectile as fired.....140.55 pounds
Length of Projectile w/fuze.....22.65 inches
Filler and Weight.....4.53 lbs, Explosive D
Fuzes.....Base Detonating
Propelling charges.....32.5 pounds
Color.....Unknown

Reference: Complete Round Charts and Drawings, 1945

SHELL, H.E., 6-INCH, MK IIA2



Use: This shell was developed by redesign of the Mk II high-explosive shell. The Mk II shell was manufactured so that on adapter was required to assemble the Fuze, P.D., M47, to the shell, resulting in a shell contour that was unsatisfactory ballistically. To rectify this, the shell was modified and was designated the Shell, H.E., Mk IIA1. The modification consisted of lengthening the ogive so that the P.D. Fuze, M51A3, could be assembled directly to the shell without using an adapter. With the new shell and fuze contour the ballistic characteristics were improved. A further modification, this time to the rotating band, resulted in the Mk IIA2 shell. Guns - M1900A2, M1903A2, M1905A2

The shell is manufactured from steel forging, and to insure that no gases leak into the bursting charge the base of the shell is protected by a steel base cover. Two different bursting charges are permitted, 13.98 pounds of Grade I, Cast TNT or 13.11 pounds of 50-50 Amatol with 0.20 pounds of Grade I Cast TNT surrounding the booster. Both type loadings require fuze well cups to prevent broken pieces of the charge interfering with the assembly of the Fuze P.D. M51A3. The shell is shipped with an eye-bolt closing plug and the fuze assembled prior to firing. The 89.53 pound shell is propelled by 32.5 pounds of NH powder. The propelling charge, contained in a single-section type powder bag, is ignited by the M30 electric primer. The propellant is an M1 class powder, 87-10-3 formula. The grains have seven perforations and a web of 0.055 inch. The fuzed shell measures 25.22 inches in length and the powder bag a maximum of 42 3/8 inches by 6 ½ inches in diameter.

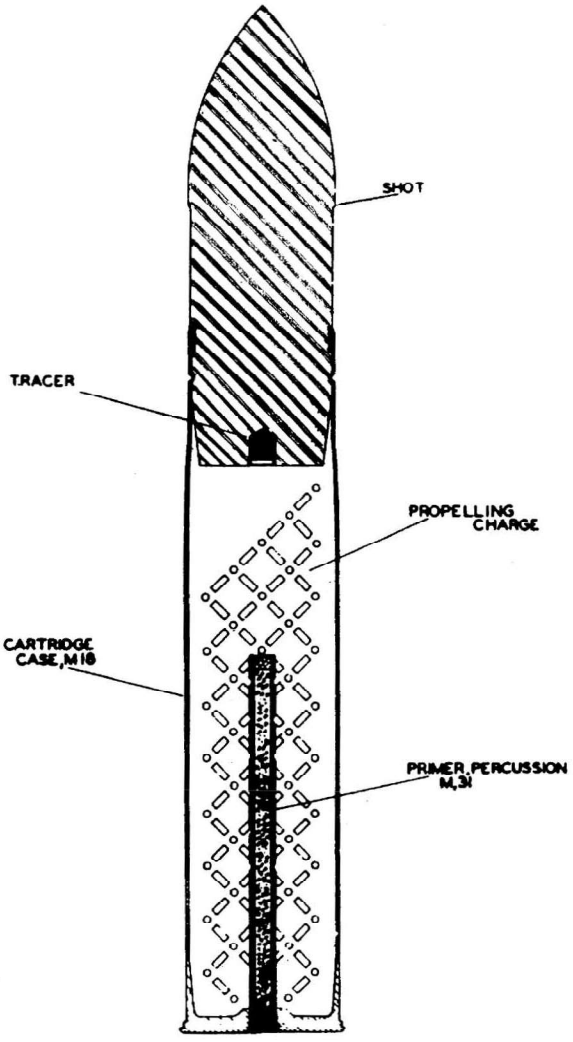
Weight of Projectile .....89.53 lb
Length of Projectile w/fuze.....25.22 in
Filler and Weight.....13.98 lb, Cast TNT or
13.11 lb 50/50 Amatol and 0.20 lb Cast TNT
Fuzes.....P.D. M51A3
Propelling charges.....32.50 lb Single-sec NH powder
Maximum Range .....20,995 yards

Reference*:* *Catalogue of Ordnance Items*, Second Edition 1944

SHELL, 75mm, ARMOR PIERCING, M72

General. This round was developed as a substitute for the M61 & M61A1. It has no armor-piercing cap. It does, however, fulfill the requirement of the using arms for armor-piercing ammunition.

Projectile. This projectile is a solid hardened steel shot with a small cavity in the base in which is incorporated a tracer element similar to that of the M66A1 base detonating Fuze and that of the M61 Projectile. It has a 1.5-caliber radius of ogive, a rotating band of gliding metal, a fringing groove, a single groove for stab crimping of the cartridge case to the projectile, and a boat-tail base with a 9-degree taper. The absence of the armor-piercing cap as stated above caused it to be lesser efficiency than the M61 APC Projectile, having a greater tendency to ricochet on angled impacts and no protection against breaking of the nose on impact. The projectile is painted black and stenciled in white with designations of the weapon and the complete round.



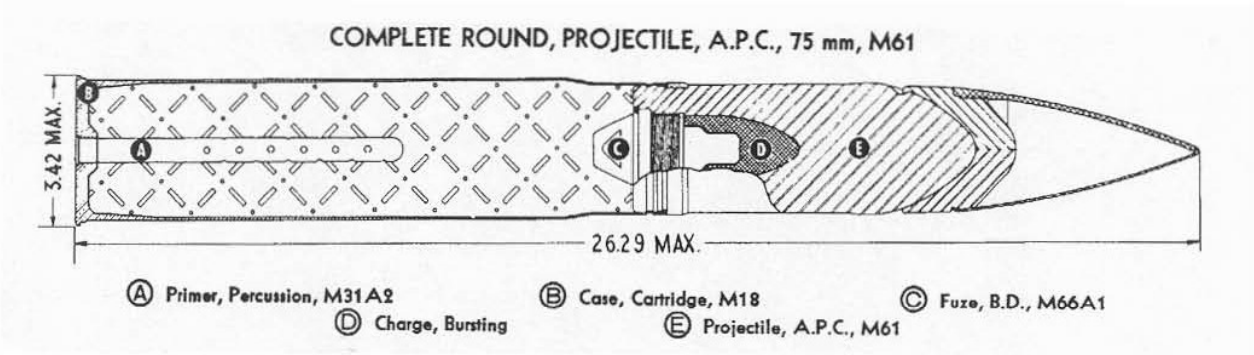
Propelling charge. A super charge of average weight of 1.90 pounds of FNH powder.

Guns. This round is provided , as described above, for all types of 75-mm guns.

Cartridge Case M18
Propellant .....1.90 lb. FNH powder
Primer M31
Fuze .....None
Painting and markings .....Black with white w markings

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944; *Department of Ordnance, Complete Round Chart, No 5981*, December 1940

SHELL, 75mm, GUN AP-C, M61, W/BD FUZE, M66A1 and TRACER



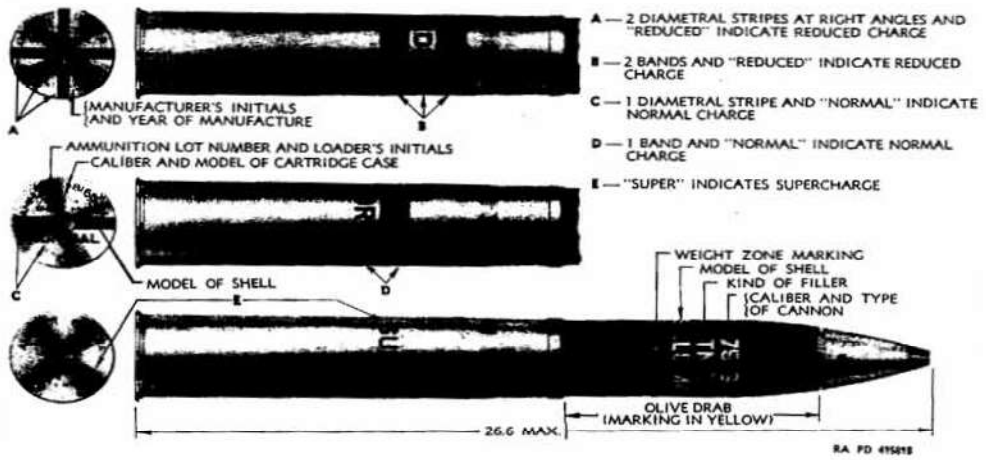
Use This round is provided as described for all 75-mm guns.

General. This projectile, as its name indicates, is an armor-piercing round. The fact that it has a high-explosive filler is indicated by the inclusion of the fuze in the nomenclature.

Description. This projectile has a 7.5 caliber radius of ogive, a gliding metal rotating band, a fringing groove, a single groove for stab crimping, and a square base. The body of the projectile is of hardened forged steel. A cavity machined in the base contains the explosive filler, which consists of 0.15 pound of explosive D. To the nose of the body is crimped and soldered an armor-piercing cap, which is centrally hardened and peripherally toughened. This armor-piercing cap is designed to take up the initial shock of impact, thereby protecting the body, and to set up favorable stresses in the plate, so as to enhance penetration by the body itself. It also reduces greatly the possibilities of ricochet on highly angled impacts. To the armor-piercing cap is threaded a die-cast aluminum windshield or ballistic cap. It is this cap, which is responsible for the streamlining of the otherwise blunt-nosed projectile. The base of the projectile is closed by the M66A1 Base-detonating Fuze, which contains its own booster. The fuze projects about 0.06-inch beyond the base of the projectile, the projecting end containing a red tracer. A notch in the fuze body is so shaped that a dove-tailed groove is left between the fuze body and the base of the projectile. Lead calking wire is hammered into this groove so as to seal the joint between fuze and projectile against seepage of propelling charge gases, thus protecting against premature detonation of the explosive D filler. This projectile is not weight-zoned since the machining operations enable it to be brought to a close weight tolerance. The projectile is painted a lusterless olive drab, and stenciled in yellow with the designation of weapon, explosive filler, and complete round. The components associated with the projectile in the complete round are: Fuses M66 and M66A1; Cartridge Cases M18 and M18B1; Propelling Charge, the supercharge only, since the greater muzzle velocity afforded by this charge is a necessary factor in effective penetration of armor plate; Primer M32

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, 75mm, GUN HE, M48



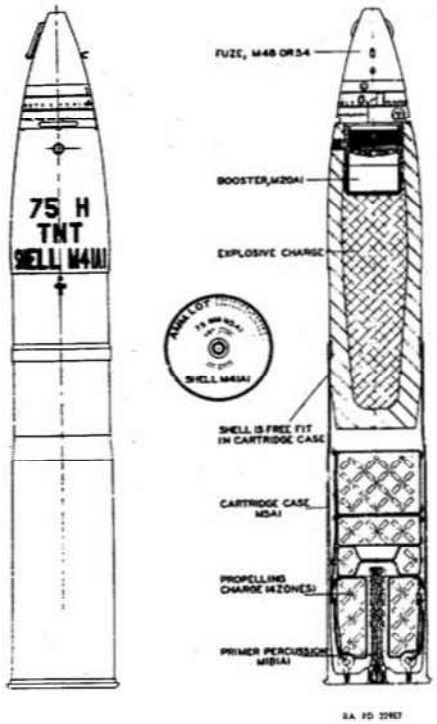
SHELL, H.E., M48, for 75-mm Guns

Description This projectile is streamlined with a 9° tapered or boat-tailed base and a 7.5-caliber radius of ogive. The projectile is made of forged steel; it has a rotating band of gilding metal, a fringing groove; and a steel base cover spot welded to its base. It is also provided with a single groove, between the fringing grove and the boat-tail, for stab crimping of the cartridge case. The booster and fuze assemble directly to the nose of the shell, the booster being tightened in place by a set screw, and the fuze by staking into notches cut in the rim of the nose. The standard bursting charge consists of 1.49 pounds of TNT. The actual weights, for uniformity of ballistics, are classified into weight zones which are indicated by yellow crosses (+++) stenciled below the bourrelet of the shell. The propelling charge M18 and M18B1 provides three charges; normal, super, and reduced. The mean weight of the complete round are: for the supercharge, 19.3 pounds; for the normal charge, 18.5 pounds; and for the reduced charge, 18.0 pounds. The projectile is painted lusterless olive drab and is stenciled in yellow with the designation of weapon (75G), the designation of filler (TNT), and the complete round designation (Shell M48).

Over-all Length (Max).....26.6 inch
Diameter (body).....2.925 inch
Total Weight.....(+) 18.0 pound
(++) 18.5 pound
(+++) 19.3
Filler.....TNT
Filler weight.....1.49 pounds
Cartridge Case.....M18, M18B1
Propellant.....FNH powder
Primer.....M22A3, M22-series and M31
Fuze.....M48A2, M54, M51A4, M21A4
Painting and markings.....Olive drab w/ yellow markings

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, 75mm, HE, M41A1



Shell, Semifixed, H.E., M41A1

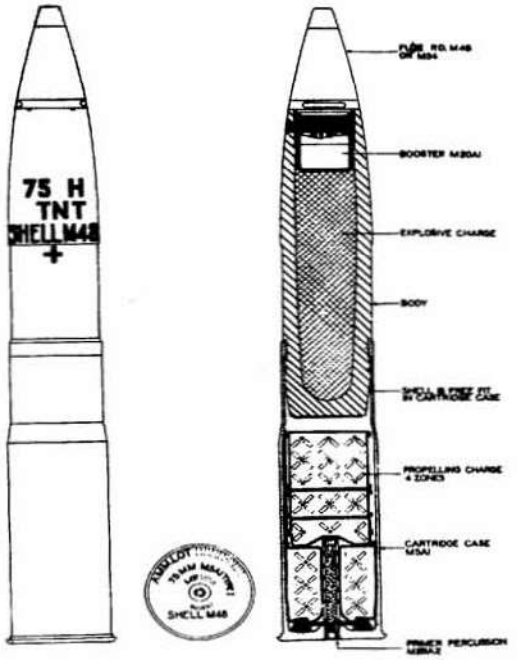
General. This round is a substitute for the M48 H.E. Shell in the 75-mm howitzer. This projectile is made by cutting off the nose of the Mk. IV, H.E. Shell and rethreading it to take the M48, M48A1, M54 fuzes, and the M20 Booster.

Description. This projectile has an 11-caliber radius of ogive and a boat-tail base with a 9° taper. The rotating band is of copper and a steel base plate is soldered to the base. It is a low-capacity shell, having a bursting charge in the howitzer of 1.11 pounds of TNT. There are only two weight zones in this projectile. The markings of the projectile will be in yellow on an olive-drab base coat, and will include the designation of weapon (75 H), filler (TNT), complete round (Shell M41A1), and weight zone (+).

Filler .....TNT
Filler weight.....1.11 pounds
Cartridge Case M5A1, M5A1B1
Propellant .....FNH powder
Primer M1B1A2
Fuze.....M48, M48A1,M54
Painting and markings.....Olive drab w/ yellow markings

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, 75mm HOWITZER, HE, M48



Shell, Semifixed, H.E., M48

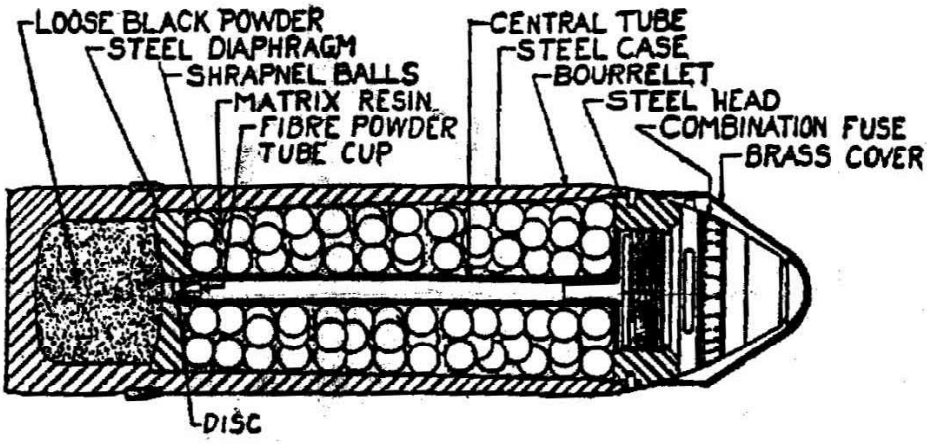
General. The complete round with the exception of cartridge case, primer, propelling charge, and markings is similar to the gun Round M48.

Description. This projectile is streamlined with a 9° tapered or boat-tailed base and a 7.5-caliber radius of ogive. The projectile is made of forged steel; it has a rotating band of gilding metal, a fringing groove; and a steel base cover spot welded to its base. It is also provided with a single groove, between the fringing grove and the boat-tail, for stab crimping of the cartridge case. The booster and fuze assemble directly to the nose of the shell, the booster being tightened in place by a set screw, and the fuze by staking into notches cut in the rim of the nose. The standard bursting charge consists of 1.49 pounds of TNT. The projectile is painted lusterless olive drab and is stenciled in yellow with the designation of weapon (75H), the designation of filler (TNT), and the complete round designation (Shell M48).

Filler .....TNT
Filler weight.....1.49 pounds
Cartridge Case M5, M5A1B1
Propellant .....FNH (15.55 oz. max)
Primer M1B1A2
Fuze.....M48, M48A1, M54
Painting and markings.....Olive drab w/ yellow markings

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

PROJECTILE, 75mm, SHRAPNEL, MK I



Description. This projectile consists of a steel case, near the base of which a shoulder is formed on the interior surface. A base charge of 3 ounces of black powder is packed in the base of the projectile beneath a diaphragm of steel which rests on the shoulder. This diaphragm also supports a flash tube, the upper end of which is flared out into a smaller thin diaphragm. Between the two diaphragms is held a charge of melted resin which holds 270 lead balls suspended within it. These balls average 42 to the pound, the 270 totaling 6 pounds, 7 ounces. Above the lower diaphragm, the interior of the shrapnel case is gradually enlarged in diameter so that it tapers outward from the base to head. The top of the case is closed by a steel head which fastens to the case with a fine thread, and which is adapted to the fuze with a coarse thread. The shrapnel is issued fuzed with the 21-second Combination Fuze M1907M, which is set at safe, and covered with a metallic moisture proof cap.

Function. The flame from the magazine charge of the fuze flashes down the central tube and ignites the black powder base charge. Explosion of this charge forces the lower diaphragm matrix and balls, and flash tube upward, blowing off the fuze and the head as a unit, the rupture occurring at the fine threads between the head and the case. It is painted red and stenciled in black with the designations of weapon, and complete round.

Fuze .....M1907M 21-sec Combination Time fuze
Cartridge Case M18
Propelling Charge.....A normal charge of 1.69 pounds of powder which imparts a muzzle velocity of about 1,755 feet per second.
Primer M1B1A1
Guns .....This round is issued for the 75mm field gun only.

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

COAST ARTILLERY AMMUNITION
Early 1900s

General – A round of ammunition is those elements used in firing a gun once. It is composed of:

Primer – a device used to ignite the propelling charge.

Propelling charge – the explosive placed behind the projectile in the bore of the gun and used to impart motion to the projectile.

Projectile – a missile thrown from a gun by the propelling charge to serve as a carrier for high explosives, gas, smoke, etc., which it is desired to carry to and explode or scatter at a definite point.

Bursting Charge – the explosive placed in the cavity of the projectile and designed to explode with sufficient violence to rupture the shell and hurl the fragments with destructive effect.

Fuze – a device attached to the projectile to cause the detonation of the shell at the time or under the circumstances desired.

Kinds of Ammunition – the relation of the above elements of a round of ammunition to each other determines the kind of ammunition. This division is as follows:

Fixed Ammunition – In which the primer, propelling charge, and projectile are in a single metal container. This type of ammunition is used in 3-inch, 4.7-inch, and 75mm guns.

Semi-Fixed Ammunition – in which the primer and propelling charge are in a single metal container, and the projectile is loaded separately. This type is used in the 4.7-inch and 6-inch howitzers, and 9.45-inch trench mortar.

Separate Loading Ammunition – in which primer, propelling charge, and projectile are each loaded as a separate unit. This type is used in guns of 5-inch caliber and up, 155mm gun and howitzers of 8-inch caliber and up.

Primers – are classified as follows: Friction, Electric, Combination Electric and Friction, Percussion, Drill, Igniting

Propelling Charge – Powders, which are used for propelling charges, are progressive explosives, which are comparatively slow burning.

Black Powder – in small grains was the first powder used as a propelling charge. It is a mechanical mixture of 75% saltpeter, 15% charcoal, and 10% sulphur.

Brown prismatic powder – was used after black powder. This was similar to black powder, but the charcoal was replaced by undercharred rye straw.

Smokeless Powder – Modern propelling charges are chemical compounds, which burn practically without smoke. In our army and in the French the powder is nearly all pure nitrocellulose, but the British use a mixture of nitrocellulose and nitroglycerine.

Nitrocellulose Powder – a product of process involving cotton linters, which the result is a material known as wet gun-cotton or pyrocellulose.

Nitroglycerine Powder – the British use a powder called "Cordite", the name derived from the cord-like form it assumes in manufacture. This powder is a mixture of 60% gun-cotton, 35% nitroglycerine and 5% Vaseline.

Ballistite is another nitroglycerine powder used in mobile artillery. It is also used in trench mortars.

Projectiles – all projectiles have the same general shape, cylindrical with ogival head. The length is from 2½ to 5 times the caliber of the gun. The longitudinal section of the ogive is usually the arc of a circle, the radius of which varies from 2 calibers to 10.5 calibers. The ogive may extend to the point, if a base fuze is used, or it may be truncated to form the fuze seat for a point fuze. In rear of the ogive is the maximum diameter of the shell itself, which is known as the bourrelet. The body of the shell extending from the rear of the bourrelet to the rotating band is of slightly smaller diameter than the bore of the gun until the force of the explosion makes it conform to the shape and size of the lands and grooves. In rear of the rotating band is the base, which is cylindrical or conical, the latter shape being called "boat tailed".

Projectiles used in Coast Artillery may be classified as follows:

Armor Piercing (A.P.) Shot – used against the side of armored vessels at short range to obtain penetration.

A.P. Shell – used against the side of armored vessels at longer ranges to damage the armor without penetration.

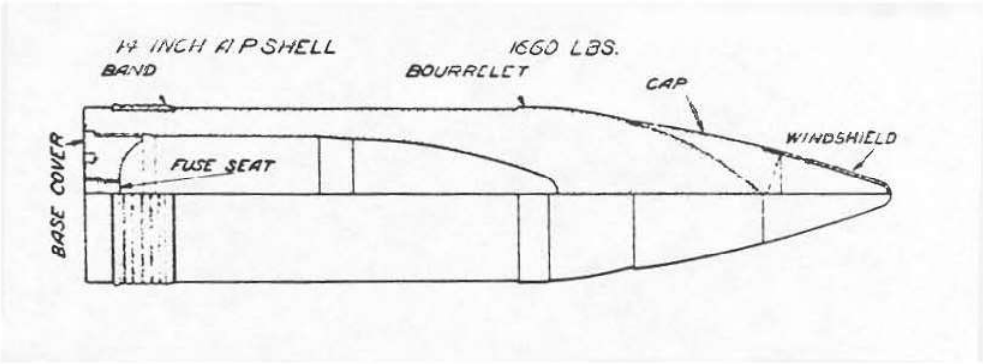
Deck Piercing (D.P.) Shell – used in high angle fire to penetrate the deck of vessels and explode after penetration.

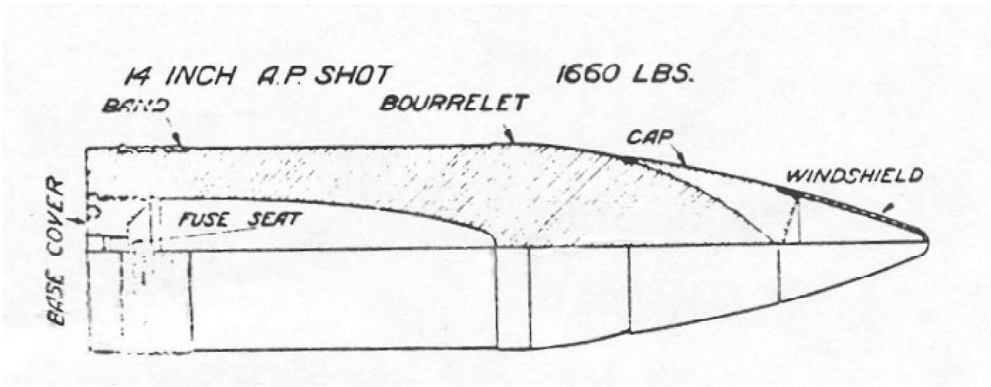
Common Steel Shell – used in light armament against unarmored ships.

Sub-Caliber – used in target practice.

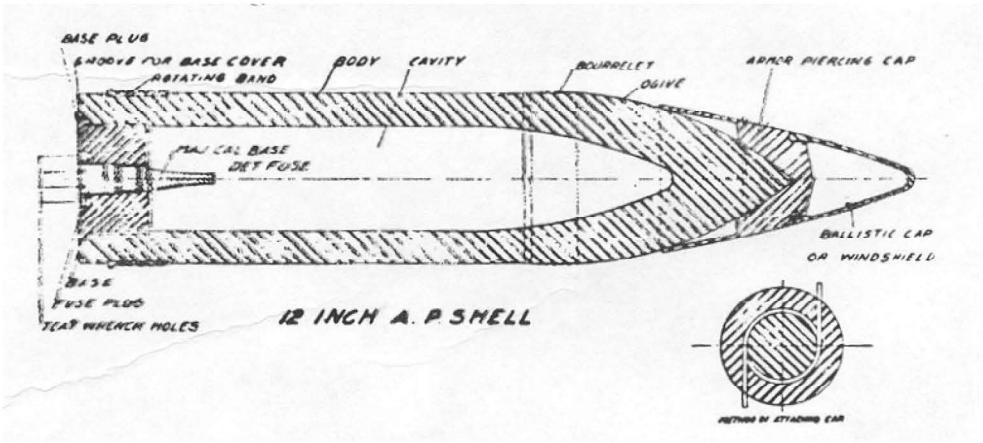
Target Practice – cast iron projectiles for use in target practice.

Shot and shell **are of equal weight when used for the same gun. The shot, however, is shorter than the shell, has thicker walls and carries less explosive. Due to the thicker walls of the shot it has a greater penetrative power than the shell. In the shell the bursting charge is 5% to 6% of the total weight. In the shot it is 1.5% to 2% of the total weight of the projectile.**

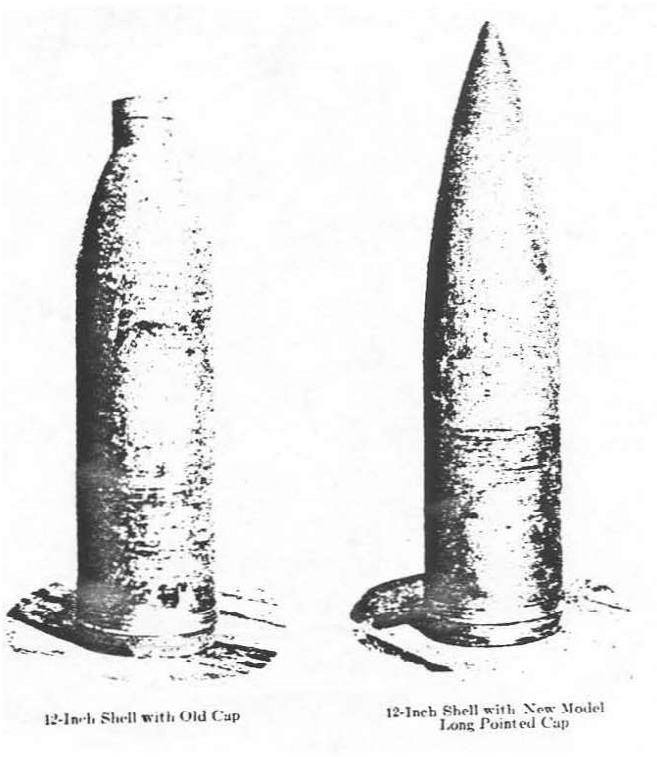




Armor-piercing Cap (A.P.C.) **– all APC projectiles are now fitted with soft steel caps, which, under ordinary circumstances, increase the penetration of the projectile when attacking hard-faced armor. As shown above the A.P. cap is fastened to the body of the shell as follows: an annular groove of semi-circular cross section is ground into the head of the shell and a similar groove is cut in the cap. These grooves coincide when the cap is placed in position. Two pieces of wire are then driven into the grooves through tangential holes drilled in the side of the cap, thus fastening the cap to the head of the shell.**



Ballistic Cap (Windshield) **– Until recently the cap in our service was cylindrical in form with a blunt nose. However, a sharp-pointed cap is now being made.**



12-Inch Shell with Old Cap

12-Inch Shell with New Model Long Pointed Cap

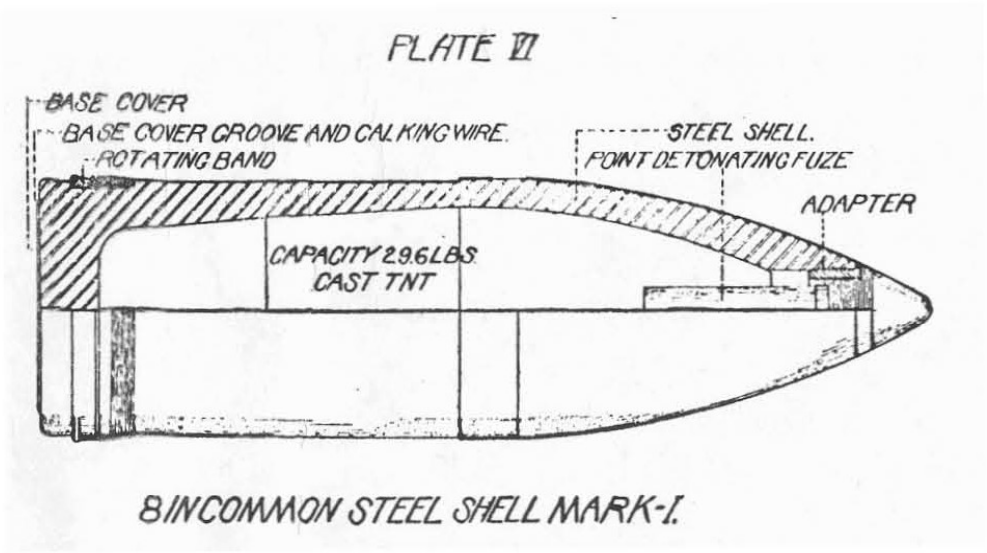
Tracers **– There are two types of tracers, a day tracer and a night tracer. The night tracer consists of a tracer and fuze, assembled in a short metal cylinder, which may be secured in a seat prepared in the base of the projectile. After the projectile leaves the gun, the pressure on the tracer port being released, the cover of the tracer is forced to the rear and thus draws the central rod back and ignites the friction compound, which in turn, ignites the compressed, slow-burning composition. During the day the tracing feature is accomplished by placing in the cavity of the projectile a mixture of lampblack and water.**

Bursting Charges.

T.N.T. **– Tri-nitro-toluol, commonly known as TNT is known in other countries under such names as trotyl, tolite, etc. It was adopted in this country sometime before the war as filler for high explosive shells, mines, bombs, etc., and is used alone or mixed with ammonium nitrate. It is a cream colored crystalline substance when pure, darkening on exposure to the light. TNT may be used in shells of all caliber, but as a rule is used only in point fuzed projectiles, as it has been found more advantageous to use Explosive D in base fuzed projectiles, in which it is possible to load this explosive by means of tamping.**

Amatol **– a combination of ammonium nitrate and TNT. Amatol is made up in two ways: one is a mixture of 50% TNT with 50% ammonium nitrate, and the other is a mixture of 80% ammonium nitrate with 20% of TNT. All amatol filled shells contain some form of smoke mixture to aid in spotting the burst. Smoke may be a mixture of 75% aluminum and 80/20 amatol, or a mixture of ammonium chloride, ammonium nitrate, and TNT. Amatol is used in point fuzed projectiles of all calibers.**

Explosive D **– has for many years been used in this country as a high explosive shell filler, but is now used in only certain types of shells, TNT and amatol being used to a far greater extent. Explosive D is an orange colored salt.**



Fuzes **– may be divided into three general classes according to their mode of action.**

Time fuzes **– or those, which are designed to produce the explosion of the shell at a predetermined time after shell is fired.**

Time fuzes may be further classified as (a) powder train fuzes or those whose time of operation is regulated by the burning of a train of compressed powder, and (b) clockwork or mechanical fuzes depending upon the operation of a clockwork for their time of functioning.

Percussion fuzes **– or those designed to function when the shell meets some resisting object.**

Percussion fuzes are classified as to

(1) Location in the shell: (a) Point (b) Base

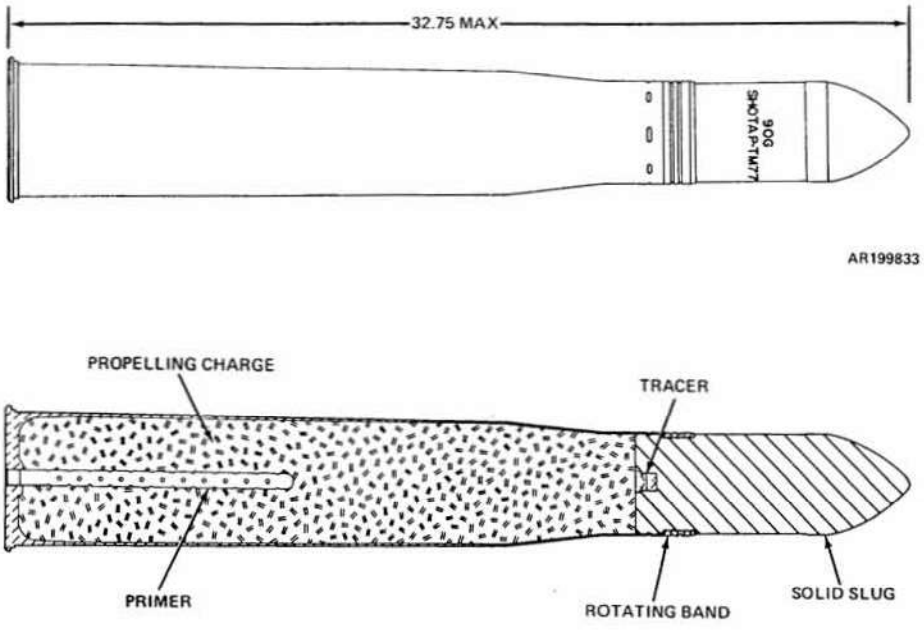
(2) Time of functioning after impact: (a) Instantaneous; (b) Non-delay; (c) Short delay; (d) Long delay

(3) Method of arming: (a) Inertia; (b) Centrifugal force; (c) Those containing both inertia and centrifugal force.

Combination fuzes **– or those containing both the time and percussion elements.**

Reference. **Bulletins 216-R2 and 287** ***Notes on Ammunition,*** **Coast Artillery School, October 1918**

SHELL, 90mm, AP, M77

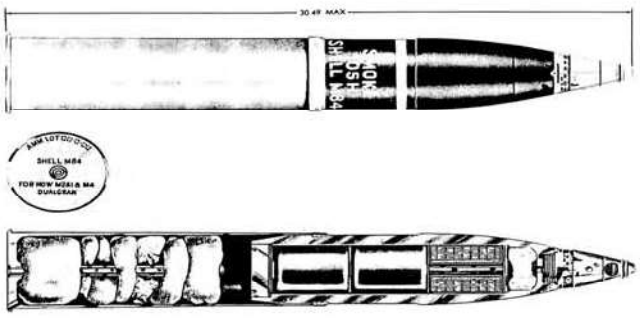


Description. The 90-mm gun M1 can be used either against aircraft or tanks, the ammunition is adapted to both targets. The Shot M77 is provided for antitank use. The projectile consists of a heat-treated solid steel shot with a tracer; no provision made for booster or fuze. The complete round consists of a Shot, armor-piercing, M77, firmly attached to an M19 Cartridge Case containing NH smokeless powder and an M28A1 or A2 Primer.

Length (complete round).....32.75 inches
Length (projectile).....10 inches
Diameter.....3.537 inches
Weight.....42.04 pound
Filler.....None
Weight of propellant.....7.31 pound
Fuze.....None
Color.....Black with white marking

Reference: TM 9-1904, *Ammunition Inspection Guide*, dated March 1944, TM 9-1901, *Artillery Ammunition*, dated September 1950, *Complete Round Chart No. 5981*, dated March 1945

CARTRIDGE, 105mm, SMOKE, HC & COLORED, M84 SERIES



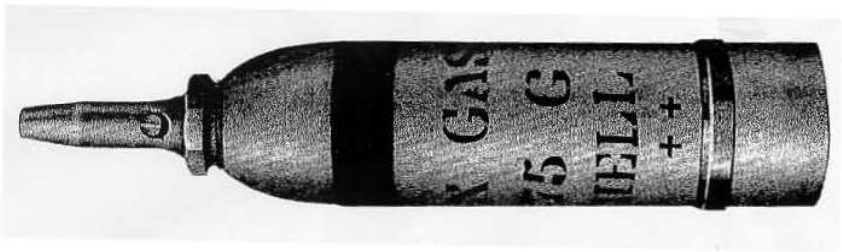
Description. The projectile body consists of a hollow steel forging with a boattail base, a streamlined ogive gilding metal rotating band, and base plug. A black powder expelling charge is assembled into the projectile at the nose end. Next, a steel baffle (pusher) plate, with a central hole, is assembled behind the expelling charge followed by three smoke canisters, alternating spacers, fillers, and the base plug. The spacers are assembled between canisters, as well as at the base, to insure a tight canister pack. An MTSQ or MT fuze is assembled to the nose of the projectile. The canisters are metal cylinders with a central igniter core. Around the igniter core is a first-fire mix which serves to initiate the smoke mix. The smoke mix surrounds the first-fire mix and when initiated, generates a white (HC) or, in the cases of the M84 and M84B1, HC or other colored smoke. The cartridge case contains a percussion primer assembly and even individually bagged and numbered propelling charge increments. 'the base of the cartridge case is chilled and the primmer assembly is press fitted in the base. The percussion primer assembly consists of a percussion ignition element ad a perforated flash tube containing black powder. The seven numbered increment bags are tied together, in numerical order, with acrylic cord. These are assembled into the cartridge case, around the primer flash tube, with Increment I at the base of the cartridge case and Increment 7 toward the mouth of the cartridge case.

Functioning. The projectile functions above ground at a predetermined height based upon time of flight. The fuze initiates the black powder in the expelling charge which flashes through the center hole of the baffle plate initiating the first-fire mix in the canisters. The burning black powder generates gas pressure against the baffle plate which, through the canisters, causes the base plate and canisters to leave the projectile. The first-fire mix initiates the smoke charge. The canisters burn for 40 to 90 seconds.

Length .....30.49 inches
Diameter .....105mm (4.13 inches)
Weight.....41.96 pounds
Filler .....12.3 pounds
Expelling charge.....0.14 pounds Black Powder
Propelling Charge.....M67, 2.83 pounds
Fuze.....MTSQ - M501, M501A1, M577, M548; MT - M565; ET - M762

Reference: TM 43-0001-28, *Army Ammunition Data Sheets for Artillery Ammunition*, April 1994

SHELL, 75mm, CHEMICAL, MK II



General this round also represents older types of rounds in use before the streamlined type were developed. At the time of reference publication date it was the only standard chemical for the 75mm gun. It may be expected that a chemical round of the newer streamlined type (similar to the M64 Chemical round for 75mm howitzers) will be developed in the near future. The loading of this round being carried out at the present time is from empty shell taken from World War I reserves.

Projectile Mk II. This projectile varies from the H.E. Projectile Mk I, only in that it is pipe-threaded in the nose and has no base plate. (Absence of the base plate is common to chemical shell of all calibers.) The purpose of the pipe threads in the nose of the shell is the insuring of a gastight seal in the joint between adapter booster and the nose of the projectile. The adapter booster in this projectile performs the function of bursting the shell. It is not entirely efficient in this respect, sometime fragmenting only the upper half of the shell and leaving the lower half in the form of a cup which would carry a portion of the chemical filler into the ground undisperesed. This projectile will be found provided with five different fillers: H – mustard; FS – chlorsulfonic acid and sulfur trioxide; WP – white phosphorous; FM – titanium tetrachloride; and NC – chlorpicrin. Present loadings are being made with the first three of these fillers while the latter two remain in storage from previous loadings. The projectile is weight-zoned in the same way as is the MkI H.E. projectile. The markings of the projectile for the various fillers is shown in the following table. The base color of the chemical projectile, regardless of agent contained, is gray. The marking are in addition to the designation of weapon, complete round, and weight zones

Chemical Filler	Markings on Shell	
	Present Color Scheme (reference date)	Old Color Scheme (prior to reference date)
H – persistent gas	H – GAS and 2 bands (all in green)	3 red bands
NC – persistent gas	NC – GAS and 2 bands (all in green	1 white, 1 red & 1
FM – smoke	FM – SMOKE and 1 band (all in yellow)	yellow band
FS – smoke	FS – SMOKE and 1 band (all in yellow)	2 yellow bands
WP – smoke	WP – SMOKE and 1 band (all in yellow)	None
		1 yellow band

.*Fuze* M46
Adapter Booster Mk IVB and Mk IV M1

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, 105mm, FIXED, HE, M38 & M38A1
SHELL, 105mm, FIXED, PRACTICE, M38 & M38A1

No Photos available

Guns The 105mm AA Gun M3 on the Mount M1

Shell, Fixed, H.E., M38

General In 1944 the M38 Round was the standard for issue. This was due to the fact that it used the older M2 Mechanical Time Fuze and an adapter rather than the M43 Fuze series. The M2 Fuze required a nose opening of 2.2 inches, and had a booster embodied in its makeup.

Projectile **The M38 Projectile is streamlined in shape and is of forged steel construction. It is adapted to take a fuze that continues this streamline effect. The rotating band on the shell is 1.42 inches wide. A base plate of steel is found welded on the base. A cavity large enough to hold 4 pounds of TNT as a bursting charge is also provided.**

Components A complete round of H.E., M38 consists of a loaded fuzed (M.T. M2 Fuze) projectile firmly attached to the M6 Cartridge Case with is propellant of NH or FNH powder, a distance wad, an igniter, and an M28A2 Percussion Primer.

Shell, fixed, H.E., M38A1

General This high-explosive round is the same in every respect as the M38 mentioned above, with one exception: The nose of the Projectile M38A1 is modified to receive an M43-series Mechanical Time Fuze in conjunction with the M20 Booster.

Shells, fixed, Practice, M38 & M38A1

General These two practice rounds differ from the high-explosive rounds in regard to filler only. The filler consists of 3.09 pounds of an inert filler made of lead oxide, paraffin, and barium carbonate accompanied by a black powder charge. This black powder charge is 8 ounces in the M38A1 Round, while it is only 5 ounces in the M38 round. The components are the same as those in the high-explosive rounds.

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

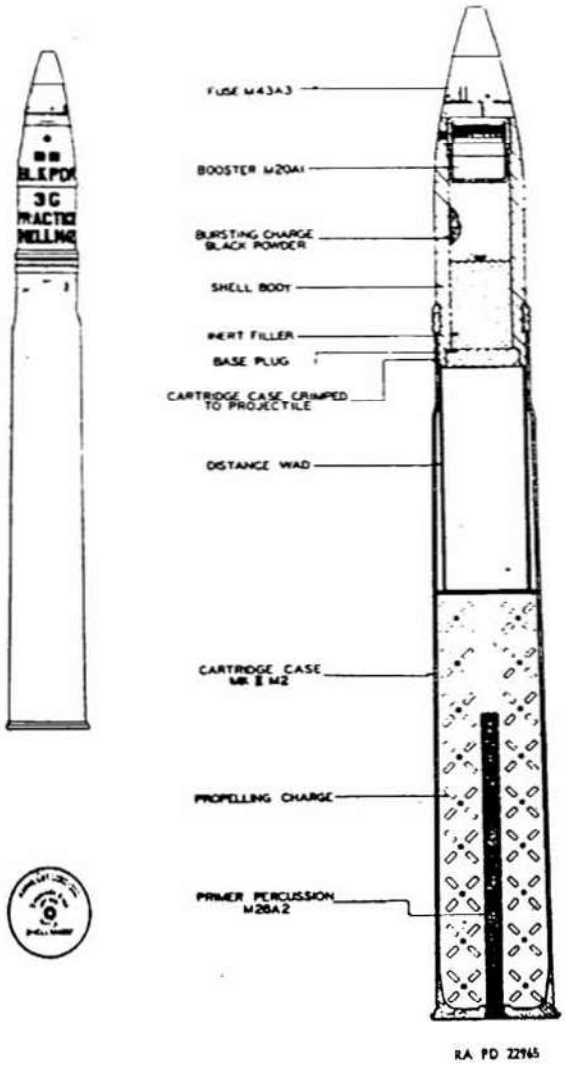
SHELL, FIXED, PRACTICE, 3-INCH, M42B2

General. This round was designed for practice in AA fire, setting of the fuze, etc.

Projectile. The M42B2 Shell body has an open base which is closed when a large steel base plug is screwed into place. In all other respect except for painting it is the same as the M42 Shell body. It is painted with white stencil.

Components. This complete round is sand-loaded with a black powder spotting charge, and has the M20-series of booster, the Mechanical time Fuze M43 (all modifications). The projectile is firmly attached to the Mk. IM2 or Mk. IIM2 Cartridge Case with its propelling charge of NH powder, distance was, and the M28A2 Primer.

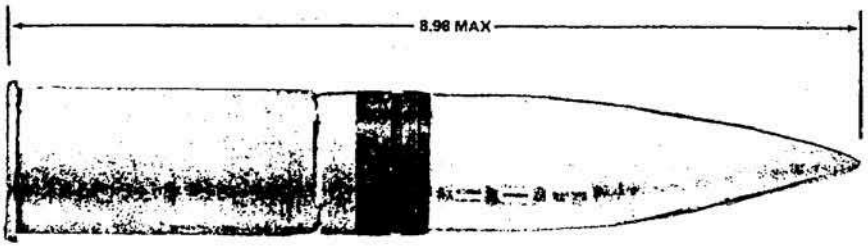
Guns. The M42B2 Practice Round can be used in all models of fixed and mobile mounted guns, providing the cartridge case corresponds with the proper weapon. The round for the fixed mount guns is the only one standard for future manufacture.

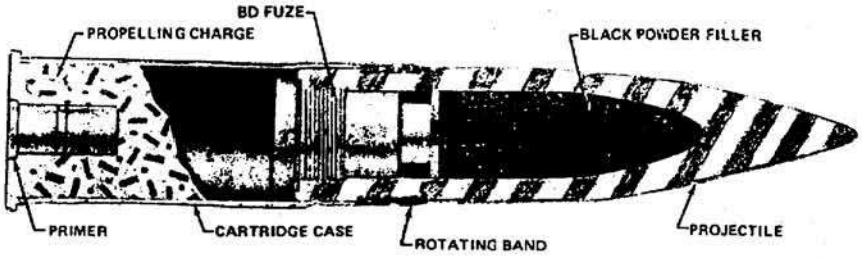


Length (Projectile) .....12.4 inches
Diameter .....3.04 inches
Projectile Weight.....12.65 pounds
Filler .....Sand with black powder spotting charge
Color.....Blue w/white markings
Fuze.....M43 Mechanical Time Fuze

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

SHELL, 37mm, TP, M63 MOD 1





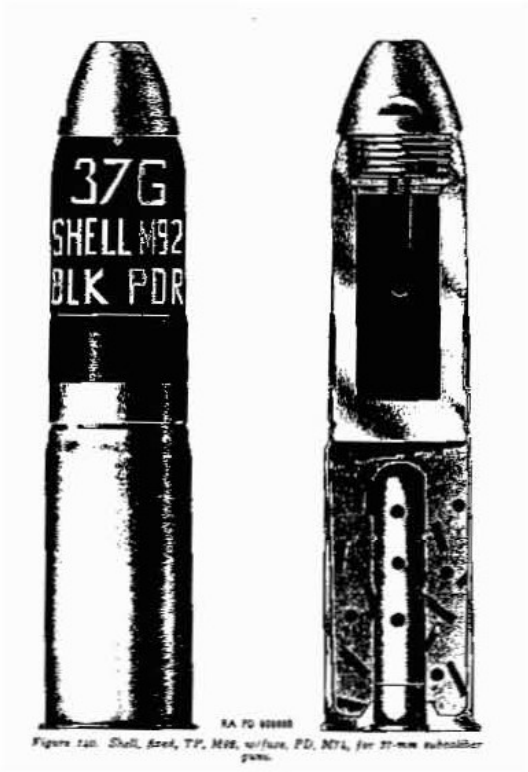
Use. This target practice cartridge is used in subcaliber 37-mm guns fitted to larger weapons for practice firing training.

Description. The cartridge consists of a black powder filled steel projectile crimped to a steel cartridge case and fitted with a base-detonating practice fuze. A rotating band encircles the projectile near the base. The cartridge case is loosely filled with propellant and is fitted with a percussion primer.

Weight.....2.01 pound
Length.....8.98 inch
Filler.....Black Powder
Filler weight.....0.084 pound
Cartridge case.....MK1A2, MK1A2B1
Propellant.....M2, 0.56 pound
Color.....Blue with white markings
(brown band for later manufacture)

Reference: TM 43-0001-28, *Army Ammunition Data Sheets Artillery Ammunition*, April 1977

SHELL, 37mm, TP, M92

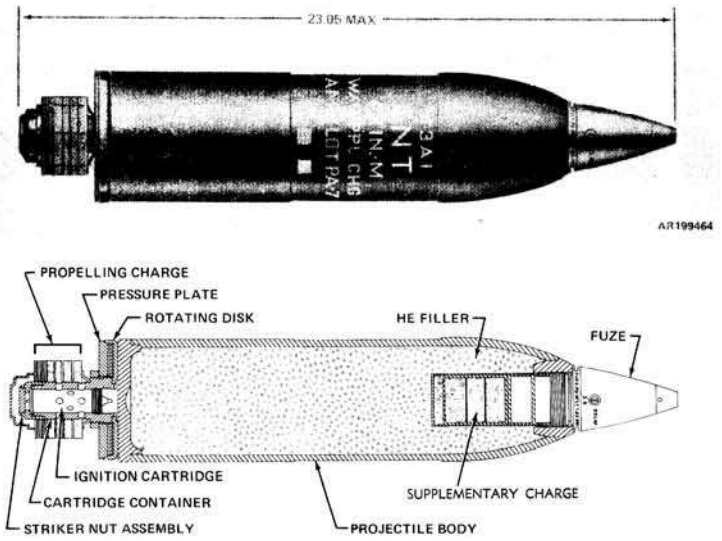


General. This round is used in subcaliber guns M12, M13, M14, M15, and M1916. However, it should not be fired in the 37mm subcaliber gun M14 when used on the 90mm gun M1 or M1A1 on anti-motor-torpedo-boat mount M3 because of the type of the fire control equipment on the M3 mount. The explosive charge consists of 0.086 pound of pressed Black Powder.

Weight of complete round .....1.64 pound
Length of complete round .....7.21 inch
Weight of projectile, as fired ***1.20 pound***
Length of fuzed projectile.....4.14 inch
Length of cartridge case .....3.64 inch
Width of rotating band.....0.74 inch
Radius of Ogive .....2.24 caliber
Muzzle velocity .....1,276 fps
Maximum Range.....5,165 yard
Fuze.....M74 Point Detonating

Reference: TM 9-1901, *Artillery Ammunition*, September 1950

MORTAR, 4.2-INCH, HE, M3A1 & M3



Use. This cartridge is used against personnel and material, providing both fragmentation and blast effect.

Description. The complete round consists of a projectile body, a fuze, and a tail assembly. The steel body is designed to accommodate an impact, delay, or proximity fuze. A deep fuze well in the nose, is fitted with a supplementary charge of TNT. This charge is removed to accommodate certain proximity fuzes. The tail assembly consists of a pressure plate and rotating disc, a propelling charge, a cartridge container and ignition cartridge, and a striker nut assembly.

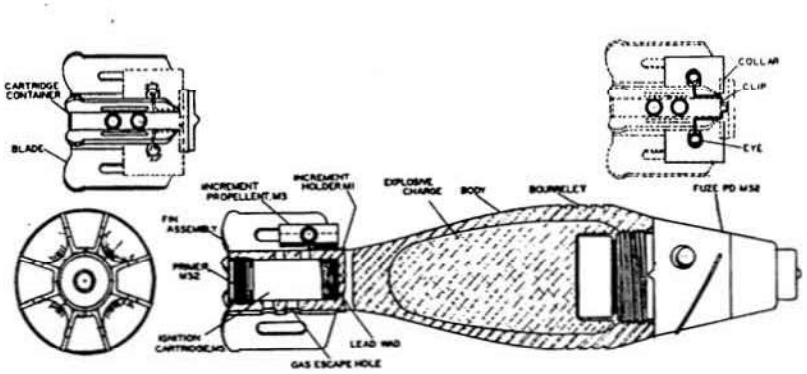
Difference between Models. The fuze well on the M3 cartridge is designed to accommodate the burster tube of the M9 fuze. In addition, the physical dimensions of the two models are slightly different.

Over-all Length.....23.05 inches
Diameter (body) .....4.2 inches
Total Weight .....26.20 pounds
Filler .....TNT
Filler weight.....7.80 pounds
Supplementary Charge .....0.365 pounds
Propellant M6
Fuze.....PD, M557; MTSQ M520 series;
Proximity, M513 series
Color.....Olive Drab w/ yellow markings

Reference: TM 43-0001-28, *Army Ammunition Data Sheets, Artillery Ammunition*, April 1977

MORTAR, 60mm, HE, M49A2,

PRACTICE, M50A2



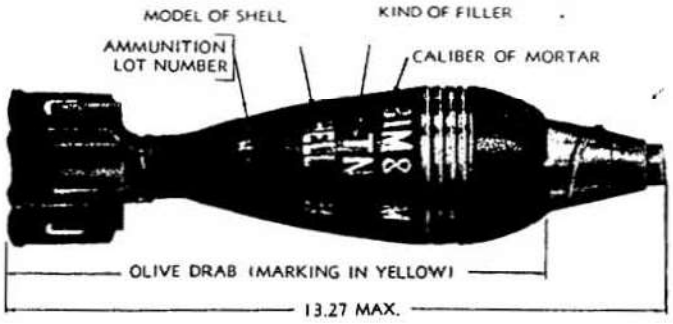
Description. The body of this shell may be constructed of forged steel, cupped-rolled, plate-welded longitudinally, or a machined casting. It is tear-dropped in shape, having a blunt nose and tapered tail. Near the nose end of the shell is a machined bourrelet which acts as a forward bearing surface and as a gas check. The nose is threaded to receive the fuze directly. The fuze used is the Point-detonating Fuze M525A2 which has a superquick action. The tail end is closed and internally threaded to receive the stabilizer assembly. The shell filler is 0.34 pounds of flake TNT. The ignition cartridge M5A1, contains 40 grains of double base powder. The propellant increments, M3, consists of square strips of double base powder sewn together. Each increment has 35 grains of finely granulated double base powder. The shell body is painted olive drab and stenciled in yellow.

Shell, Practice, M50A2. This shell is identical to the service round. It differs in that the filler consists of 0.05 pounds of black powder to act as a spotting charge, and 0.29 pounds of inert filler. The body is painted blue with white stenciling.

Over-all Length.....9.5 inch
Diameter (body) .....2.34 inch
Total Weight .....2.94 pound
Filler .....TNT (flaked)
Filler weight.....0.34 pounds
Propellant ..... ballistite
Fuze.....M52 PD
M525A1 PD
Painting and markings.....Olive drab w/ yellow markings

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944, TM 9-1300-205, *Ammunition for Mortars*, September 1960

MORTAR, 81mm, HE AND PRACTICE, M43A1



Shell, HE, M43A1, Shell Body. It is constructed of forged steel. It is tear-dropped in shape; that is, blunt nose and tapered tail. It has a bourrelet machined near the nose of the shell consisting of several annular grooves which serves to act as a forward bearing surface and a gas check The nose is machined and threaded to receive an adapter. The adapter is threaded and acts as a bushing for a bakelite fuze well cup and the fuze. The fuze used is the Point-detonating Fuze M45. This fuze has a selective element and can be set for either superquick or delay action. The shell filler is 1.22 pounds of TNT. The total weight of the completely assembled round is 7.05 pounds. Entire length of the fuzed shell is 13 1/4 inches.

Fin assembly. The fin assembly consists of a machined cartridge container to which are attached six stationary fins. One end is threaded and screwed on to the body of the shell. The other end is machined and hollow inside so as to receive the ignition cartridge. Several holes leading from the interior to the exterior periphery of the cartridge container serve to conduct the flames from the ignition cartridge to the propellant increments which are seated in the fins.

Shell, Practice, M43A1. The shell body, components used, and packing are identical to the shell previously described. It differs in that the filler consists of 0.16 pound of black powder to act as a spotting charge, and 1.06 pounds of inert filler such as wax, talcum, or rosin. The body is painted blue with white stencil to indicate a practice shell.

Over-all Length.....13.25 inches
Diameter (body).....3.16 inches
Total Weight.....7.05 pounds
Filler
- **HE**.....TNT, 1.22 pound
- **Practice**.....Black powder, 0.16 pound

Propellant.....Ballistite
Fuze.....M45, point-detonating

Painting and markings

- **HE**.....Olive drab, yellow markings
- **Practice**.....Blue, white markings

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

MORTAR, 81mm, HE, M56

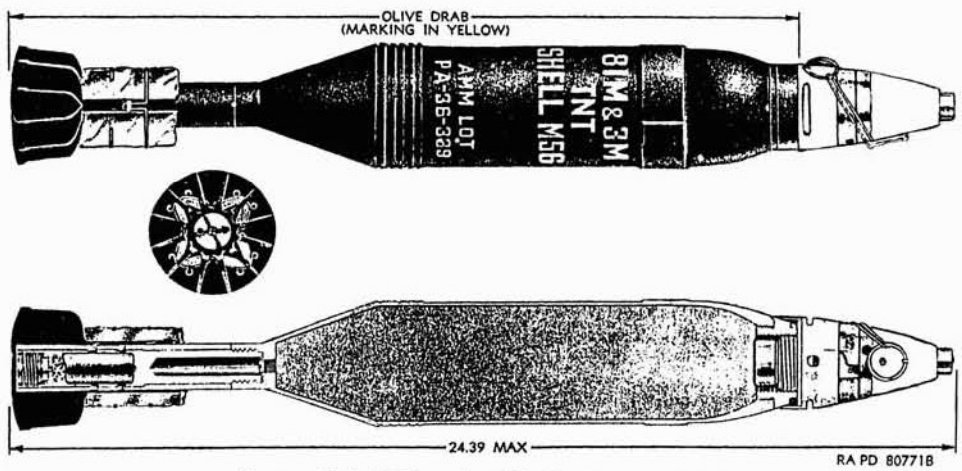


Figure 98. Shell, HE, M56, w/fuze, TSQ, M77, for 81-mm mortars.

General. This shell is the heavy type of the two current standard rounds for fragmentation and blast effect. The standard round consists of six components: the M56 shell or an alternative (M56B1, M56B2, or M56B3), and M77 TSQ fuze, an M4 fin assembly, an M2A1 propelling charge, an M6 ignition cartridge, and an M34 percussion primer. When the M77 fuze is not available, FUZE, PD, M52A1 will be issued when SQ action is needed. The projectile is made up of a 4.3-pound high-explosive charge (TNT) held in a thin-walled shell made of steel tubing. The shell casing is formed to a long cylindrical shape with a long tapered (boat-tailed) base and a short ogival nose. In M56 and M56B2 shells, the nose is threaded to hold an adapter into which the fuze is assembled after the shell is loaded. The M77 fuze is not staked to shell M56B1, and M56B3 shells have nose opening to suit the fuze eliminating the need for an adapter. The tapered base is drilled and threaded to hold the fin assembly, except in the case of the M56B3 shell which is fitted with a threaded base plug. The fin assembly is an aluminum alloy die casting with 12 blades seated on a hollow cylindrical shaft. The shaft acts as a sleeve for a steel liner which is threaded at the front end to screw into the shell base. The rear of the liner is hollow and holds the ignition cartridge and primer, the latter screwing in and holding the cartridge in position. The shaft is vented to permit transmission of the flash of the ignition cartridge.

Range. Maximum range with charge 4 (cartridge and 4 increments) is approximately 2,560 yards. Maximum range with other charges are: charge 3, 3,000 yards (at 49¾°); charge 2, 1,400 yards (at 68¼°); charge 1, 800 yards (at 56½°).

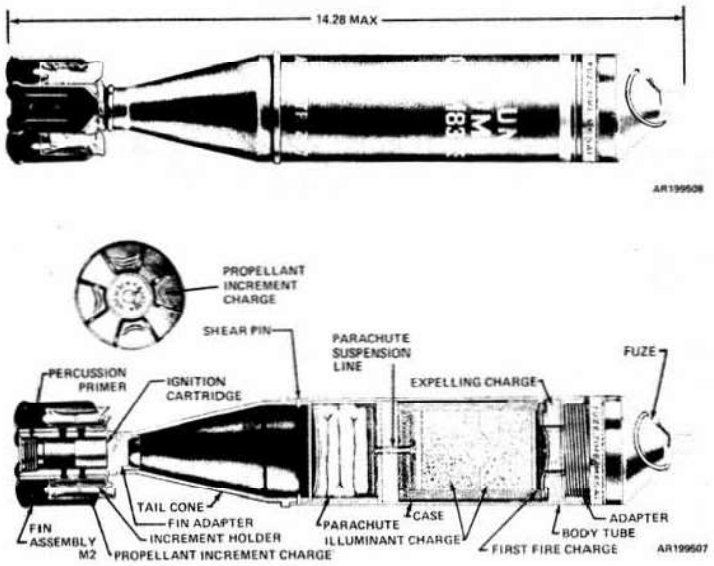
Over-all Length
- **w/M77** ..... 24.45 inches
- **w/M52A1 and M53A1** ..... 22.91 inches

Diameter 81mm
Total Weight ..... 10.97 – 11.86 pounds
Filler ..... TNT, 4.3 pounds

Fuze.....M77 TSQ; M52A1 PD; M53A1 PD
Painting and markings..... *Olive Drab w/ yellow markings*

Reference: TM 9-1901, *Artillery Ammunition*, September 1950

MORTAR, 60mm, ILLUMINATING, M83A3, M83A2, & M83A1



Use. This cartridge provides illumination for observation during night missions.

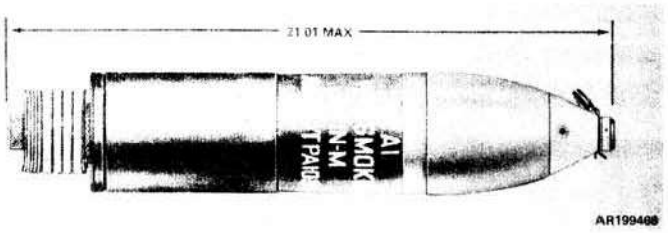
Description. The complete round consists of a body tube, a tail cone assembly, an illuminant charge, a parachute assembly, a time fuze, a fin assembly with four increments of propellant charge, an ignition cartridge, and a percussion primer. The nose of the thin-walled steel tubing body is fitted with a steel adapter and internally threaded to accept the fuze. The cone is fitted with an internally threaded adapter to accept the fin assembly, and is attached to the body tube with four equally spaced shear pins. The illuminant assembly, which consists of a first-fire charge and an illuminant charge, is contained in a boxboard casing which is attached to the parachute with a suspension line. An expelling charge directly below the fuze, ejects the illuminant and parachute assembly.

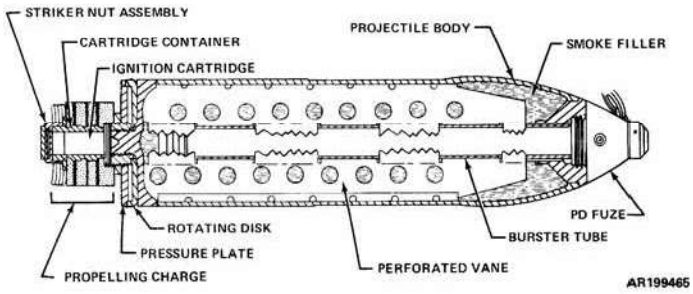
Length .....14.28 inches
Diameter (body) .....81 mm
Weight.....4.15 pounds
Filler .....Illuminating
Filler weight.....0.49 pounds
Propellant
- **M83A3**.....M182
- **M83A2 & M38A1** M3A1

Fuze.....Time, M65A1
Painting and markings.....White with black markings
Fin assembly.....M2

Reference: TM 43-0001-28, *Army Ammunition Data Sheets, Artillery Ammunition*, April 1977

MORTAR, 4.2-INCH, SMOKE, PWP OR WP, M2A1 AND M2





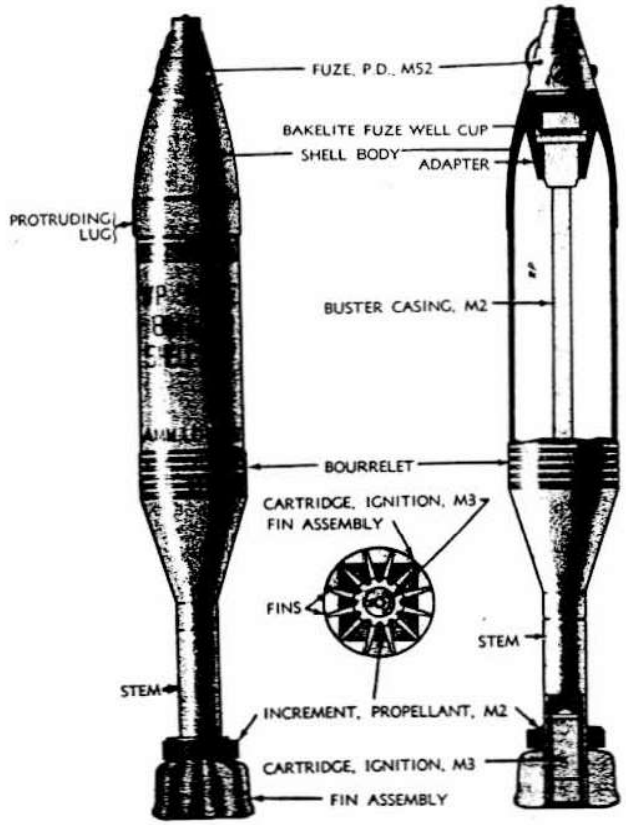
Use. This cartridge is used against personnel and material as an incendiary device, and to produce a screening smoke.

Description. The complete round consists of a projectile body, a point detonating (PD) fuze with an integral burster, and a tail assembly. The body contains a perforated vane assembly welded to the inside of the body and designed to accommodate the burster tube that extends from the fuze. The tail assembly consists of a pressure plate and rotating disc, a propelling charge, a cartridge container and ignition cartridge, and a striker nut assembly. Cartridge M2 differs slightly from the Cartridge M2A1 in the design of the obturating mechanism.

Over-all Length.....21.01 inches
Diameter (body) .....4.2 inches
Total Weight .....24.91 pounds
Filler .....(WP) White Phosphorous or (PWP) Plasticized White Phosphorous
Filler weight.....7.50 pounds
Propellant M6
Fuze.....PD, M8 (with M14 burster)
Painting and markings.....Gray w/ yellow band and yellow markings

Reference: TM 43-0001-28, *Army Ammunition Data Sheets, Artillery Ammunition*, April 1977

MORTAR, 81 mm, CHEMICAL, M57



Description. Three chemical fillers were used in these shells. The mortar was used for the placing of smoke screens or gas clouds with a secondary incendiary effect when white phosphorus was used as its chemical filler.

Filler	Weight of filler (lbs)	Weight of Round (lbs)	Color Code
WP	4.04	11.50	blue-gray base with yellow stencil and yellow band
FS	4.59	12.00	blue-gray base with yellow stencil and one yellow band
H	3.15	10.45	blue-gray base with green stencil and two green bands

Fuze M52, Point Detonating
Burster M1, Tetryl
Propellant Increments M2

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

MORTAR, 60mm, PRACTICE, M50A2

Use. This shell is a practice round provided for the 60mm mortars.

Description. Components of the M50A2 practice round are the same as used in the M49A2 service round except for the high-explosive shell filler. The M50A2 projectile has a filler of inert material (plaster of paris and stearic acid, and a black powder pellet (0.05-lb), adjacent to the booster of the M52A1 fuze. The M52A1 or M52A1B1 fuze is a superquick fuze and causes the shell to function upon impact. The black powder pellet and booster charge provide a spotting charge for observation purposes. The shell is loaded to the same weight as the service round, thereby providing for the same ballistic values. The M52A1B1 fuze is approximately 0.13 pounds lighter than the M52A1 fuze.

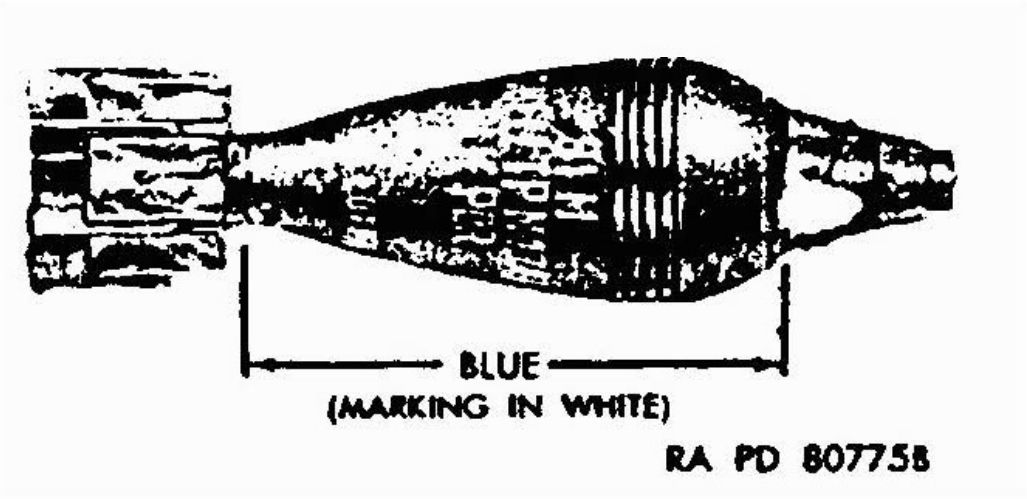
Weight assembled.....3.07 pounds
Length assembled.....9.59 inches
Filler.....INERT with black powder pellet
Fuze.....M52 series
Color.....Blue w/White markings

Muzzle Velocity/Maximum Range

Charge 0.....189 fps/332 yds
Charge 1.....292 fps/784 yds
Charge 2.....377 fps/1,204 yds
Charge 3.....449 fps/1,594 yds
Charge 4.....518 fps/1,990 yds

Reference: TM 9-1901, *Artillery Ammunition*, September 1950

MORTAR, 81mm, PRACTICE, M43A1



Use. This is a practice round to simulate Shell, HE, M43A1.

Description. It is an adaptation of the M43A1 service round for practice purposes, accomplished by changing the shell filler. All other components are the same as for the service round, and construction and assembly of these in the round are the same. For practice purposes, the shell cavity is filled with an inert material (plaster of paris and stearic acid) except for a 0.05-pound black powder pellet. The black powder is loaded at the front end of the cavity, adjacent to the rear wall of the booster casing when the fuze is assembled t the shell. The fuze booster charge and black powder pellet provide a spotting charge for observation of fire. Ballistic properties are the same as for M43A1 service round.

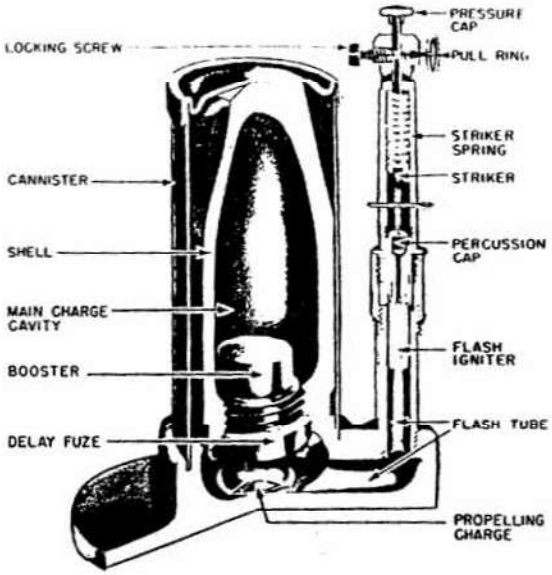
Weight assembled .....7.28 pounds
Length assembled .....13.32 inches
Filler .....INERT with black powder pellet
Fuze .....M52 series
Color .....Blue w/White markings

Muzzle Velocity/Maximum Range

Charge 0 .....235 fps/541 yds
Charge 1 .....332 fps/1,020 yds
Charge 2 .....419 fps/1,502 yds
Charge 3 .....499 fps/2,042 yds
Charge 4 .....572 fps/2,517 yds
Charge 5 .....638 fps/2,963 yds

Reference: TM 9-1901, *Artillery Ammunition*, September 1950

MINE, ANTI-PERSONNEL, M2

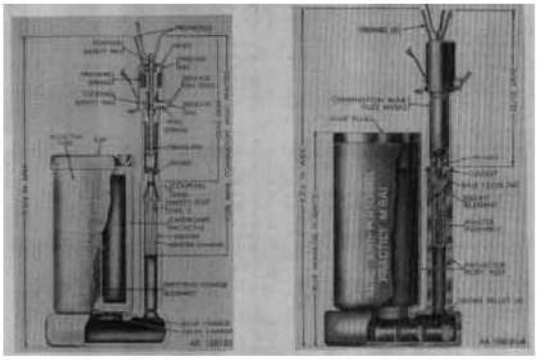


Description. The M2 is a "bounding" anti-personnel mine, usually activated by a combination firing device. The mine consists of an explosive shell contained in an upright thin-walled steel tube that is riveted to the base plate. A cavity in the base plate contains the propelling charge, which consists of 20 grains of black powder. The tube containing the shell is sealed at the top by a metal cap. The mine is similar to a small mortar. When the fuze is actuated, the primer sets off the igniter. The flash from the igniter sets off the propelling charge in the base plate which projects the shell into the air and at the same time ignites the delay fuze in the base of the shell. When the shell is at a height of approximately six feet above the base plate, the delay fuse fires a tetryl booster, which detonates the main charge. These mines are usually fuzed with the Combination Fuze M2 or M2A1 consisting of the combination-firing device M1 with an igniter cap attached, or with the combination Fuze M6.

Over-all Height .....6.5 inches
Case diameter.....2.5 inches
Base diameter.....5.25 inches
Weight of shell.....3 pounds
Filler Weight .....0.4 pounds
Color.....Mine and firing device is dull Olive drab in color except for the base flange, which is yellow.
Fuze.....M2, M2A1, or M6

Reference: NAVSEA OP 1664 Volume 1&2, *U.S. Explosive Ordnance*, May 47

MINE, ANTIPERSONNEL, PRACTICE, M8



Use. The antipersonnel practice mines M8 and M8A1 simulates the M2 series of antipersonnel mines and are used for training in the proper methods and precautions to be observed in the care, handling, laying, booby trapping, arming, and disarming of the M2 and M15 series.

Description. The metal parts of these mines are similar to those of service mine M2A4; The M8 mine uses a cardboard projectile containing a spotting charge. The M8A1 uses smoke pellets to indicate activation of the mine. These practice mines may be used many times by replacing the fuzes and separately requisitionable components.

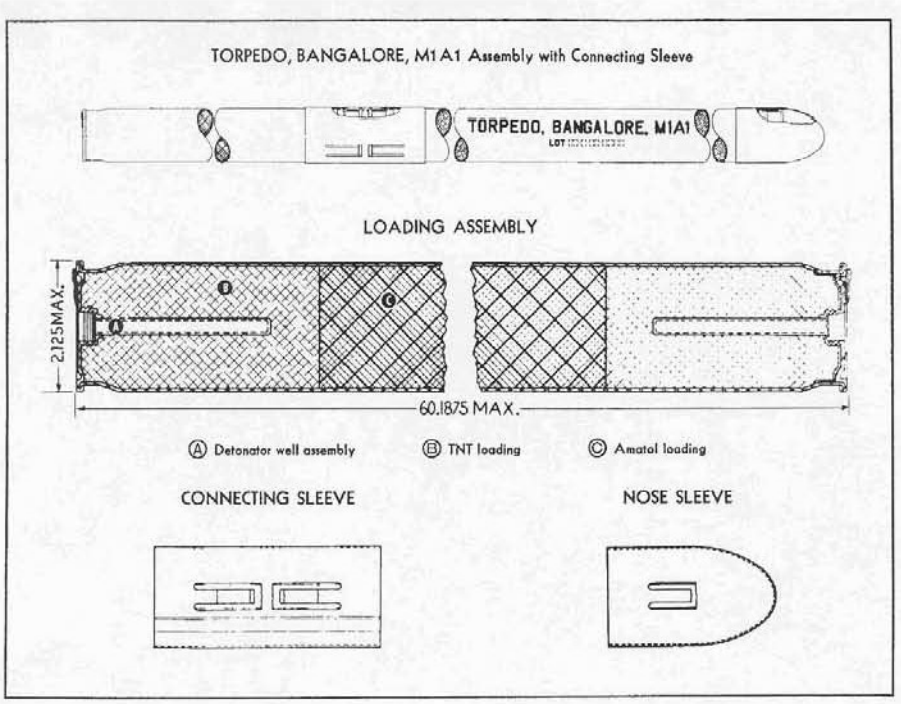
Functioning. Mine M8 with Fuze M10 or M10A1. The fuze firing mechanism is activated by an applied load of 8 to 20 pounds on any of the prongs or by pull of 3 to 10 pounds of the trip wire. The fuze firing train ignites the delay element in the projectile and also propels it about 2 meters into the air. The delay initiates the spotting charge that explodes with a loud report and emits smoke.

Mine M8A1 with Fuze M10A2. The fuze firing mechanism is activates in the e it manner as the M8. The fuze firing train ignites the yellow smoke pellets through 4 to 5 second delay. The plastic plug is propelled in the air allowing the yellow smoke to be emitted from the top of container

Height - fuzed.....9.75 inches
Diameter.....4.03 inches
Weight.....4.5 pounds
Filler Weight
  M8.....Black powder, 186.32 gr. max
  M8A1.....Smoke composition, 11.92 gr.
  Yellow Smoke, 92.7 gr.
Color.....Blue
Fuze
  M8.....M10, M10A1
  M8A1.....M10A2

Reference: TM 43-0001-36, *Army Ammunition Data Sheets for Land Mines*, February 1977

BANGALORE TORPEDO, M1A1



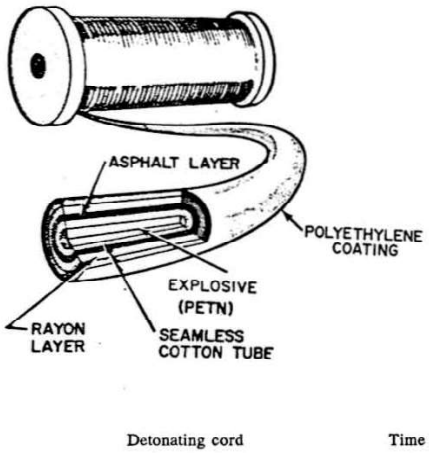
The Bangalore Torpedo is a tube filled with high explosive and used primarily for blasting an opening through wire entanglements and for clearing mine fields. The M1A1 Bangalore Torpedo consists of a steel tube, 5 feet long and 2 1/8 inches in diameter, flanged and capped at each end.

The torpedo is loaded with four inches of TNT at both ends of the tube and the mid-section is filled with 82-20 amatol. The complete charge weighs about 9 pounds. Each end of the tube contains a threaded recess to accommodate a blasting cap. A nose sleeve fits on the end of the torpedo and connecting sleeves are provided for assembling torpedoes in multiple lengths. This torpedo also may be used as an anti-personnel mine or as a demolition charge.

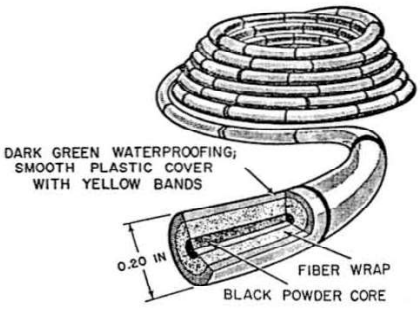
Standard Corps of Engineers special blasting caps, either electric or fuzed, may be used to detonate the torpedo. The nose sleeve is held in place by a single clip. It aids while moving the torpedo through or around obstacles. The connecting sleeve is a short tube, which has six spring clamps. When assembling two torpedo tubes with a sleeve, each tube is held by three spring clamps.

Reference: TM 9-1904, *Ammunition Inspection Guide,* March 1944

CORD, DETONATING AND FUZE, BLASTING, TIME M700



Detonating cord



Time blasting fuse

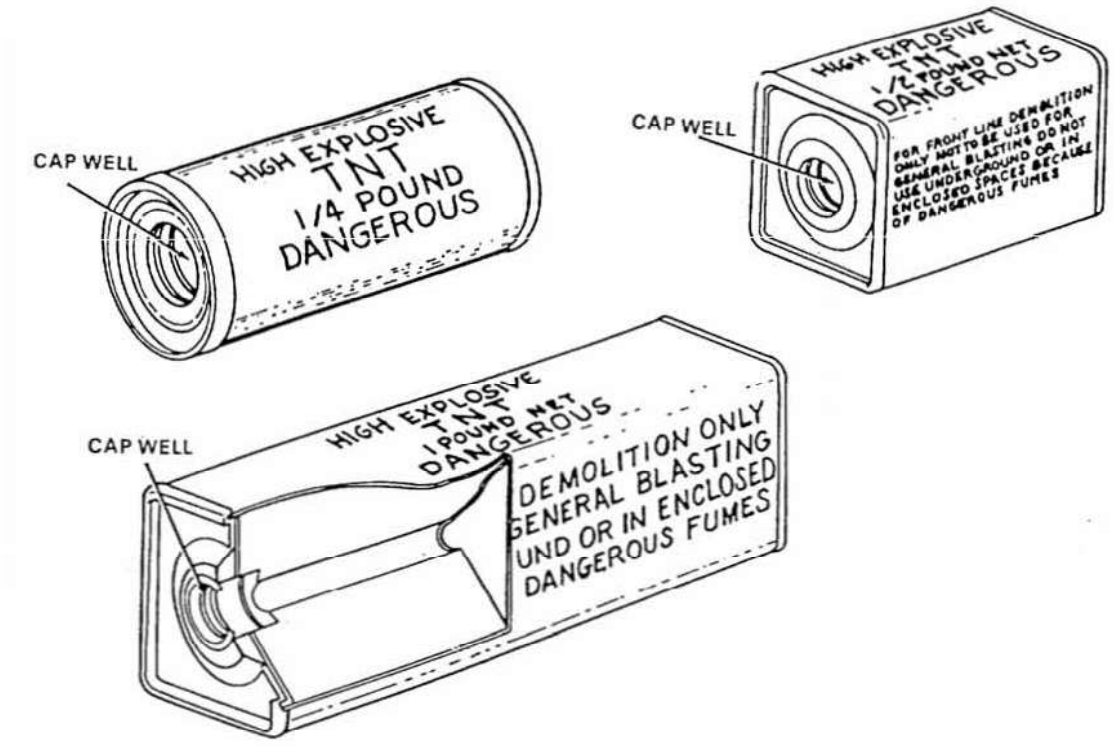
USE. Detonating cord is used to prime and detonate other explosive charges. Time blasting fuze is used to ignite nonelectric blasting caps.

Description. Both of these demolition materials are sheathed in an olive drab plastic cover that resembles thick clothesline, but each has a very different filler. Detonating cord contains a central core of PETN high explosive, while the time blasting fuze contains black powder. The important difference is that detonating cord explodes at a velocity of 5,000 feet per second, while time blasting fuze burns at around 40 seconds per foot. Detonating cord can be initiated by either electric or nonelectric blasting caps and can transmit an explosive wave from one demolition charge to another. Either a fuze igniter or match initiates time blasting fuze and can itself initiate nonelectric blasting caps.

Diameter .....approximately 0.20 – 0.23 inches
Overall Length .....Detonating cord can be cut to any length from 500 or 1,000 foot spools; Time blasting fuze can be cut to any length from 50-foot spools
Filler .....Detonating Cord: PETN; Time blasting fuze: Black Powder

References: *USAF, T.O., 1-1M-34*; *ORDDATA*, Naval EOD Technology Division, Indian Head, MD

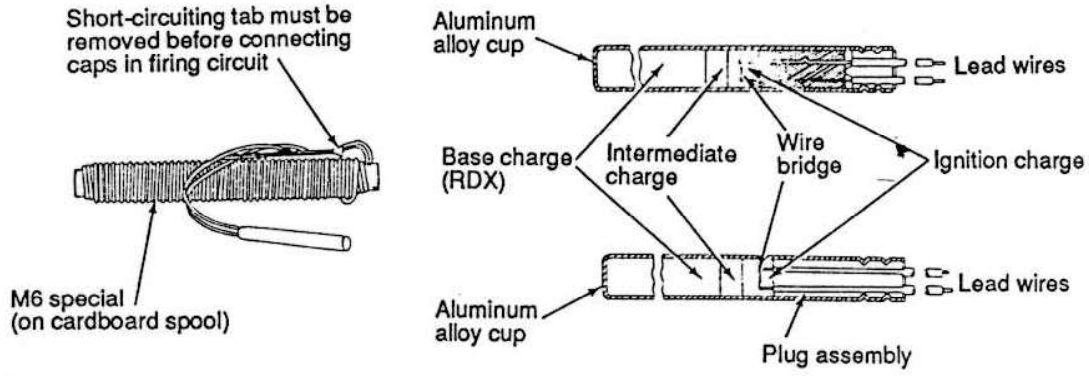
TNT, (TRINITROTOLUENE)



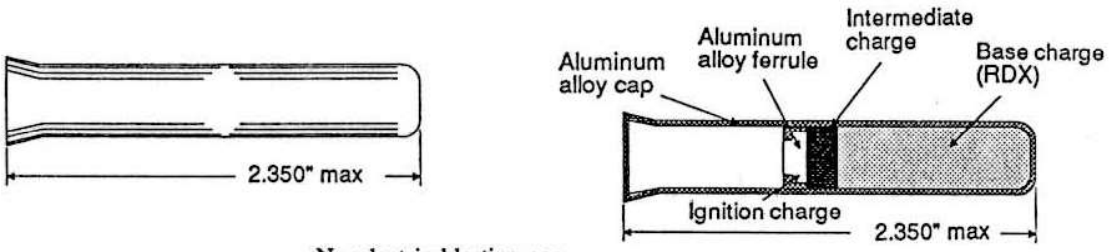
Description. TNT (trinitrotoluene) block demolition charges are standard demolition charges used for all types of demolition work. However, the 3-pound charge is used primarily for training purposes. TNT is manufactured in the form of light yellow crystals from the successive nitration of toluene. Toluene is produced byproduct coke ovens as a byproduct in manufacture of illuminating gas in the manufacture of kerosene from crude petroleum. TNT as issued to the service has a density of 1.46 and melts at 176° F. TNT is issued in three sizes. The 3-pound block is issued in a cylindrical waterproof olive-drab cardboard container. The 2-pound and 1-pound blocks are issued in similar rectangular containers. All of the three charges have metal ends with a threaded cap well in one end. TNT is insensitive in all forms and requires a powerful detonating agent. It will not detonate even under strong pressure or severe blows. It is detonated by the special issue tetryl caps and by detonating cord. The detonation of TNT produces poisonous gases, but in open air these are rapidly dissipated as to be harmless.

References: FM 5-25, *Explosives and Demolitions*, January 1942; FM 5-25, *Explosives and Demolitions*, May 1967; FM 5-25, *Explosives and Demolitions*, March 1986

CAP, BLASTING, ELECTRIC, M6 AND NONELECTRIC, M7



Electric blasting cap



Nonelectric blasting cap

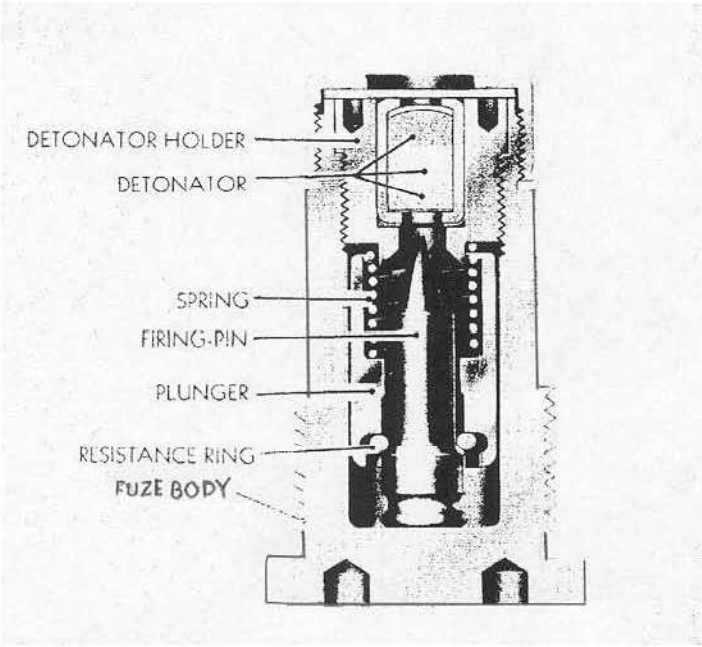
Use. Blasting caps are used to initiate high explosive demolition charges. Electric caps utilize a blasting machine or other source of electric power, while nonelectric caps are used in conjunction with time blasting fuse or a firing device base coupling.

Description. Blasting caps are small, thin aluminum (sometimes copper) tubes containing minute amounts of initiating explosives and a base charge, usually of RDX. Electric caps have two lead wires connected to a bridge, wire, which is inside the tube. Nonelectric caps also contain initiating explosives and a base charge, but have a flared opening to accept either time blasting fuze or the base coupling of a firing device. Initiation of these blasting caps will detonate all military explosives.

Diameter .....approximately 0.24 –0.26 inches
Overall Length .....2.35 inches
Filler .....electric: lead styphnate, special mix (smokeless powder) and RDX; nonelectric: lead styphnate, lead azide, RDX

References: TM 43-0001-38, *Army Ammunition Data Sheets for Demolition Materials*, June 1981; FM 5-250, *Explosives and Demolitions*, 15 June 1992

FUZE, BASE DETONATING, PRACTICE M38



Use. Used in the shell, Practice, Subcaliber, Mk IIA1

The M38 fuze is a non-delay, base detonating fuze which contains no booster and requires but few parts for its functioning. The plunger assembly contains the firing pin and a resistance ring which fits over the shoulder of the firing pin in the unarmed position.

Upon firing of the propelling charge, setback moves the plunger to the rear and forces the resistance ring over the shoulders of the firing-pin until it seats in a groove in the pin. This action locks plunger and pin together. The plunger unit is now armed but held away from the detonating charge by a spring.

When the projectile strikes, the weight of the plunger and firing pin unit compresses the spring. The pin strikes the detonator, which ignites the bursting charge in the shell.

Reference: *Catalogue of Ordnance Items, Vol. III,* Second Edition, 1944

FUZE, BASE DETONATING, M62 & M62A1

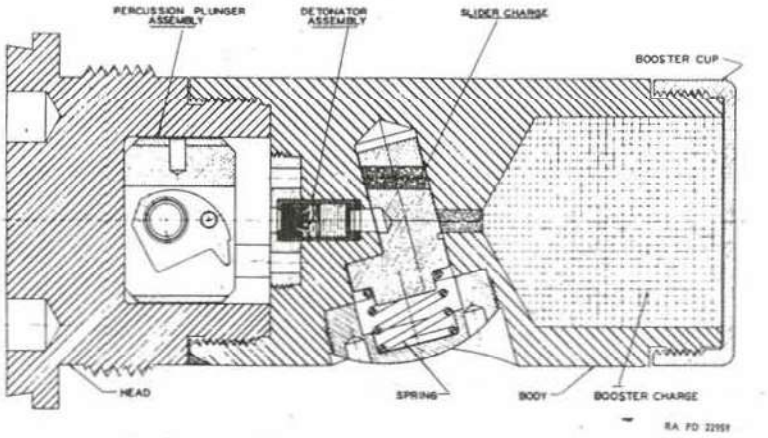


Figure 175 — FUZE, B.D., M62

General The M62 Fuze is a comparatively small device, measuring approximately 1.75 inches in diameter, and 3.5 inches in length. It is designed for use in the H.E., AT shell only.

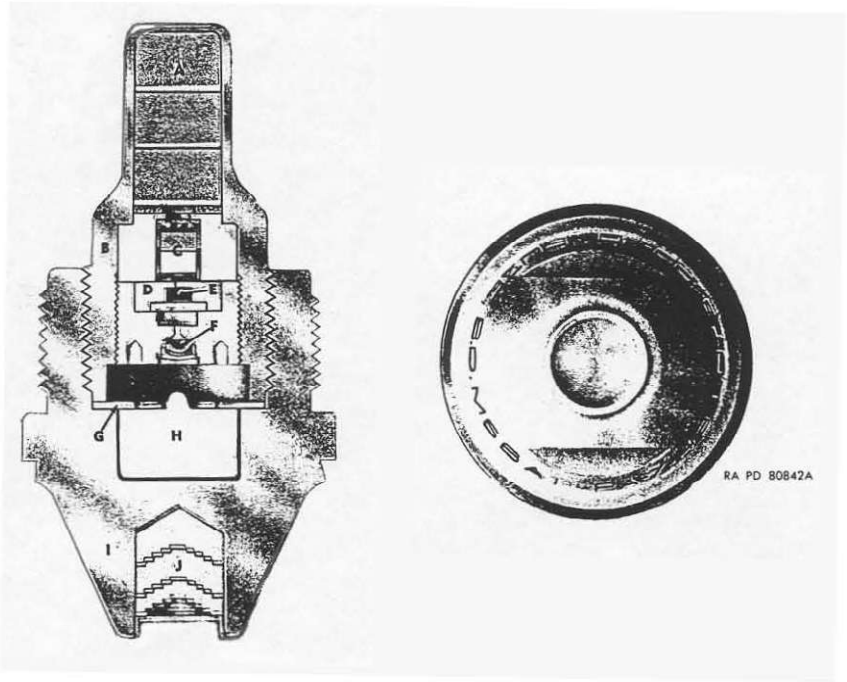
Description This fuze consists of two major parts, the head and the body. A recess within the head seats the percussion plunger. The body contains the explosive train, which consists of a detonator of priming mixture, lead azide, and tetryl; a slider charge of tetryl; a booster lead charge of tetryl; and a booster charge of tetryl. The booster charge is held within the cavity in the upper end of the body by the booster cup. The body also houses a slider, slider spring, and retaining cap. This device causes the fuze to be bore-safe by positively interrupting the explosive train and also by carrying a charge of tetryl out of alignment with the remainder of the explosive train in the unarmed or safe position.

Function The frictional forces resulting from linear acceleration prevent movement of centrifugally actuated parts while the projectile is in the bore of the weapon. When the projectile emerges from the weapon, however, centrifugal force cause arming of the percussion plunger and slider assemblies. The centrifugal pins which hold the rotary firing pin of the plunger against their springs, thereby releasing the firing pin. The firing pin is rotated outward and upward into its armed position beneath the detonator by centrifugal force. Also, centrifugal force moves the slider outward to its armed position, aligning the slider charge of tetryl with the remainder of the explosive train

The M62 is used with Shell, H.E., A.T., 75mm; the M62A1 is used with the Shell, H.E., A.T., 105mm

Reference: TM 9-1904, *Ammunition Inspection Guide,* May 1944

FUZE, BASE DETONATING, M66A1



General. The M66A1 is a delay-action base detonating fuze which is provided for use with the M61 and M61A1 (75mm) and M62 and M62a1 (76mm) armor-piercing capped projectiles. It is a simple inertia-type fuze without bore-safety provision, in which the firing pin is held at rest by a soft steel washer prior to impact at the target. Upon impact, the weight of the firing pin forces it past the washer.

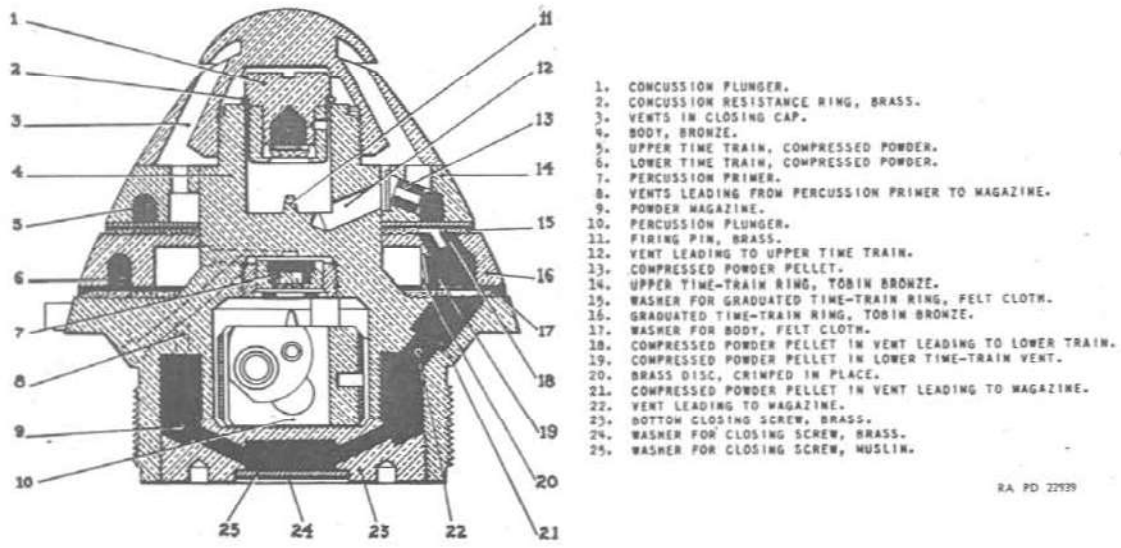
Data. Over-all length, 3.458 inches; weight, 1 pound; thread size, 1.65-10NS-1 LH.

Description. The fuze is made up of three parts: a body assembly (I), a detonator-booster assembly (B), and a primer holder assembly (D). The body assembly contains the firing pin and, in a cavity in the boat-tailed rear portion, a red tracer composition (J) which operates independent of the fuze mechanism. The detonator-booster assembly holds a tetryl booster pellet (A) and a detonator (C). The primer holder assembly contains PRIMER, No. 26 and a black powder pellet (E).

Function. The tracer composition is ignited by the flash of the propelling charge, and burns thereafter for a prescribed time (minimum 0f 3 seconds), providing a visible trace. The firing pin remains at rest upon firing and during the flight of the projectile. Upon impact, the forward force of the firing pin breaks the soft steel washer, and the point of the pin strikes the primer. Action of the primer ignites the delay pellet. After burning a prescribed time (0.01 second), the black powder pellet initiates detonation of the detonating elements in the explosive train. The final charge (the booster pellet) in turn caused the filler of the projectile to explode.

Reference: TM 9-1901, *Artillery Ammunition,* Sep 1950

FUZE, COMBINATION, 21-SECOND, M1907M



This fuze is designed for use with 75mm, shrapnel, combines in one fuze body a mechanism for operating on impact or after the lapse of a predetermined period of time. This fuze can be set and reset at any time from 0, for canister effect (point blank burst approximately 75 feet from the muzzle), to 21.2 seconds, the longest time that the fuze will burn after leaving the weapon. It is made of brass and bronze, and weighs 1.25 pounds.

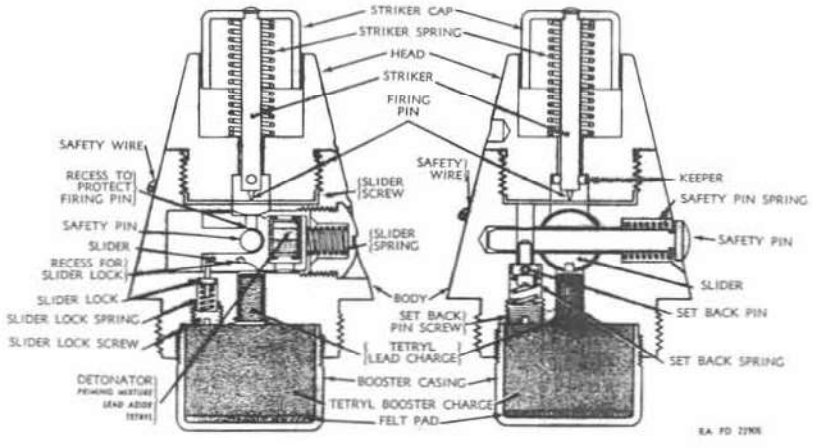
The body of the fuze is machined from a bronze casting. The time-train rings 14 and 16 are turned from hard-rolled rods of Tobin bronze. An annular groove in the shape of a horseshoe is milled in the lower face of the time-train rings. Meal black powder is compressed into these grooves under high pressure, forming a time train, the total length of which is approximately 9 inches.

The fuze is issued set at safe and assembled to the shrapnel projectile. It is protected by a waterproof cover, which is removed and thrown away when the fuze is set for time of flight.

The fuze has no detonating element, as it is designed to ignite the base charge of black powder in the shrapnel. If the time element of the fuze fails to function, or the setting is too long, the percussion element will cause the shrapnel to function upon impact. The term "combination" is derived from this double-action (time and impact) feature. Either burning of the time element or firing of the percussion element on impact will ignite a black powder magazine charge of the fuze. The flame from this charge will cause ignition of the black powder base charge of the shrapnel.

Reference: TM 9-1904, Ammunition Inspection Guide, May 1944; Book 101, *Field Artillery Ammunition,* 1932

FUZE, POINT DETONATING, M52



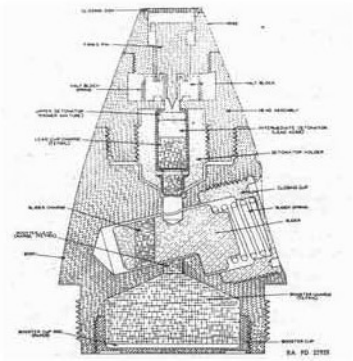
General. The M52 Fuze is a superquick fuze used to effect the functioning of rounds fired from the 81-mm and 60-mm mortars. It is normally used with light shell when fragmentation above the ground is desired. This fuze will fit any of the present "M" series of shell; however it is only assembled in the following shells at present: M43A1 H.E., 81mm Mortar, M57 Chemical, 81-mm Mortar, M43A1 Practice, 81mm Mortar, M49A2, H.E., 60mm Mortar, M44 Practice, 81mm Mortar, M50A2 Practice, 60mm Mortar.

The weight of the fuze is 0.45 pound. The fuze housing is made of aluminum. The head of the fuze screws into the body. The head houses a long protruding striker and a compressed restraining spring. The striker and restraining spring are held in place by a keeper. The body houses the slider, slider lock, safety pin, and set-back pin, with their respective springs. In the center and at the base of the body is an inverted cup known as a lead cup. It is held in place by crimping and contains a tetryl lead pellet. The base of the body is internally threaded to receive a booster cup which in turn houses a tetryl booster pellet. The slider carries a detonator and a blank flash hole to receive and protect the firing pin from shocks due to handling and set-back action. The M52 Fuze is bore-safe. To prevent arming of the set-back pin, which holds the safety pin in position, a cotter pin is utilized.

Function. The cotter pin is removed to free the set-back pin. The force of set-back resulting from ignition of the propelling charge caused the set-back pin to move rearward against its spring, which frees the safety pin. The safety pin, due to the action of its spring, is forced out of the fuze until its head comes in contact with the bore of the mortar. After emerging, the safety pin is completely ejected. The slider is now free, and due to the action of the slider spring, is forced into the armed position, thereby bringing the detonator in direct alignment with the explosive train. Upon impact with the target, the striker is forced inward against its spring bringing the firing pin into the detonator charge of priming mixture, lead azide, and tetryl. The wave produced functions the lead charge of tetryl, which in turn detonates the booster of tetryl. The booster charge amplifies the wave and sends it to the shell filler.

Reference: TM 9-1901, *Ammunition Inspection Guide,* May 1944

FUZE, POINT DETONATING, M56



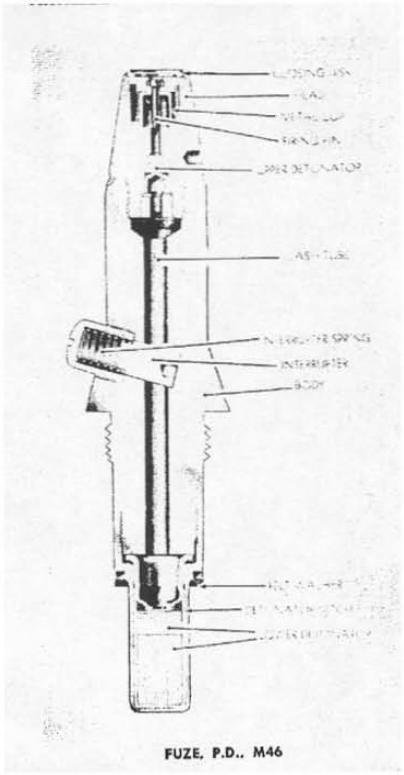
Use. Since the High Explosive Round 54 is required to function on impact with light materials such as those used in planes, a supersensitive fuze is needed.

General. A supersensitive fuze is one, which will detonate on very slight impact such as with a double thickness of airplane fabric. The M56 is both supersensitive and superquick because the firing pin is protected only by a very thin aluminum closing cup and rests, at the time of impact, right on the detonator which initiates an almost uninterrupted train of detonating explosives. The body of the fuze is divided into three parts; the body loading assembly, the head assembly, and cap. The booster of tetryl is pressed into a cavity in the lower part of the body, and is held in place by an aluminum closing cup which screws into the base of the fuze. The body loading assembly also contains an eccentrically weighted slider. The slider incorporates a charge of tetryl and is held in place, with its charge out of line with the rest of the explosive train, by a spring backed up by a cup-shaped brass retaining screw, which assembles into the side of the fuze body. The detonator assembly consists of a brass detonator holder, which screws into the body loading assembly; a detonator of priming mixture, lead azide and tetryl, and a lead charge of tetryl. Semicircular, brass half blocks held together by a flat steel spring sit loosely in a cavity in the head assembly which screws over the detonator holder and into the body loading assembly. All of the parts just described except the slider, the detonator holder, and the half blocks and their spring, are made of aluminum alloy.

The function of the fuze begins when the projectile has cleared the muzzle of the weapon and centrifugal force comes into play. The velocity with which the projectile rotates as it leaves the gun causes the eccentrically weighted slider to compress its spring and bring its tetryl charge into line with the explosive train. At the same time, the half blocks spread outward against their spring and the firing pin rides up the beveled notches. As the half blocks spread a sufficient distance apart, the firing pin comes gradually down between them and rests on the light aluminum closing disc of the detonator. When the projectile contacts the materials of the target, the light aluminum closing cup in the cap is pushed n, and forces the firing pin into the priming mixture. The priming mixture initiates the explosive train of detonator, lead azide and tetryl, lead charge of tetryl, slider charge of tetryl, tetryl booster, and bursting charge of tetryl. These explosives are arranged in a practically uninterrupted train which gives this fuze superquick action.

Reference: TM 9-1901, *Ammunition Inspection Guide,* May 1944

FUZE, POINT DETONATING, M 46



The M46 is a superquick, point-detonating fuze. A cavity in the forward end contains a firing-pin supported by a metal cup. The cup is sufficiently strong to resist the setback force produced by acceleration in the gun, but is crushed when the firing pin is driven into the primer on impact.

The flash tube of this fuze is equipped with an interrupter of conventional type as a bore-safety measure. Setback holds the interrupter in place while the shell is in the bore, but after the projectile leaves the muzzle and its rotation reaches 1,800 r.p.m., centrifugal force causes the interrupter plunger to compress its retaining spring and move outward. This movement clears the flash tube and the fuze is armed.

When the firing pin strikes the upper detonator the flash passes through the tube to the lower detonator and to the bursting charge in the projectile.

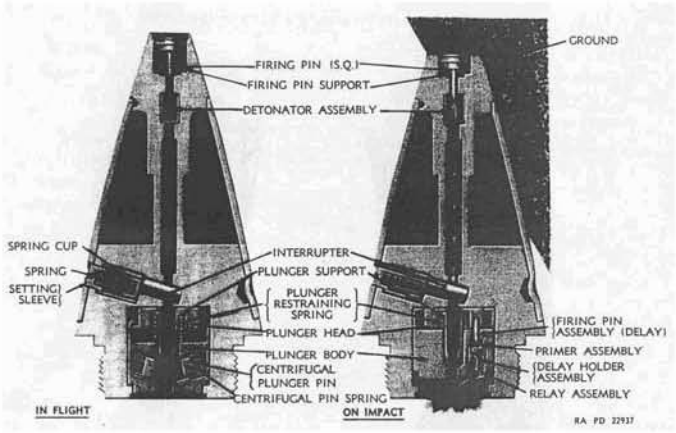
Rounds

- Shell, Chemical, 75mm, Mk II
- Shell, HE, 75mm, Mk I
- Shell, HE, 155mm, Mk III
- Shell, HE, 8-inch, Mk I
- Shell, HE, 12-inch, Mk X

Overall Length .....5.66 inches
Weight.....0.72 pounds

Reference: *Catalogue of Standard Ordnance Items, Volume III,* 1944

FUZE, POINT DETONATING, M 48



Description. The fuze consists of a head which carries the superquick element; a body which carries the delay element; setting device and threads assembling the fuze to the booster; a flash tube which forms a channel for the superquick detonation and holds the head in its proper position; an aluminum ogive which continues the contour of the projectile ogive; and a delay plunger assembly.

Settings. As issued, this fuze is set for superquick action. It is readily set and reset for either superquick or delay action by a setting sleeve which for superquick action permits the interrupter to move to its armed position, or which for delay action retains the interrupter in its unarmed position during flight. Both the superquick and delay elements function on impact but, with a superquick setting, the faster action operates before the delay action, while with a delay setting, the superquick action is stopped at the interrupter. Where superquick action is desired, the setting sleeve is turned so that the screwdriver slot is in line with "S.Q." stamped on the ogive. For delay action, the screwdriver slot in the setting sleeve is turned so as to be in line with the word "DELAY" stamped on the ogive. In this position, one of the legs at either side of the slotted portion of the setting sleeve overlaps the eccentrically located interrupter. The interrupter is this retained in this unarmed of safe position during firing or flight.

Delay Element. The delay element is contained in the rear of the fuze body. During transportation and firing, a plunger support and centrifugal pins prevent the plunger body, which carries the delay element, from contacting the plunger head, which carries the delay firing pin. The centrifugal pins and their springs are placed in the body, below the plunger support, in order to limit the possible movement of the plunger body until after the projectile has cleared the muzzle of the weapon. A plunger restraining spring coiled about the plunger support between the plunger head and the plunger body prevents these elements from contacting each other due to creep force during flight. The delay-explosive train consists of a percussion primer which is actuated by the delay firing pin, a delay pellet of compressed black powder which is adjusted so as to burn for 0.05 second, and a relay pellet of lead azide which transforms the combustion of the delay pellet into a detonation.

Reference: TM 9-1904*, Ammunition Inspection Guide,* March 1944

FUZE, POINT DETONATING, M54

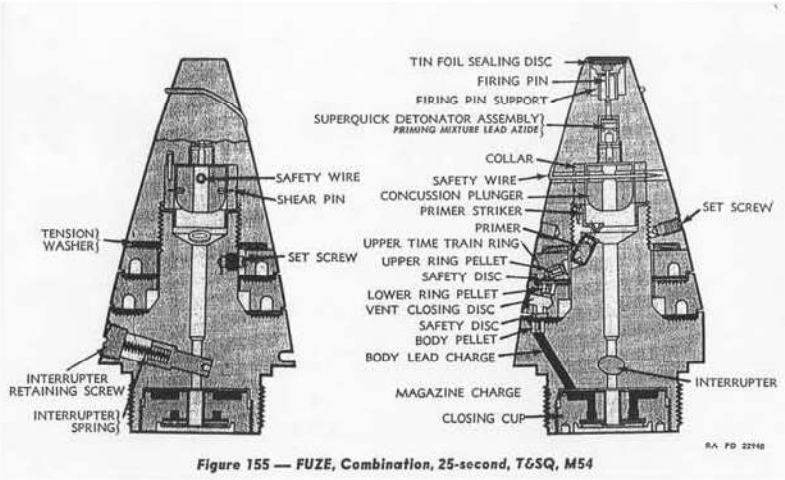


Figure 155 — FUZE, Combination, 25-second, T&SQ, M54

Fuze, P.D., M54, 25-second, Time and Superquick. This fuze is a combination fuze which is used in conjunction with the M20 booster to effect the functioning of a shell after a predetermined lapse of time, or upon impact. The fuze consists of a closing cap assembly, which carries the superquick element; and a concussion (acting upon setback) plunger for initiating the burning of the time train; a body which carries two brass time-train rings; an interrupter; and a black powder magazine charge. The rear portion of the body is threaded for assembly to the mating threads of the booster.

Superquick element. Three major parts within the head comprise the superquick impact mechanism of the fuze. A cavity in the forward end contains a firing pin, shaped like a large-headed tack, and a gliding metal cup which acts as a support for the firing pin. In a cavity below the point of the firing pin is the detonator assembly. A washer holds the firing pin in place and a tinfoil closing disc seals the open end of the cavity to exclude foreign matter.

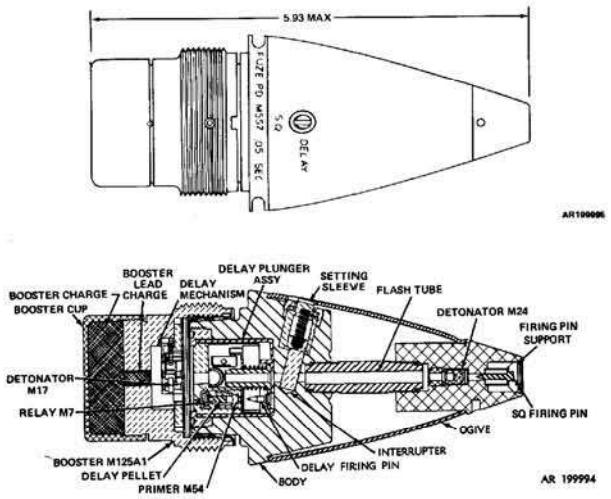
Time element consists of an upper time-train ring which is locked to the body of the fuze by a set screw which engages a slot in the inner surfaces of the ring, a movable graduated time-train ring, a pellet and body charge which connects the graduated ring time-train to the magazine charge, and the initiating device consisting of a concussion plunger, primer striker, and a primer.

Superquick Action . The nonsetting interrupter used with this fuze moves to its outward or armed position as soon as linear acceleration is overcome by centrifugal force. Provided the fuze is set on sage or with a time of burning in excess of time of flight, the fuze will function on impact.

Time Action When the gun is fired, set-back force causes the concussion plunger to shear its shear pins and bend the primer striker against the primer. The primer, upon impact ignites the upper ring pellet which ignites the powder of the upper time-train ring.

Reference: TM 9-1904, *Ammunition Inspection Guide,* March 1944

FUZE, POINT DETONATING, M557



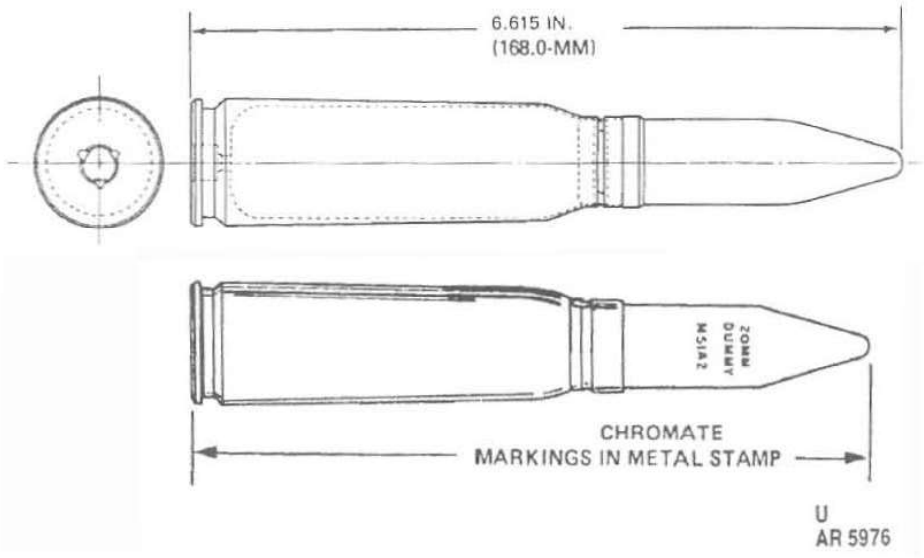
Use. Point Detonating Fuze M557 is a selective superquick or 0.05 second delay impact fuze designed for use in ammunition for guns of 75mm through 155mm, for rifles of 75mm and 105mm, for howitzers of 75mm through 8-inch, and 4.2-inch mortars.

Description. The M557 fuze consists of Fuze M48A3 assembled with the M125A1 booster. The fuze PD head assembly contains a firing pin held in position by a firing pin support which prevents initiation of Detonator M24 until impact. The fuze body contains an M1 delay plunger assembly and an interrupter assembly with a setting sleeve which provides a means of setting or selecting fuze PD (super quick action) or delay functioning. The delay plunger assembly includes a firing pin and Delay Element M2. The delay element includes Primer M54, a black powder delay charge and Relay M7. The head assembly is attached to the body by means of the flash tube which also positions the fuze windshield or ogive. The ogive is a thin-walled steel stamping utilized to provide an aerodynamic shape to the fuze. The M125Al booster consists of a brass booster body having external (male) threads to fit projectiles having 2-inch diameter, 12 threads per inch and internal (female) threads to receive fuzes having l.7-inch diameter, 14 threads per inch. An aluminum booster cup containing a 340 grains tetryl booster pellet is threaded to the booster body. The M125Al booster internal configuration is that of an eccentric rotor containing an M17 detonator held in an unarmed (out of line) position by centrifugal detents and a gear train mechanism which provides for delayed arming of the booster assembly for approximately 200 ft. depending upon the weapon and charge being fired.

Overall Length .....5.93 inch
Visible Length .....3.72 inch
Explosive Components .....Detonator M24, Detonator M17, tetryl booster, lead charge, and tetryl booster charge, Delay plunger Assembly M1 (M54 primer, black powder delay charge, and Relay M7), Detonator M17, tetryl booster lead charge, and tetryl booster charge.

Reference: TM 43-0001-28, *Army Ammunition Data Sheets*, April 1977

CARTRIDGE, 20mm, DUMMY, M51A2

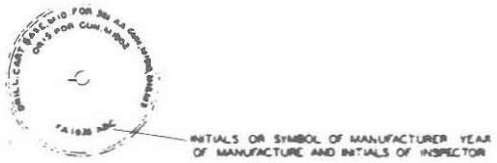


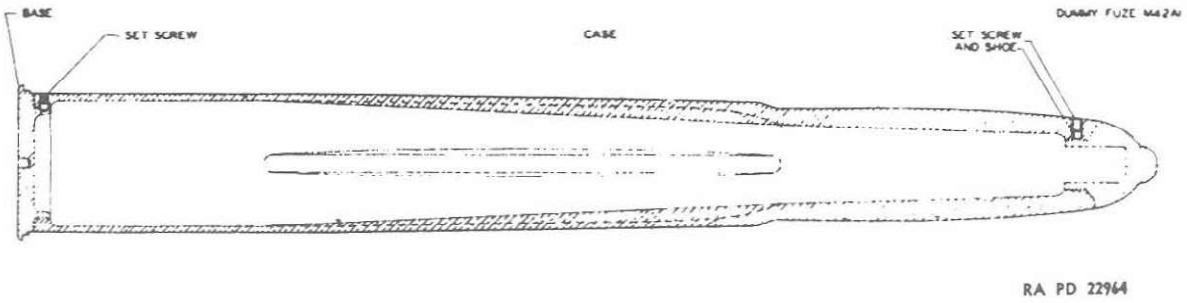
Use. The cartridge is a completely inert assembly used for filling the conveyor system during shipment or storage and for non-firing system checkout.

DODAC.....1305-A924
Overall Length.....6.615 in
Weight.....0.3850 gr
Tracer.....NA
Primer.....NA
Filler.....Inert
Fuze.....NA

Reference: TM 43-0001-27, *Small Arms Data Sheets*, April 1994

CARTRIDGE, 3-INCH, DRILL, M9 & M10





Use. The M9 Drill Round is used in all models of guns on fixed mounts, while the M10 is used on mobile mounts.

General. It has always been standard, logical training procedure to train gun crews in loading weapons and setting of the fuze on something other than service ammunition. The drill round is an outgrowth of this procedure.

Complete round. This round consists of a 1-piece hollow bronze casting (cartridge case and projectile) simulating service ammunition. The nose is threaded to receive 21-second M42 Dummy Fuze. The round has a base that is threaded and screwed in rear of the drill cartridge; this base receives the inert dummy primer. Both the fuze and base are held in place by means of set screws.

References: TM 9-1904, *Ammunition Inspection Guide*, March 1944

CARTRIDGE, 37mm, TP, M51A2

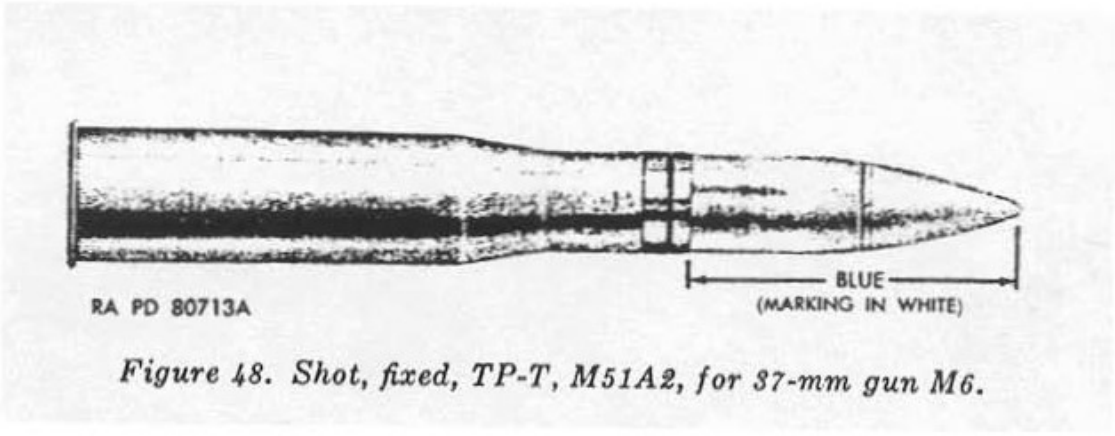


Figure 48. Shot, fixed, TP-T, M51A2, for 37-mm gun M6.

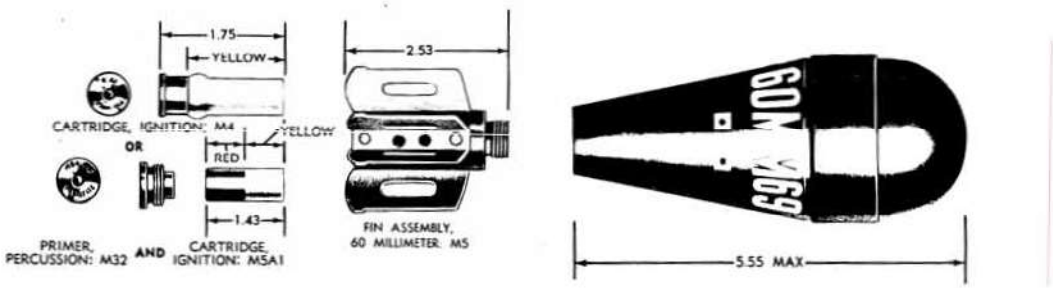
Use. 37mm Gun M6

General. This shot simulates SHOT, fixed, APC-T, M51, for practice firing from the tank gun. Components are the same as for the service round, except that the projectile body is a solid slug having the same over-all dimensions as combined body and armor-piercing cap of service shot. The windshield is attached to the body instead of the cap as in the M51 APC shot. The M51A2 TP shot supersedes an M51A1 TP design, which was similar except that no windshield was present.

Projectile Length .....6.36 inches
Length of complete round .....14.55 inches
Length of cartridge case .....8.75 inches
Radius of ogive (false ogive) .....8.97 calibers
Weight of complete round .....3.39 pounds
Width of rotating band.....0.74 inches
Muzzle velocity .....2,900 fps
Maximum range.....12,850 yards

References: TM 9-1901, *Artillery Ammunition*, September 1950

MORTAR, 60mm, TRAINING, M69



Use. This cartridge is used for training in the loading and firing of 60-mm Mortars M2 and M19.

Description. Unlike other mortar ammunition, the components of this round are issued separately. This facilitates replacement of damaged, worn, or expended parts. The body of the shell is cast iron. It is tear-dropped with a blunt nose and tapered tail. It has a bourrelet on the body near the nose to act as a forward bearing surface and gas check. At the tail end is a recess which is threaded to receive a stabilizer assembly. The nose end is closed and rounded with no provisions made to receive a fuze. Its weight varies depending on its weight zone. Seven weight zones are possible with a minimum of 3.83 pounds for weight zones one and a maximum of 4.07 pounds for weight zone seven *without* fin assembly and ignition cartridge.

Fin assembly and propelling charge. The fin assembly consists of a machined cartridge container closed at one end with a threaded protrusion to screw into the shell body. It is hollow, with the other end threaded to receive an ignition cartridge and a percussion primer. Attached to the cartridge container are eight stationary fins. The shell can be fired more than one time. There are no propellant increments used, for the shell is designed to be fired in the first zone only.

Complete Round

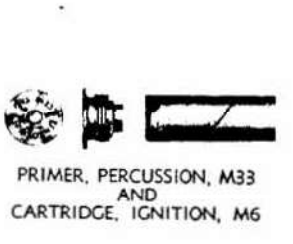
Weight assembled	4.43 pounds
Length assembled	7.72 inches
Filler	INERT
Ignition Cartridge	M5A1 or M4
Propellant	None
Percussion Primer	M32
Fuze	None

Color

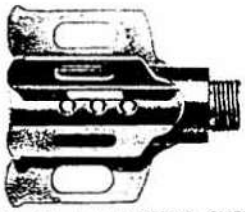
Old manufacture	Black or blue w/White markings
New manufacture	Bronze w/ White markings

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944; TM 9-1300-205, *Ammunition for mortars*, September 1960; TM 43-0001-28, *Army Ammunition Data Sheets, Artillery Ammunition*, April 1977

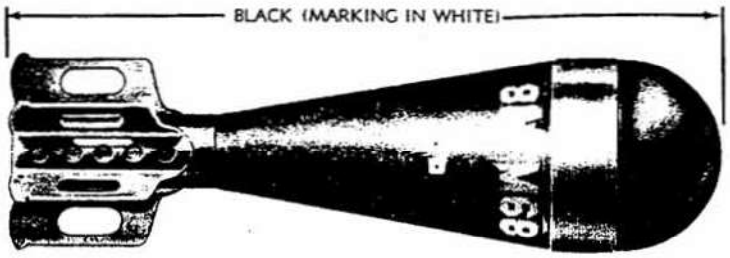
MORTAR, 81mm, TRAINING, M68



PRIMER, PERCUSSION, M33
AND
CARTRIDGE, IGNITION, M6



FIN, 81 - MM MORTAR SHELLS,
M43A1 AND M68



Use. The shell is designed to give the mortar crew training in loading and practice in firing under conditions which will not permit firing in more than the first zone.

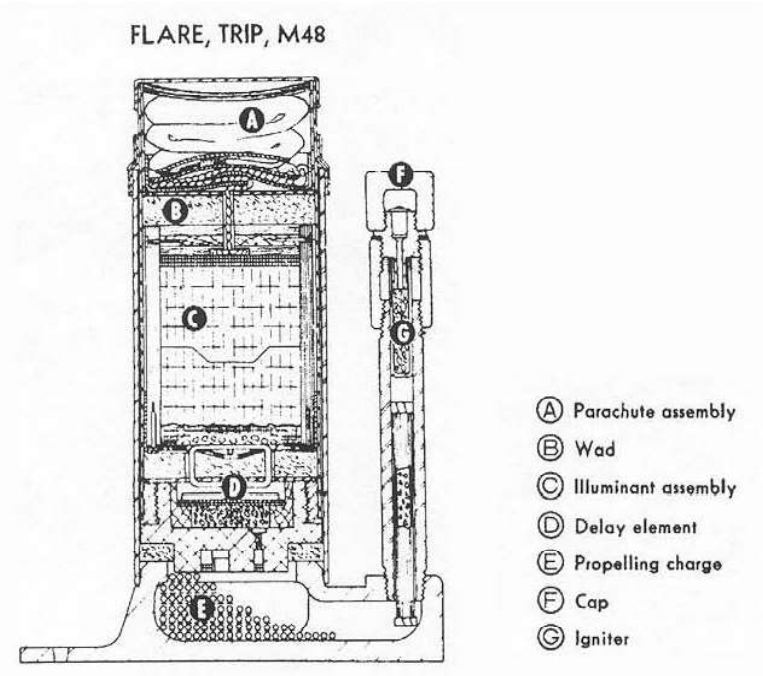
Shell body. The body of the shell is cast iron. It is similar in shape to the light High Explosive, 81-mm shell which is tear-drop with a blunt nose and tapered tail. It has a bourrelet on the body near the nose to act as a gas check. At the tail end is a recess which is threaded to receive a stabilizer assembly. The nose is closed and rounded with no provisions made to receive a fuze. Its weight varies depending on its weight zone. Nine weight zones are used with a minimum of 9.50 pounds and a maximum of 10.10 pounds, weighed without fin assembly and ignition cartridge.

The fin assembly and propelling charge. The fin assembly consists of six stationary fins. It receives the Ignition Cartridge M3. Several ignition cartridges are provided with each round so the shell can be fired more than one time. There are no propellant increments used because the shell is designed to be fired in the first zone only. The maximum range is 350 yards.

Markings. The shell is painted black with white stencil. On the shell body may be found a number of white squares (one to nine) with a prick punch mark in the center of each to indicate the zone weight.

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

TRIP FLARE, M48



Use. To reveal movements of hostile troops at night. The requirements were that they light automatically on being tripped by wire and that they illuminate hostile troops in night operations at a minimum distance of 300 yards.

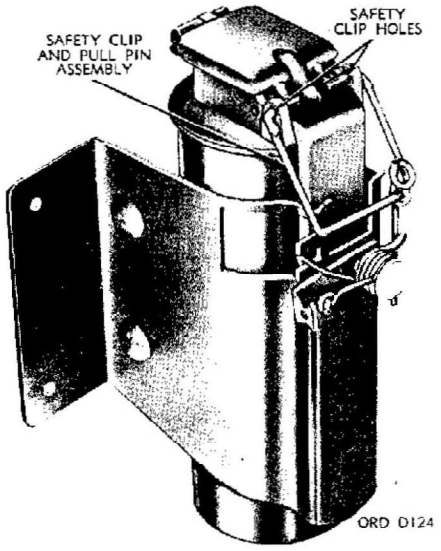
Description. The M48 trip flare consists of an illuminating projectile in modified M2 antipersonnel mine projector. The projector is buried three inches in the ground with only the trip wire projecting above the surface. The tip firing mechanism is the same as that used with M2 anti-personnel mines; M2 or M3 anti-personnel mine fuze. The propelling charge consists of 75 grains of A4 black powder.

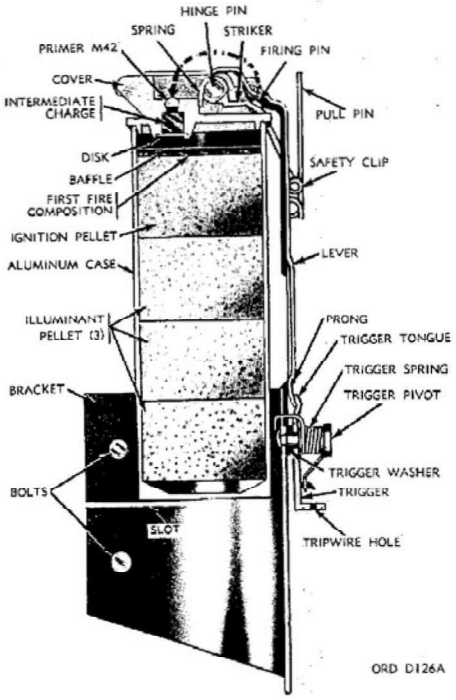
The 75 grains propelling charge projects the illuminant shell to an altitude of approximately 250 to 400 feet. The propelling charge also activates a three second delay fuze which at the end of the delay time ejects the illuminant assembly similar to that of the shell, illuminant 60mm, M83. The illuminant burns for about 20 seconds while drifting earthward attached to a parachute. The flare burns with approximately 110,000 candle power. The effective illumination is designed to cover a radius of 300 yards.

Four lengths of trip wire each 26 feet long, are shipped with each M48 trip flare.

Reference: *Catalogue of Standard Ordnance Items, Vol. III,* Second Edition 1944

SURFACE TRIP FLARE, M49A1





Use. To give warning of infiltrating troops by illuminating the field of the advancing enemy.

Description. The trip flare consists of an illuminant assembly; cover loading assembly, and mounting bracket assembly. The illuminating assembly is an aluminum case containing an ignition increment and three illuminant increments. The waterproof cover loading assembly contains a percussion primer, intermediate charge and a spring-loaded striker. The mounting bracket holds the illuminant assembly in the position desired. The lever is hinged to the cover and is held in position by the safety clip when armed. Attaching a trip wire to either the trigger or pull pin arms the flare.

Functioning. A pull on the trip wire causes either the trigger tongue or pull pin to release the lever, which in turn permits the firing pin to strike the primer. The primer sets off the intermediate charge, which ignites the first-fire composition on the ignition increment of the flare. The flare will provide a light intensity exceeding 35,000 candlepower for approximately one minute.

Length ..... 4.85 inches
Diameter ..... 3.10 inches
Weight loaded ..... 0.75 pounds
Pyrotechnic charge ..... Illuminant composition, 5 oz
Primer ..... Percussion M42
Color ..... Olive drab w/black markings

Reference: TM 9-43-0001-37, *Military Pyrotechnics*, February 1977

APPENDIX E

TEXTUAL REFERENCES

TEXTUAL REFERENCES

Assistant Secretary of Defense for Installations and Logistics.

1972 Installation Survey Report on Naval Air Station, Miramar, San Diego, California. Accession 291-80-0005; Box 12 of 16; File: Miramar Naval Air Station, San Diego, CA. Washington National Records Center, Suitland, MD.

Blasland, H. D.

1918 Letter: "Small Arms Ranges at Camp Kearny," dated 5 August 1918. Record Group 393; Entry 3: General Correspondence; Box 11. National Archives I, Washington, D.C.

Board of Inspection.

1939 "Report on the Feasibility of Purchase of Certain Properties in the Camp Kearney Area," dated 25 August. Record Group 71; Entry 1001; Box 133; File: MC Training Area Camp Elliott. National Archives, College Park, MD.

Bureau of Yards and Docks.

1941 Memorandum: "Assignment of Building Numbers at Camp Elliott, Marine Corps Base, San Diego, Calif.", dated 9 August 1941 and 1st Endorsement dated 13 August 1941; 2nd Endorsement dated 27 August 1941. Record Group 181; Entry 63A0589-63K0589; Box 379; File: KP104. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

1943b "Final Project Cost Report (Magazines)," dated 17 March. Box: Contracts NOY 4175, 4186, and 4187. Command Historian's Office, Seabee Museum, Port Hueneme, CA.

Chief Gas Officer.

1919 "Shipment of Empty Chlorine Cylinders," dated 6 January. Record Group 175; Entry: General Correspondence; Box 477. National Archives, College Park, MD.

Coletta, Paolo E., ed.

1985 *United States Navy and Marine Corps Bases*, *Domestic.* Westport, Connecticut: Greenwood Press.

Commandant, Eleventh Naval District.

1941a Letter: "United States of America v. 19298.25 acres of land, more or less, in San Diego County, California, Lawrence Oliver, et al. No. 105 Civil - Southern Division." Record Group 71; Entry: 1001; Box 133; File: Marine Corps Training Area, Camp Elliott. National Archives, College Park, MD.

1943 "Gas Defense Recommendations, Camp Elliott," dated 12 February. Record Group 181; Entry: General Correspondence; Box 382. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

Commander, Naval Base, San Diego.

1984 "Final Report of Ordnance Clearance Operations in Tierrasanta, 16 January 1984 to 27 April 1984," dated 1984. San Diego County Sheriff's Department, CA.

Commanding General, Fleet Marine Force.

1937b Correspondence to the Major General Commandant, dated 31 August, regarding the combat range, Camp Kearney. Record Group 127; Entry 18A; Box 27; File: 1275-65. National Archives, Washington, DC.

1939 Letter: "Combat Training Area, purchase of," dated 7 September 1939. Record Group 71; Entry 1001, Box 133, File: Marine Corps Training Area, Camp Elliott. National Archives, College Park, MD.

1940b Correspondence to the Major General Commandant, dated 23 February, regarding the regulation of firing at Camp Holcomb. Record Group 127; Entry 18B; Box 1982; File: 2400-10 (5). National Archives, College Park, MD.

Commanding General, Marine Corps Base, San Diego.

1939 Correspondence to the Civil Aeronautics Authority, dated 20 December, regarding civilian aircraft in firing area. Record Group 127; Entry 18B; Box 1982; File: 2400-10 Artillery, Heavy and Light. National Archives, College Park, MD.

Commanding Officer, Tank Battalion, Camp Elliott.

1943 Correspondence to the Commandant, USMC, dated 29 March, regarding experimental anti-aircraft firing. Record Group 127; Entry 18B; Box 1982; File: 2400-10. National Archives, College Park, MD.

Depot Quartermaster.

1938 Correspondence to the Quartermaster, dated 14 March, regarding leases and renewals for FY 1939. Record Group 127; Entry 18A; Box 27. National Archives, Washington, DC.

Deputy Chief of Naval Operations (Logistics).

1983 "Installation Survey Report, Naval Air Station Miramar, San Diego, California," dated 19 May. Record Group 429; Entry UD/17; Box 9; File: NAS Miramar. National Archives, College Park, MD.

District Fire Officers.

1950 Memorandum: "Naval Training and Distribution Center, Camp Elliott, San Diego Brush Fire of 3-4 November 1950," dated 7 November. Record Group 181; Entry: 11th Naval District Commandant's Office 1924-1955; Box 481. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

DJG, Inc. Williamsburg, VA; Dynamic Systems, Inc., Reston, VA; UXB International, Inc., Washington, D.C.

1988 "Final Engineering Report and Environmental Impact Statement," dated 27 April. Submitted to U.S. Army Engineer District, Huntsville, AL (Entire document is available through the Project Information Retrieval System (PIRS).

Eleventh Naval District.

1944b Memorandum: "Bombing Targets in Southern California Sector, Western Sea Frontier." dated 24 August 1944 (reference excerpt from Archives Search Report, Findings for Naval Air Station, Miramar, San Diego, California, dated November 1996, on loan from Rock Island District).

Environmental Chemical Corporation.

1995a "Final Ordnance Report, Tierrasanta, California," dated February. Explosive Ordnance Disposal Division, Burlingame, CA (On file at Rock Island District, Corps of Engineers, CEMVR-ED-DO).

Fleet Marine Force.

1940 Special Order: "Camp Holcomb, change of name," dated 20 June 1940. Record Group 181; Entry: 63A0589-63K0589; Box 379; File: KP104. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

Headquarters, Fleet Marine Force.

1940b Addendum to Force Training Memorandum Number 4-40, dated 05 July, on a change of boundary for Camp Elliott. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

Headquarters, Marine Training and Replacement Command.

1946 Correspondence to Commandant of the Marine Corps, dated 08 July, regarding the utilization of portions of U. S. Naval Training and Distribution Center Facility at Camp Elliott. Record Group 127; Entry 18B; Box 225; File: 1275/70-2050 Camp Elliott. National Archives, College Park, MD.

Headquarters, Ninth Corps Area.

1922 "Proceedings of a Board of Officers Convened at San Diego, California, November 14, 1922; Claim of William Fitzherbert West and Helen S. West," dated November 14, 1922. Record Group 92; Entry: 1891; Box 1016; File: 153 Camp Kearney, CA. National Archives, College Park, MD.

Headquarters, U.S. Marine Corps.

1941a Correspondence to the Major General Commandant, dated 13 November 1941 regarding Inspection of Combat Range at Camp Elliott with attached map titled, "U.S. Marine Corps Combat Range, Camp Elliott, California," dated October 3, 1941. Record Group 127, Entry 18B, Box 211, File: 1275-65 (Ranges, Targets). National Archives, College Park, Maryland.

Hinds, James W.

1986 *San Diego's Military Sites*. U.S. Army Center of Military History. Washington, D.C.

Holzman, Ellen B.

1995 "Off to the Boondocks for Polishing Up, Thousands Trained for WW II at Camp Elliott," *Traditions, San Diego's Military Heritage,* Vol. 2 No. 7.

Human Factors Applications, Incorporated (HFA)

1999 "Draft Removal Report, Volume 1, Ordnance and Explosives (OE) Removal Action, East Elliott, San Diego California," dated March 10, 1999. Prepared for USACE Engineering and Support Center, Huntsville, AL. (Entire document is available through the Project Information Retrieval System (PIRS).

Interdepartmental Air Traffic Control Board.

1942 Minutes to IATCB Meeting No. 110, dated 30 June. Record Group 237; Entry 37; Box 2; File: IATCB 101-125. National Archives, College Park, MD.

1944 Minutes to IATCB Meeting No. 529, dated 22 September. Record Group 237; Entry 37; Box 3; File: IATCB 526-550. National Archives, College Park, MD.

1945b Minutes to IATCB Meeting No. 633, dated 29 June. Record Group 237; Entry 37; Box 4; File: IATCB 626-650. National Archives, College Park, MD.

Jones, Frederick Redway.

1943 "A Training Center Chronicle," dated August. U.S. Marine Corps History Center, Washington Navy Yard, Washington, D.C.

Kawasaki, Theilacker, Ueno and Associates (KTU&A).

1997b "1997 Master Plan, MCAS Miramar, Existing Conditions Report," dated October. Prepared for Commander, Marine Corps Air Bases, Western Area, Southwest Division (On file at St. Louis District, Corps of Engineers, CEMVS-ED-P).

Kinman, Guy M.

1920 Letter: "Data on Camp Kearny, California," dated 17 June. Record Group 393; Entry 3: General Correspondence 1917-1920; Box 15: Construction Data. National Archives I, Washington, D.C.

Major General Commandant.

1934 Correspondence to the Assistant Secretary of the Navy, dated 18 December, regarding a lease in the Camp Kearney area. Record Group 127; Entry 140; Box 65; File: 198-4. National Archives, Washington, DC.

1938a Correspondence to the Secretary of the Navy, dated 22 March, regarding a lease in the Camp Kearney area. Record Group 127; Entry 18A; Box 27. National Archives, Washington, DC.

1940a Correspondence to the Judge Advocate General, dated 14 February, regarding the leasing of real estate. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

1940c Correspondence to Secretary of the Navy, dated 07 June, regarding a lease in the Shepard Canyon area. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

1940d Correspondence to Secretary of the Navy, dated 13 June, regarding leases in the Camp Kearney area. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

1941a Correspondence to the Secretary of the Navy, dated 19 March, regarding lease renewals. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rents-Leases and Agreements. National Archives, College Park, MD.

1941b Correspondence to the Secretary of the Navy, dated 19 March, regarding lease renewals. Record Group 127; Entry 18B; Box 215; File: 1275-70 Rentals-Leases and Agreements. National Archives, College Park, MD.

Marine Corps Air Station (MCAS), Miramar.

1946 Letter: "Historical Report of MCAS, Miramar, from 1942 to present date, submision of," dated 20 May 1946. Record Group 181; Entry 63A600; Box 39; File: NJ-9 / KV-1946. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

Marine Corps Base, San Diego.

1939 Letter: "Combat Training Area East of Camp Kearny," dated 20 December. Record Group 127; Entry 18B; Box 1982; File 2400-10. National Archives, College Park, MD.

Miramar Jet Journal.

1965 "Elliott Property Becomes Part of NAS Miramar," dated 12 March 1965. Geographic Files - Miramar. Command Historian's Office, Seabee Museum, Port Hueneme, CA.

Montgomery Watson.

1995 "Draft Archives Search Report, Former Camp Elliott (East Elliott) Engineering Evaluation/Cost Analysis (EE/CA), San Diego, CA," dated January. Prepared for U.S. Army Corps of Engineers, Huntsville Division, Huntsville, AL.

1999 "Final Engineering Evaluation/Cost Analysis (EE/CA) Formerly Used Defense Site Camp Elliott (East Elliott), San Diego, CA," dated August 1999. Prepared for USACE Engineering and Support Center, Huntsville, AL. (Entire document is available through the Project Information Retrieval System (PIRS).

n.a.

n.d.a "*Marine Corps Activity at Camp Elliott*." Command Historian's Office, Seabee Museum, Port Hueneme, CA.

Naval Air Station (NAS), Miramar, Command Historian's Office.

1995 "Naval Air Station Miramar CY 95 Command History." Navy Historical Center, Aviation History Branch, Washington Navy Yard, Washington, D.C.

Naval Air Station (NAS), Miramar, Marine Public Affairs Office.

c1994 "MCAS Miramar -- A Homecoming for the Corps," dated c1994. U.S. Marine Corps History Center, Reference Section, Geographic Files. Washington Navy Yard, Washington, D.C.

Office of the Chief of Naval Operations.

n.d. "Compilation of Naval Air Targets, Gunnery and Bombing Areas," undated. Record Group 127; Entry 18B; Box 1983: General Correspondence; File: Aviation Bombing. National Archives, College Park, MD.

Office of the Los Angeles District Engineer.

1963 Map of San Diego Missile Test Site, dated 23 August, showing real estate transactions. Record Group 291; Entry 1; Box 42; File: San Diego Missile Test Site. National Archives, College Park, MD.

SCS Engineers, Inc.

1984 "Initial Assessment Study of Naval Air Station Miramar, San Diego, California," dated September. Prepared for Navy Assessment and Control of Installation Pollutants (NACIP) Department, Port Hueneme, CA.

Second Chemical Co., Second Marine Division.

1941 "Defective Ammunition, 4.2 Chemical Mortar Ammunition," dated 28 February. Record Group 175; Entry 1; Box 235. National Archives, College Park, MD.

Shettle, M. L., Jr.

1997 *United States Naval Air Stations of World War II*. Bowersville, Georgia: Schaertel Publishing Co.

South Coastal Information Center

2003 "California Historical Resources Information System Site Files Record Search," dated 29 July 2003.

U.S. Army Corps of Engineers, Los Angeles District.

1985 Findings and Determination of Eligibility for DERP-FUDS Project No. J09CA006701, Tierrasanta (Camp Elliott), San Diego County, CA, dated 17 September 1985.

1989 Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, Mission Trails Regional Park (Camp Elliott), San Diego, CA, Project No. J09CA006702, dated 16 February 1989.

1991 Defense Environmental Restoration Program, Formerly Used Defense Sites, Findings and Determination of Eligibility, Camp Elliott (East), San Diego County, CA, Site No. J09CA006702, dated 27 August 1991.

U.S. Army Corps of Engineers, Rock Island District.

1996a "Archives Search Report, Findings for Naval Air Station Miramar, San Diego, California, Final Report," dated November. Prepared for Naval Air Station Miramar, Staff Civil Engineer Department, San Diego, CA.

U.S. Army Topographic Engineering Center.

2004 "Former Camp Elliott, California, Examination of Historical Photography – Selected Sites, Final Report," dated May 2004. Prepared for the U.S. Army Corps of Engineers, Huntsville Engineering and Support Center, AL.

U.S. Marine Corps, 2nd Marine Division, F.M.F.

1941 Correspondence to the Major General Commandant, dated April 22, 1941 regarding artillery and antiaircraft ranges, with attached map titled, "Camp Elliott Combat Area", dated January 1940, revised July 1940. Record Group 127, Entry 18B, Box 212, File: 1275-65 (Ranges, Targets). National Archives, College Park, Maryland.

U.S. Naval Air Station (NAS), San Diego.

1941 "Report of Board of the Development of the Existing Outlying Landing Fields," dated 11 October. Record Group 181; Box 38. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

U.S. Naval Auxiliary Air Station (NAAS) Miramar.

1947 Station General Order: "U.S. Marine Corps Air Station, Miramar, California - Redesignation of, as U.S. Naval Auxiliary Air Station," dated 30 June 1947. Record Group 181; Entry: 63A0589-63K0589-32; Box 377; File: KK. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

1950 "Long Range Development Plan for NAAS Miramar," dated 8 March. Record Group 181; Entry 63A600; Box 38; File: N1-9 1947-50. National Archives-Pacific Southwest Region, Laguna Niguel, CA.

Assistant Secretary of Defense for Installations and Logistics.

Installation Survey Report on Naval Air Station, Miramar,
San Diego, California.
dated 1972
Accession 291-80-0005; Box 12 of 16;
File: Miramar Naval Air Station, San Diego, CA.
Washington National Records Center, Suitland, MD.

DEPARTMENT OF DEFENSE

EXECUTIVE ORDER 11508

INSTALLATION SURVEY REPORT

NAVAL AIR STATION MIRAMAR

SAN DIEGO, CALIFORNIA

OFFICE, ASSISTANT SECRETARY OF DEFENSE FOR INSTALLATIONS AND LOGISTICS

SECTION I

SUMMARY OF SURVEY REPORT

LAND

The Naval Air Station, Miramar, San Diego, California, consists of approximately 15,283 acres of Government-owned land and 228 acres of easements. Although divided by a highway, all of the land is contiguous, and there are no subinstallations.

HISTORY

The station was first established during World War I as an Army infantry training center. During World War II, it was commissioned as an auxiliary air station, and in 1951, funds were appropriated to develop it into a master jet air station. In 1952, it was redesignated Naval Air Station, Miramar, and it began its training of fighter aircraft crews for the Pacific Fleet.

MISSION

The station supports training of fighter and photographic squadrons for the Pacific Fleet.

IMPROVEMENTS

Acquisition costs of completed improvements total approximately $73,171,290. Improvements under construction total approximately $8,996,000. Installation planned improvements for Fiscal Year 1973 through Fiscal Year 1978 total approximately $18,059,000.

SECTION II

PURPOSE AND SCOPE

compliance with the provisions of Executive Order 11508, a physical survey
s made of the Naval Air Station, Miramar, California, during the period
rch 7-9, 1972, by the following persons:

olonel H. W. Townsend, Team Chief, OASD(I&L)
ptain W. H. Crawford, USN
mmander T. E. Morton, USN
r. T. N. Scott, General Services Administration

he survey was made to identify those areas within the facility that appeared
o be not utilized, underutilized or not being put to optimum use.

he survey started with a command briefing by the Commanding Officer,
aptain Kinnear, U.S. Navy.

he subject matter included the base mission, organization, land utilization,
mposite noise rating zones and the surrounding civilian community. All
rincipal commands that utilize the facilities were present. They included:
aptain S. Wingfast, USN, Naval Air Forces, U.S. Pacific Fleet
aptain V. F. Kelly, USN, Department of Defense, Project Wire
olonel J. W. Haggerty, USMC, Marine Corps Reserve Depot, San Diego
ieutentant J. A. Brady, USN, Ecology Office, Naval Air Station, Miramar
ommander N. Peterson, USN, Public Works Officer, Naval Air Station, Miramar

III
IV
V
VI
VII
VIII
IX
X

.eutenant Commander J. H. McAulaffe, USN, Recruit Training Command,
Naval Training Center, San Diego

;jor R. L. Bergevin, USA, 111th Area Headquarters

;jor J. P. Souders, USA, 4th Tank Battalion

.eutenant Colonel S. H. Rauh, USMC, Landing Force Training Command,
Naval Amphibious Base, Coronado

'. H. K. Friedland, Fleet Air Miramar

SECTION III

AREA DATA AND VICINITY MAP

LOCATION

Naval Air Station (NAS), Miramar, is located in San Diego County, approximately 13 miles north of San Diego, California, on U.S. Highway 395. It is considered an ideal location for a master jet base. It is in close proximity to a deepwater port and offshore carrier operating areas, far enough inland to escape much of the coastal fog, and relatively near to other naval installations providing significant logistical support.

COMMUNITY DATA

Naval Air Station Miramar is situated in a rapidly expanding suburban area just within the limits of the city of San Diego which has a population of over 700,000 people. Immediately north of the station proper are residential areas that have grown about 700 percent in the past five years. The metropolitan areas of San Diego County contain a large industrial complex of aerospace, shipbuilding and repair, commercial fishing, electronics, and other industrial type efforts that one may expect to find near a major seaport. The area has excellent schools, medical facilities, recreational facilities, points of cultural interest, and is a major tourist attraction. The area immediately adjacent to the installation varies from noncompatible residential sections to compatible light industrial sections and unimproved land in a natural state.

ATOLOGY

climate is ideal with the exception of a low mean annual rainfall of
inches. Temperatures rarely drop below freezing, and are occasionally
r 100 degrees during the months of August, September and October. Some
ly morning or late evening fog may be expected, on the mean, 10 days a
th. The inland location (7 miles) and elevation (477 feet) tend to
imize the effect of fog on aircraft operations.

NSPORTATION

mercial transportation in the metropolitan area is outstanding. The
a is accessible by state and county all-weather roads and freeways and
erstate Highways 5, 8, and 15. Water transportation is readily accessible
a major deepwater port at the city of San Diego. Air transportation is
vided by eight scheduled commercial airlines at Lindbergh Field, San Diego,
additional limited military air transportation is available at Naval Air
tion, North Island, San Diego.

RKS AND RECREATION

ere are 5 national forests, 2 national historic sites, and 22 state parks
d beaches located within a 100-mile radius of the installation. (See
ction X, Tab B.)

STALLATION DATA

Land

e land identified with Naval Air Station Miramar consists of one contiguous
nd area comprising approximately 15,511 acres. It is bordered on the west

y Interstate Highway 805, and U.S. Highway 395 divides the installation nto two adjacent functional areas of almost equal size. The airfield perating area to the west consists of approximately 7,801 acres, and the ld Camp Elliott area to the east contains 7,710 acres. Acquisition cost or the 15,511 acres totals $9,799,895.

here are 374 buildings at Naval Air Station Miramar: 191 permanent, 88 semi-ermanent, and 95 temporary. In addition, other facilities include 5 small-rms ranges, storage for 3,132,383 gallons of petroleum, oils, and liquids POL); 75 miles of roads, streets and pavements; and approximately 8 miles f railroad beds.

Annual Operation and Maintenance costs of the installation total approximately $28,050,082.

AND DISPOSALS

There have been no significant land disposals since 1963.

MPROVEMENTS

Existing

Acquisition costs of present buildings, structures, and facilities total approximately $73,171,290.

Approved or Under Construction

The FY 72 funded military construction program is as follows:

Jet Engine Test Cell	$ 965,000
Ammunition Magazines	156,000

Blasland, H. D.

Letter: "Small Arms Ranges at Camp Kearny,"
dated 5 August 1918.
Record Group 393; Entry 3: General Correspondence; Box 11.
National Archives I, Washington, D.C.

AUGUST 5,1918.

From: The Commanding Officer.

To: The Adjutant General of the Army,Washington D.C.

Subject: Small Arms Ranges at Camp Kearny.

1. In compliance with letter from your office dated July 13,1918, I submit the following report concerning the facilities available at this camp for the instruction of troops in small arms and the gun firing.

(A) Number of rifle ranges; three

Short Range-- 300 targets
Firing distances--100,200 & 300 yards
Distance from the center of Camp--1.2 miles by air line and 1.5 miles by road.

Mid-Range----54 targets
Firing distance 500 & 600 yards
Distance from Camp--1.5 miles by air line and 2 miles by road.

Long Range---5 targets
Firing distance --800 & 1000 yards
Distance from the center of Camp--1.5 miles by air line and 2 miles by road.

(B) Number of pistol ranges; Total listed below

12 targets - Ranges 25c-50 yards- Pit
20 targets - Ranges 25c-50 yards-Pit
10 targets - Ranges 25 yards--No Pit.
Distance from Camp to the above ranges is 2 miles by road and 1.3 miles by air line.
At a distance of 3 miles by road and 1.6 miles by air line,southwest of Camp, there is a pit which can accomadate 15 targets. Range 15c-25 yards.

NARA I DC
RG 393
Entry 3, San Carlos

At a distance of 2.9 miles by road and 2.1 miles by air line, south of the camp there is a pit which can accomadate 20 targets--range 25c-50 yards.

5 targets range 15c-30 yards- No Pit
2 targets range 25c-50 yards Pit
Distance from the center of camp .62 miles by air line and .95 miles by road.
3 targets range 15 yards -Pit
Distance from the center of camp .53 miles by air line and .6 miles by road.

(C.) Number of machine gun ranges-; 1 1000 inch

71 targets
Distance from the center of camp 2 miles by air line and 2.6 miles by road.

(D.) Combat firing ranges for small arms and machine guns listed below:

Machine Gun target range 1200 yards
MachineGun target range 500 yards
Machine Gun target range 600 yards
Distance from the center of Camp 1.7 miles by air line and 2 miles by road.

(E). Number of artillery ranges-: one

Suitable for all kinds of Artillery fire.
Distance from the center of camp 1.6 miles by air line and 2 miles by road.

2. The number of targets on the short ranges, namely two hundred, for rifle practise is not considered sufficient to train a Division. This can be overcome by the extension of the short range now in use. It is thought the installation of one hundred more targets will overcome this difficulty.

3. The facilities offered by all other ranges are deemed sufficient for the training of a Division.

4. I am forwarding under separate cover a map showing the location of the different ranges and their distances from the center of the Camp

Harry D.Blasland
Lieut. Colonel 32 Inf.
Commanding

Board of Inspection.

"Report on the Feasibility of Purchase of Certain Properties
in the Camp Kearny Area,"
dated 25 August 1939.
Record Group 71; Entry 1001; Box 133;
File: MC Training Area Camp Elliott.
National Archives II, College Park, MD.

(COPY)

No. 3-s

OFFICE OF
THE COMMANDING GENERAL
FLEET MARINE FORCE
MARINE CORPS BASE, SAN DIEGO, CALIFORNIA.

25 August 1939.

From: Board of Inspection.
To : The Commanding General, Fleet Marine Force.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

References: Ltr. CG to LtCol. O.P. Smith, 1240-70/1, dated 21 July 1939.

1. The above reference directed the Board to inspect and report on the feasibility of purchase of certain properties in the Camp Kearney Area.

2. The board did not feel that it could intelligently make recommendations regarding the purchase of land for training purposes in the Camp Kearney Area without first determining the maximum training requirements of the Marine Corps Base and the Fleet Marine Force and examining the facilities already available.

3. As a guide, it was assumed that, as a maximum, it would be necessary to provide an area for the combat training of a reinforced brigade (Tables of Organization, U.S.Marine Corps, 1938, Tentative), and that the period available for training might be relatively short. It was further assumed that the area selected for the combat training of such a force should be separate and distinct from the recruit depot and concentration center, but should be conveniently located with respect thereto.

4. Training activities of the Marine Corps Base and Fleet Marine Force in the San Diego area are at present carried on at the following places:

Marine Corps Base proper:	Disciplinary training Technical training.
Rifle Range, La Jolla:	Technical training.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

NAS, San Diego:	Disciplinary training. Technical training. Tactical training.
FTB, San Clemente:	Technical training. Tactical training.
Combat Range, Camp Kearney: (leased land)	Technical training. Tactical training.

Note: - Disciplinary technical, and tactical training are assumed to include the following, respectively:

Disciplinary Training
- Military courtesy
- Personal hygiene
- Troop inspections
- Interior guard duty
- Drill, close and extended order
- Physical training.

Technical Training
- First aid
- Field sanitation
- Defense against chemical agents
- Tent drill
- Grenades, hand and rifle
- Marksmanship (rifle, pistol, automatic rifle, machine gun).
- Service practice (artillery)
- Musketry
- Combat practice firing
- Field fortification
- Firing demonstrations
- Technique of ship-to-shore operations
- Bayonet drill.

Tactical Training
- Scouting and patrolling
- Combat principles
- Marching, camping, and cooking
- Field exercises
- Tactical demonstrations
- Field maneuvers and landing exercises
- Command post exercises
- Tactical inspections.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

For ground troops, under present training allowances, the facilities now available (including the leased Combat Range) are adequate to carry on the necessary disciplinary and technical training. Facilities for tactical training are inadequate. In the event of a national emergency calling for the expansion, not only of Fleet Marine Force units but recruits under training, present facilities for disciplinary and technical training would be inadequate and for tactical training wholly inadequate. Expansion of present rifle range facilities and provision for a concentration and classification center in the Camp Kearney Area would satisfy all needs for disciplinary and technical training prior to assignment of men to combat units.

5. For the technical and tactical training of combat units there is an urgent need for an area suitable for this purpose. Having in view our primary training mission "to prepare for immediate operations with the U. S. Fleet in case of national emergency", such an area should provide for the following:

a. Terrain suitable for and of sufficient extent to permit firing of all weapons with which the Fleet Marine Force is armed.

b. Terrain suitable for the maneuver of infantry and artillery units.

c. Facilities for training in the technique of ship-to-shore operations and base defense.

d. Impact areas for naval supporting ships.

e. Impact acreas for supporting aircraft.

From the standpoint of supply and transportation, the area should meet the following requirements:

a. Be accessible.

b. Provide suitable camp sites.

c. Have an adequate water supply.

Manifestly, an area fulfilling all of the above requirements would be very difficult to find.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

6. The Fleet Training Base, San Clemente, fulfills in part the above requirements as far as peacetime training is concerned:

a. It is possible to fire all weapons with which the Force is armed, but due to the absolute lack of cover other than that provided by the relief of the terrain, such firing involves considerable artificiality. Construction of an airfield at Black Pt. now limits the area available for this purpose to the southeastern end of the island. More general use of the Fleet Training Base by Fleet units will probably cause increasing restrictions on areas available to the Marine Corps in the not too distant future. The area available southeast of the airfield is approximately 12 miles long and varies between 3 and 4 miles in width. The area over which tropps can maneuver with their weapons is approximately 9 miles long and 2 to 3 miles wide. Maneuver is limited by the steep bluffs on the northern side of the island and the presence of cactus in the southeastern end of the island.

b. The terrain, although of sufficient extent, is not particularly suitable for the maneuver of infantry units because of the lack of cover and the presence of cactus in the southeastern part of the island.

c. San Clemente Island is suitable for training in the technique and ship-to-shore operations and base defense. Due to the presence of cactus in the southeastern part of the island, landings involving an advance inland are limited to the northwestern end. This limitation on landing areas makes any maneuver involving landings somewhat artificial.

d. The island provides suitable impact areas for naval supporting ships and aircraft.

e. Camp sites are available on the island, but, due to the prevalence of fog and wind, living under canvas is at times disagreeable.

San Clemente, as a training area for combat units, has definite limitations:

a. At present water must be transported from the mainland. A catchment basin has been constructed, but no information is available as to the amount of water it will supply.

b. San Clemente is inaccessible. Tugs plying between San Diego and San Clemente require eight hours to make the trip with heavy material. Tugs and lighters are supplied by the Base Force and are not readily available. Usually arrangements are made three months in advance. Docking facilities on the island are limited. During certain periods of the year, due to exposure of docks to the weather, it would be impracticable to land troops and equipment. Troops on San Clemente are isolated from other activities of the Base, making supply and administration difficult, particularly for any large body of troops.

7. The area now under lease east of Camp Kearney serves a very useful purpose, but has certain definite limitations as a combat training area:

a. Being situated some 10 miles inland, it has no facilities for training in the technique of ship-to-shore operations and base defense, nor for impact areas for naval supporting ships and supporting aircraft.

b. The longest dimension of the area is approximately 6,500 yards and the narrowest dimension about 1,500 yards. Under present training allowances, infantry units of the 2nd Brigade are given training in firing all of the infantry weapons with which the brigade is armed. For combat practice firing, because of the restrictions on available impact areas, the approach must be made on land not leased by the Marine Corps. As the surrounding area is sparsely settled, it has been possible to do this. Such procedure, of course, is dependent upon the good will of the owners of the land. For the training of a brigade organized in accordance with Tables of Organization, 1938, the present leased area would be inadequate.

Pack howitzer firing has been conducted in the present leased area. Due to limitations on terrain available it is impracticable to vary battery positions and impact areas, thus introducing artificialities. Furthermore, artillery firing would interfere with infantry training. Under present training allowances, it would be possible to schedule the use of the combat range so that there would be no interference. However, during 1938 and 1939, because of the restrictions indicated, service practices of the 2nd Battalion, 10th Marines, have been conducted at San Clemente Island.

Firing of guns and machine guns of the Anti-aircraft Battalion is not practicable on the present leased area.

c. Even for small units suitable areas for maneuver of infantry are only available provided permission can be obtained to use adjoining land.

This area has certain definite advantages as a combat training area:

a. It is readily accessible. Two paved roads connect the Marine Corps Base with the present Combat Range, the distances being approximately 10 and 12 miles, respectively. A paved road connects the present rifle range with the area, the distance being approximately 10 miles. The brigade can use its organic transportation to reach the area. This makes the area available throughout the year, not only for formal periods of training when the unit is encamped in the area, but also for demonstrations, command post exercises, field exercises, refresher firing, tests of weapons, etc., not held during formal periods of training. San Clemente Island, due to its inaccessibility and the difficulty of arranging transportation thereto, is definitely inferior in this respect as a combat training area.

b. Camp sites are available which do not interfere with training.

c. Weather conditions are more suitable for training in the Camp Kearney Area than on San Clemente Island, not only from the standpoint of comfort of the men, but from the standpoint of non-interference with training.

d. City water is available within 4 miles of the present camp on the Combat Range. Inquiries have developed that, in some parts of the area under consideration, water can be obtained in very limited quantities by drilling to a depth of approximately 30 feet and in fairly adequate quantities at a depth of approximately 700 feet.

7. After a study of the training facilities now available in the San Diego area, the board came to the conclusion that, for the training of combat units of the Fleet Marine Force, the facilities of the FTB, San Clemente as well as a readily accessible training area in the vicinity of San Diego are necessary. The board felt that an attempt should be made to find a training area in the vicinity of San Diego which would provide facilities for all phases of the technical and tactical training of combat units of the Fleet Marine Force, except the following:

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

- -

Marksmanship -- to be conducted at present rifle range, expanded if necessary:

Technique of ship-to-shore operations and base defense -- San Clemente Island, and, to a limited extent, at beaches on the mainland;

AA gun firing -- San Clemente Island;

Naval gunfire practices -- San Clemente Island;

Employment of aircraft against shore targets -- San Clemente Island.

8. In accordance with the terms of the precept, the board examined the area within a radius of 10 miles of the old Camp Kearney site with a view to locating a suitable combat training area. In addition to the technical and tactical considerations already discussed, the board considered the following factors as affecting the feasibility of purchase:

Presence of well-travelled roads within the area;

Presence of telephone and power lines within the area;

Presence of valuable farming and grazing land within the area.

9. Three general areas were considered (U.S.Geological Survey Map, La Jolla Quadrangle, 1:62,500, Overlay No. 1):

a. The area, shown on Overlay No. 1 enclosed in red, marked "A", in general bounded on the south by the San Diego River, on the east by U.S. Highway 395, on the north by the Miramar-Rifle Range road, and on the west by the Santa Fe Railroad right of way.

b. The area, shown on Overlay No. 1 enclosed in blue, marked "B", in general bounded on the south by U.S. Highway 395 and the Miramar-Rifle Range road, on the east by U.S. Highway 395, on the north by Black Mt., and on the west by a line running north from the old Camp Kearney site.

c. The area, shown on Overlay No.1 enclosed in green, marked "C", in general bounded on the south by the San Diego River, on the east by Sycamore Canyon, on the north by the east-west unimproved road joining U.S. Highway 395 about one mile north of BM 967, and on the west by U.S. Highway 395.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

10. Area "A" was eliminated from consideration for the following reasons:

a. Presence of the paved road, shown on Overlay No. 1, cutting through the area.

b. Presence of the heavy transmission line, shown on Overlay No. 1.

c. Presence of the telephone line (approximately 60 wires), shown on Overlay No. 1.

d. Terrain not as varied as in other areas considered.

e. Presence of Navy emergency landing field southwest of Miramar.

f. No backstop for artillery and infantry weapon firing.

g. Because of the proximity of this area to San Diego the sale price of the land would probably be higher than in the other areas considered.

11. Area "B", although considered suitable from the standpoint of character and extent, was eliminated from consideration for the following reasons:

a. To make the best use of the terrain for firing, it would be necessary to close the unimproved roads shown on Overlay No. 1. Although these roads are shown as unimproved, they give evidence of frequent use.

b. There are considerable areas of valuable farming and grazing land.

c. A Navy activity (aerial bombing range) is located in this area (see Overlay No. 1).

12. After making a preliminary reconnaissance of Area "C", the board decided that this area merited closer inspection, as it appeared to have more advantages and fewer disadvantages than the other areas considered. After a careful inspection of the area, the board arrived at the following findings:

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

---

a. Extent of area available.- Three existing installations limit the extent of area available for firing infantry and artillery weapons (shown on Overlay No. 1):

The Old Escondido Road;

The telephone line paralleling this road (approximately 60 wires);

The heavy transmission line (approximately 60,000 volts).

The Old Escondido Road has been replaced by U.S. Highway 395 for all traffic between San Diego and Escondido. If Area "C" were acquired, there would be no reason for the existence of the Old Escondido Road. It is believed there would be no difficulty in having the road closed. The telephone line paralleling the Old Escondido Road carries about 60 wires. It serves only one customer in Area "C". It is a reasonable assumption that eventually the telephone company would move this line to have it parallel U. S. Highway 395. A forced removal of the line would undoubtedly involve expense to the government. However, Area "C" would be limited value as a combat training area if this telephone line were not removed. The heavy transmission line cutting through Area "C" is of expensive construction and its removal would probably be very expensive. This line runs through rugged terrain unsuitable for maneuver and is to the eastward of a high range of hills. The presence of this transmission line should not seriously interfere with the firing of infantry and field artillery weapons in that part of Area "C" west of the transmission line.

Assuming that it would be possible to close the Old Escondido Road and remove the telephone line paralleling that road, but that it would not be practicable to remove the heavy transmission line, the remaining part of Area "C" west of the transmission line (approximately 8 miles by 4 miles) would still be of sufficient extent to serve as a combat training area for all units of a brigade except the Anti-aircraft Battalion. With reference to the Anti-aircraft Battalion, the area under consideration would provide for .30 caliber anti-aircraft machine gun firing from various gun positions and for .50 caliber anti-aircraft machine gun firing from a limited number of gun positions. In both cases safety limits as specified in Army Training Regulations would be observed.

b. Suitability of terrain for training purposes& - Area "C" (only that part west of the heavy transmission line considered) comprises flat mesa land, rolling hills of medium elevation, and high rugged hills. The area slopes generally upward from U. S. Highway 395 to the northeast. In the area considered elevations range from 200 to 500 feet on the western limit along U. S. Highway 395 and from 900 feet to a maximum elevation of 1296 feet in the eastern part of the area.

The western two-thirds of the area is cut by dry streams oriented generally from northeast to southwest. The ravines enclosing these dry streams, in general, are less abrupt in the northern part of the area than in the southern part, but nowhere in the western two-thirds of the area is the terrain so rugged as to preclude infantry maneuver.

Vegetation comprises grassland, greasewood scrub, oak scrub, elderberry, and some sycamore and eucalyptus trees. North of San Clemente Canyon and north and south of Shepherd Canyon there are considerable areas of open country interspersed with brush. The remainder of the area is generally covered with greasewood brush, except in the larger canyons where there are scattered sycamores, scrub oak, etc. By judicious clearing of greasewood brush, which would not be a serious undertaking, the fire hazard could be reduced and the terrain could be given a more varied character.

Suitable areas for camp sites are available along U. S. Highway 395 north of Murphy Canyon. Camps located in this area would interfere to a minimum degree with training activities. City water is available 4 miles from possible camp sites. To use this water would involve the expense of laying a pipe line in addition to the water rent. In the vicinity of possible camp sites reports indicate that subterranean water is available in limited quantities by drilling to a depth of approximately 30 feet and in fairly adequage quantities by drilling to a depth of 700 feet. (One such well in the area delivers 25 gallons per minute for a period of a few hours per day).

The facilities offered by the terrain under consideration (that part of Area "C" west of the heavy transmission line) can be summarized as follows:

b. Suitability of area for training purposes. - Western two-thirds contains areas suitable for the maneuver of infantry and artillery units and firing emplacements for infantry weapons, anti-aircraft machine guns, and pack howitzer artillery. Eastern one-third of area to serve as a safety factor by providing a backstop for infantry and artillery firing.

For combined maneuvers of a brigade, Area "C" alone would not be sufficient. However, the areas west and north of Area "C" are suitable for maneuver purposes and they are very sparsely settled. No difficulty should be experienced in obtaining temporary leases for short periods of time. In this connection, the board did not consider that it was feasible to recommend the purchase of land sufficient in extent for such large scale maneuvers.

c. Accessibility of area. - Paved roads give access to suitable camp sites in Area "C" as follows.

From Marine Corps Base: via Old Town, Mission San Diego and Murphy Canyon 12 miles.

via Old Town and BM 417 - 10 miles.

From Rifle Range: via Linda Vista - 10 miles.

Should the activities warrant it in the future, it would be possible to extend the railroad spur running east from Linda Vista to the western edge of Area "C". During the war this spur served Camp Kearney. No engineering would be involved in extending this spur.

d. Feasibility of purchase. - Of the three areas considered by the board, Area "C" appears to contain the largest proportion of land which could be classed as of little value for either farming or grazing. As is true in many parts of California, oil leases have been obtained in certain parts of the area, but no well has been drilled.

Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

manouver of infantry and artillery units and firing emplacements for infan

The land is on the market. Senator Ed. Fletcher, who leases to the Marine Corps the present Combat Range (Within Area "C"), has offered to sell this area to the Marine Corps or procure for sale to the Marine Corps any larger area desired. He has asked $100.00 per acre for this land. This price is believed to be entirely too high. In order to arrive at a fair price for this type of land, an analysis was made of the County Assessor's records. Not only the records pertaining to Area "C" but also those pertaining to parts of Areas "A", and "B" were examined with the following results:

Number of acres considered	42,905.97
Assessed values (land)	$394,760.00
Assessed value (improvements)	84,569.20
Average value per acre (land)	9.20
Average value per acre (land with improvements)	

In this section of the country the equation used in determining the asking price for land appears to be as follows:

Assessed value times two plus 20% equals selling value.

On this basis, the asking price for land in Area "C" would be $26.81 per acre. In the opinion of the board, not more than an average price of $10.00 per acre should be offered for the land. One lessee in the Shepherd Canyon area stated that he was renting 50 acres for grazing purposes at a yearly rental of $10.00 and that the yearly taxes on the same tract were $12.00.

From the standpoint of the real value of the land and in view of the fact that the bulk of it is apparently on the market, the board believes the purchase to be feasible.

Recommendations.

a. The board urgently recommends that steps be taken to purchase for training purposes the area shown on Overlay No. 2.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

Subject: Report on the feasibility of purchase of certain properties in the Camp Kearney Area.

b. The board further recommends that, if higher authority does not deem it feasible to purchase all of the above area at this time, steps be taken to acquire by purchases the area (shown on Overlay No. 2) now used as a Combat Range. In this connection it might be pointed out that this course, in addition to failing to provide an adequate combat training area, would make subsequent forced acquisition of additional land more costly.

In connection with the county Assessor's records. Not only the records pertaining to Area "C" but also those pertaining to parts of Areas "A" and "B" were examined with the following results:

Oliver P. Smith,
Lt-Colonel, U.S. Marine Corps,
Senior Member.

Number of acres considered	42,905.97
Assessed values (land)	$394,760.00
Assessed value (improvements)	
Average value per acre (land)	9.20
Average value per acre (land with improvements)	

Maurice C. Gregory,
Lt-Colonel, U.S.Marine Corps,
Member.

Andrew E. Creesy,
Lt-Colonel, U.S.Marine Corps,
Member.

In this section of the country the equation used in determining the asking price for land appears to be as follows:

Bert A. Bone,
Lt-Colonel, U.S.Marine Corps,
Member.

Assessed value times two

On this basis, the asking price for land in Area "C" would be $26.81 per acre. In the opinion of the board not more than an average price of $10.00 per acre should be paid for the land.

John B. Wilson,
Lt-Colonel, U.S. Marine Corps,
Member.

One lessee in the Shepherd Canyon area stated that he was renting 90 acres for grazing purposes at a yearly rental of $10.00 and that the yearly taxes on the same tract were $12.00.

Randolph C. Berkeley,
Second Lieutenant, U.S.Marine Corps,
Recorder.

From the standpoint of the land values and in view of the fact that the bulk of it is apparently on the market, board believes the purchase to be feasible.

13.

Recommendations:

13.

a. The board urgently recommends that steps be taken to purchase for training purposes the area shown on Overlay No. 2.

Bureau of Yards and Docks.

Memorandum: "Assignment of Building Numbers at Camp Elliott,
Marine Corps Base, San Diego, Calif.",
dated 9 August 1941
and 1st Endorsement dated 13 August 1941;
2nd Endorsement dated 27 August 1941.
Record Group 181; Entry 63A0589-63K0589; Box 379; File: KP104.
National Archives-Pacific Southwest Region, Laguna Niguel, CA.

(COPY)

1st Endorsement

Headquarters Marine Corps,
Washington, D. C.,
August 13, 1941.

From: The Major General Commandant.
To: The Commanding General, Marine Corps Base, Naval Operating Base, San Diego, Calif.

Via: The Commandant, 11th Naval District, San Diego, Calif.

Subject: Assignment of building numbers at Camp Elliott, Marine Corps Base, San Diego, Calif.

Reference: (a) Budocks ltr KP102/N19-1 to CG Marbase NOB San Diego, Calif via Marcorps and Cmdt 11th NavDist of Aug 9, 1941, attached.

1. Forwarded.

/s/ Arnold W. Jacobsen
Arnold W. Jacobsen
By direction.

- -

Copy to: The Quartermaster.

- -

KP102/ 15 Second Endorsement
Commandant's Office, Eleventh Naval District
(Serial No.1-3681) San Diego, California AUG 27 1941

From: The Commandant.
To: Commanding General, Marine Corps Base.

1. Forwarded. YED Formality mentioned in the second paragraph of basic letter will be prepared by the District and forwarded direct to the Bureau of Yards and Docks.

Cmdt.

(C O P Y)

KP102/N19-1

NAVY DEPARTMENT
Bureau of Yards and Docks
Washington, D.C.

AUG 9 1941

From: Chief of the Bureau of Yards and Docks.
To : The Commanding General, Marine Corps Base, Naval Operating Base, San Diego, California.
VIA : (1) The Major General Commandant, Headquarters, Marine Corps, Washington, D. C.
(2) The Commandant, 11th Naval District, San Diego, California.

Subject: Assignment of building numbers at Camp Elliott, Marine Corps Base, San Diego, California.

Reference: Commanding General's letter file 310-181/1275-10-15 dated 1 July 1941 to Chief of the Bureau of Yards and Docks, via (1) the Commandant, 11th Naval District, and (2) The Major General Commandant, Headquarters Marine Corps, Washington, D. C.

1. The Bureau approves the assignment of the following numbers to the buildings at Camp Elliott:

Number	Building
1	Dispensary
2	Officers Field Mess
2a	Annex Officers Field Mess
3	Officers Field Mess
4	Officers Field Mess
5	Non-Commissioned Officers Barracks
6	Non-Commissioned Officers Barracks
7	Non-Commissioned Officers Barracks
8	Mess Hall
9	Power House
10	Reservoir, 1,000,000 gallons
11	Reservoir, 1,000,000 gallons
12	Pump House
13	Police Shed
14	Guard House
15	Administration Building

(C O P Y)

KE102/N19-1

Subject: Assignment of building numbers at Camp Elliott, Marine Corps Base, San Diego, California.

Number	Building
16	Recreation Building
17	Headquarters Barracks
18	Mess Hall
19	Water Tank, 100,000 gallons
20	Headquarters Barracks
21	Recreation Building
22	Administration Building
23	Mess Hall
24 to 53 inclusive	Barracks
54 to 75 inclusive	Storehouses
76	Parachute Loft
77	Gas Chamber
78	Annex Recreation Bldg.
79	Fire House
80	Annex Fire House
81	Gas Chamber
82	Annex Dispensary
83	Cold Storage Building
84	Storehouse
85	Storehouse
86	Bakery Building
87	Bakery Building
88	Engineer Park
89	Gas Chamber
90	Motor Transport Park
91	Tank Park
92 (Group)	Sewage Disposal Plant
	A, Chlorinator House
	B, Primary Sedimentation Tank
	C, Digestion Tank
	D, Pump House
	E, Trickling Filter
	F, Secondary Sedimentation Tank
	G, Chlorine Contact Tank
93	Mess Hall
94	Mess Hall
95	Mess Hall
96	Mess Hall
97	Mess Hall
98	Vehicle Park
99	Mess Hall
100	Washroom

(C O P Y)

KP102/N19-1

Subject: Assignment of building numbers at Camp Elliott, Marine Corps Base, San Diego, California.

- -

Number	Building
101	Head
102	Washroom
103	Head
104	Officers Toilet Building
105	Officers Toilet Building
106	Washroom
107	Head
108	Washroom
109	Head
110	Officers Toilet Building
111	Washroom
112	Head
113	Washroom
114	Head
115	Officers Toilet Building
116	Officers Toilet Building
117	Washroom
118	Head
119	Washroom
120	Head
121	Service Station
122	Wash Rack
123 (Group)	Old Water Plant
	A, Pneumatic Tank, 5,700 gallons
	B, Pump House
	C, Water Tank, 18,000 gallons
	D, Water Tank, 25,000 gallons
124	Incinerator
125	Incinerator

2. It is requested Y&D Form 115 be forwarded for the files of the Bureau.

/s/ L. A. Morrison,
L. A. Morrison
By direction of
Chief of Bureau.

CC to Commanding General, Marine Corps Base, Naval Operating Base, San Diego, California.
CC to Commandant, 11th Naval District, San Diego, California.
CC to Major General Commandant, Headquarters, Marine Corps, Washington, D. C.

Bureau of Yards and Docks.

"Final Project Cost Report,"
(Magazines)
dated 17 March 1943.
Box: Contracts NOY 4175, 4186, and 4187.
Command Historian's Office,
Seabee Museum, Port Hueneme, CA.

BU OF YARDS AND DOCKS
NAVY DEPARTMENT
Form FC 1018 (Y.& D.)

FINAL PROJECT COST REPORT

Date 3-17-43

Contract NOy-4187

Sheet 41 of 5[illegible]

Project or Partial-project # 33 , Title Magazines

Description: Reinforced concrete magazines with access roads, 5 small and 2 large.

Location: Camp Elliott, California

Quantity: 7 - varied

Item	Unit Cost	Total Cost
Labor	$	$11,405.44
Materials, Supplies and Warehouse Stock		7,825.80
Permanent Plant and Equipment		-
Lump Sum and Fee Subcontracts		454.92
Temporary Plant & Equipment, Oper. & Depr.		275.50
SUB TOTAL - Direct Cost	$	$19,961.66
Proration of General Accounts 5.04 %		1,060.34
TOTAL COST	$	$21.022.00

Remarks:

Start: 1/25/42

Usable: 4/1/42

PORT HUENEME
SEABEE MUSEUM
HISTORIANS OFFICE
BOX: CONTRACTS NOy-4175
4186
1A CONTRACTING CO.

Chief Gas Officer.

"Shipment of Empty Chlorine Cylinders,"
Dated 6 January 1919.
Record Group 175; Entry: General Correspondence; Box 477.
National Archives, College Park, MD.

NARA-DC
RG: 175
Entry: General Correspondence
Box: 477
FILE - 470.71/379
1-6-19

CAMP KEARNY, CAL.
Jan. 6, 1919

FROM: Chief Gas Officer.

TO: Director Chemical Warfare Service.
(Thru Channels)

SUBJECT: Shipment of empty (Chlorine) Cylinders.

1. It is requested that information be given as to where empty Chlorine Cylinders should be shipped.

2. Those Cylinders were invoiced to the undersigned by his predecessor and no record is available showing where they were shipped from.

VLB/ICM

C.W.S.470.71/379 1st Ind.

Office, D.C.W.S., January 13, 1919 - To the Chief of Gas Defense Division, 19 West 44th St., NEW YORK, N. Y. (Attention Lt. Henne)

Forwarded for the information requested. (28)

WM. L. SIBERT
Major General, U. S. Army,
Director, Chemical Warfare Service,
By

V. L. Bohnson
Major, Chemical Warfare Service.

(11)

Coletta, Paolo E., ed.

United States Navy and Marine Corps Bases, Domestic,
dated 1985.
Westport, Connecticut: Greenwood Press.