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FINAL RANGE IDENTIFICATION AND PRELIMINARY RANGE ASSESSMENT MCRD PARRIS ISLAND SC

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U S ARMY CORPS OF ENGINEERS

US Army Corps of Engineers
HUNTSVILLE ENGINEERING AND SUPPORT CENTER

RANGE IDENTIFICATION and PRELIMINARY RANGE ASSESSMENT

FINAL

Marine Corps Recruit Depot Eastern Recruiting Region Parris Island

Beaufort County, South Carolina

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Prepared by
US Army Corps of Engineers
ST. LOUIS DISTRICT

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1.0 INTRODUCTION

1.1 AUTHORITY

Section 107 of the Federal Facilities Compliance Act of 1992 amended the Resource Conservation and Recovery Act (RCRA). This act required the U.S. Environmental Protection Agency (EPA) to promulgate regulations identifying when conventional and chemical military munitions become hazardous waste subject to RCRA Subtitle C regulations. The EPA's final military munitions rule, published 12 February 1997 (62 FR 6622), postponed action on identifying military munitions on closed, transferring, or transferred ranges as solid waste pursuant to the Department of Defense (DOD) developing the "range rule", to adequately protect human health and the environment.

The DOD proposed range rule, *Closed, Transferred, and Transferring Ranges Containing Military Munitions*, Title 32 Code of Federal Regulations (CFR) Part 178, contains a five part process that is not inconsistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The proposed rule is tailored to the special risks posed by military munitions and military ranges. The rule is proposed under the authorities of the Defense Environmental Restoration Program (DERP); the DOD Explosive Safety Board (DDESB); and Section 104 of CERCLA as delegated to the DOD by Executive Order (EO) 12580 (59 FR 2923, January 23, 1987). Active and inactive ranges on military installations are not covered by the range rule. *DOD Ammunition and Explosives Safety Standards (DOD 6055.9 STD)*, published in July 1997, provides range guidance on these facilities.

In July 1997, the Headquarters, U.S. Marine Corps contracted with the U.S. Army Corps of Engineers St. Louis District to prepare an *Archive Search Report* (ASR) and *Range Identification and Preliminary Assessment Report* to facilitate development of a comprehensive range inventory on Marine Corps installations. These reports provide detailed information on facility missions and features relating to ordnance, explosives, suspected chemical warfare materials (CWM) and any other warfare materials (i.e., radiological, biological).

Since 1990, the U.S. Army Engineering and Support Center, Huntsville (USAESCH), has been the Center of Expertise (CX) and Design Center for Ordnance and Explosives (OE). In cooperation with the USAESCH, the U.S. Army Corps of Engineers, St. Louis District, prepares ASRs in support of environmental restoration at active Department of Defense installations, Formerly Used Defense Sites (FUDS) and installation transitions under Base Realignment and Closure (BRAC) recommendations.

1.2 SUBJECT

Marine Corps Recruit Depot Eastern Recruiting Region (MCRD ERR) Parris Island consists of approximately 6,707.955 acres near Beaufort and Port Royal, South Carolina. Although the French and Spanish built fortifications on the island in the 15th century, modern military use at Parris Island began with the construction of the U.S. Naval Station, Port Royal in the 1890s. The dry dock facility was obsolete within 15 years, which allowed the Marine

Corps to establish a training base on the island first in 1909 on a temporary basis and permanently in 1915. The installation increased in size nearly a hundred fold during the World War I expansion of the base to include the entire island. Although, other missions have been associated with Parris Island, such as the Marine Corps Air Station on Page Field in the 1940s or artillery training in the late 1930s, the main mission of the base has been recruit training since the Marine Corps has controlled the site. Ordnance and explosive (OE) and chemical warfare material (CWM) related features of the base included assorted small arms ranges, rocket, grenade and mortar use, coastal defense gun emplacements, aerial bombing targets, artillery impact areas, gas chambers, various ordnance storage areas, maneuver areas, and training stations and courses. Plate 1 in the report plates section shows the general location of the site.

1.3 PURPOSE

The intent of the range rule is to establish a process for evaluating appropriate response actions on closed, transferred or transferring ranges. The following definitions apply:

> Transferred Range – Includes ranges being identified in the FUDS program. Many transferred ranges are a subset of FUDS, although not all of them qualify for the FUDS program.
>
> Transferring Ranges – Transferring ranges are frequently the result of property being excessed under BRAC. Concerning DOD leased property, when the decision is made to terminate the lease, the affected range will be classified as a transferring range.
>
> Closed Ranges – Closed ranges include military ranges on active military installations that are no longer needed for training or testing by the military and have been converted to an incompatible use.

Response actions address safety, human health and the environment. This report provides the data needed for the initial phases of this process for an installation's closed, transferred or transferring ranges. Additionally, the report provides a historical baseline for the installation's active and inactive ranges. The first two phases of the range rule response are Range Identification and Range Assessment.

1.4 SCOPE

This report, *Range Identification and Preliminary Range Assessment*, compiles information required by range rule from existing sources. A companion volume, the *Archives Search Report*, contains details about the data collection and analysis phase and serves as documentation for the information contained in this report. This volume provides individual Range Identification and Preliminary Range Assessment information on each of the identified ranges for the installation.

Existing information provided the basis for the creation of this report. Without verification by grid sampling of the ranges, several of the Range Assessment elements will be limited. This pertains particularly to depth, quantity and density estimates. If future needs require these elements precisely defined, an expanded range assessment may be needed. Additionally, this *Range Identification and Preliminary Range Assessment* does not include information concerning the environmental setting of the installation. The range rule stipulates a Range Assessment should include "...location and identity of human and environmental receptors potentially exposed, specific exposure routes of concern, hydrologic and hydrogeologic conditions, soils and geology, terrain, climate, biological resources and cultural resources...". Previous reports and investigations prepared for this installation include information on these topics and will not be duplicated here.

1.5 METHODOLOGY

1.5.1 Archives Search Report

The companion volume, the *Archives Search Report*, contains supportive information used to analyze the installation for the range rule, including:

- A brief history of the military activities
- A review of related site investigations
- Review of archives and repositories visited for historical records, specifying the extent of the records searched
- An aerial photography and map analysis of the site
- Real estate information, past and present
- Findings of the site inspection
- Lists of cited references and copies of pertinent documents
- Interviews
- Photographs, both current and historic
- Historical maps / drawings

1.5.2 Range Identification

Range Identification, as required by the range rule, includes a general account of an identified range. The location data describes the position and magnitude of each range. A plate supplements the location data on each range showing aerial extent. As of this writing, a system for assigning "unique range identifiers has not been established. Therefore, this information is not contained within this report. Also portions of the Range Identification may need to be updated to reflect any changes.

1.5.3 Preliminary Range Assessment

The Preliminary Range Assessment compiles an appraisal of the range based on existing data of varying levels of information. This information then forms a baseline for a qualitative risk

assessment. The following subparagraphs discuss the general methods used to develop the assessments.

1.5.3.1 Types, Quantities, and Locations of Munitions Used

The types, quantities and locations of munitions used are determined by one or more of the following:

- Specifically stated in historical maps, documents, and photography
- Past and present range names, usage, and number of years in service
- Visual site inspection (non-intrusive)
- Interviews with base personnel and former employees
- Ammunition Supply Point (ASP), Range Control, and Explosive Ordnance Disposal (EOD) records
- Standing Operating Procedures (SOP)
- Regulations on training requirements and ammunition allocations

Available historical records often provide information regarding specific types of munitions used. In the absence of such data, typical models of munitions items used during that era will be substituted. Frequently, historic maps and aerial photography designate the locations of ranges. Records and documentation seldom reveal quantities. At times, quantity of munitions can be calculated by referring to regulations of that time frame which specify ammunition allocations for training. This method proves useful if the unit type and the number of years trained at a location are known. More often, quantity will be expressed as a qualitative factor based on frequency and years of range use.

1.5.3.2 Estimated Density of Munitions

Generally, reliable UXO density data does not exist until after sampling. Record reviews do not provide accurate estimates. This assessment phase follows the guidelines set in the *DoD Range Rule Risk Methodology Qualitative Risk Evaluation* (QRE), draft version, dated November 26, 1997. The range assessment provides an estimate based upon one or more of the following methods:

- Previous and current range clearance operations
- UXO surveys from a similar range or sector at the same installation
- Range setup data
- Estimated quantity multiplied by the "10 percent default dud rate
- Frequency of range use and number of years in service

Previous and current range clearance operations provide useful information but, identify only surface density, not buried density. If available, UXO surveys from a similar range on site provide data. In instances of a known quantity estimate, this quantity of munitions fired can be multiplied by the "default dud rate of 10 percent". This dud rate, commonly used by military

units, usually reflects a worst case scenario. When no site specific data exists, estimates from range setup data can be used. The table below describes the qualitative designations of "very high" for an impact area, "high" for buffer zones, "moderate" for a safety fan, and "low" for fire and release points.

UXO DENSITY DESIGNATION	UXO DENSITY DESCRIPTION
Very High	More than 40 UXO per acre
High	More than 5 to 40 UXO per acre
Moderate	More than 1 to 5 UXO per acre
Low	1 or fewer UXO per acre

For active open style ranges, the frequency of use (logged hours from range control records) and years in operation may be the only resource available. The designated impact areas of these ranges will reflect a "very high" density from the table.

1.5.3.3 Estimated Depth of Munitions

Penetration analysis is estimated using either the Waterways Experiment Station (WES) equation or the nomograph published in TM 5-855-1. The equation developed by WES provides fragment penetration prediction for soils ranging from clay to dry sand. The equation is given as:

$$t_p = 1.975 W^{(1/3)}_{(f)} k_p \log(1 + 4.65(V_s/10^3)^2)$$

where

t_p = penetration depth (inches)
W_f = fragment weight (ounces)
k_p = constant depending on soil type

The information needed to use this equation includes the weight of the projectile and the velocity of the projectile. As a conservative value, the muzzle velocity has been used.

Predicting buried UXO detection depths have been evaluated by the Army Environmental Center (AEC) through a series of tests at Jefferson Proving Ground. This project data has been evaluated by the Corps of Engineers Huntsville Engineering and Support Center, and determined that maximum UXO detection depths can be estimated upon type of instrument used and the diameter of the munition. The figures shown in this report are based upon the magnetometer using the following formula:

$$\log(\text{depth}) = 1.354\ (\log(\text{diameter})) - 2.655)$$

DOD 6055.9-STD allows the use of a nomograph in TM 5-855-1 to estimate penetration depth for ammunition impacting the ground, but failing to function. The nomograph requires four input parameters including striking velocity, soil type, nose shape and projectile weight. In the absence of a ballistic program to compute striking velocity, again the muzzle velocity (a more publicized statistic) is used. Muzzle velocity is greater than striking velocity, therefore this parameter is conservative. For each range, a representative model of a type of ammunition capable of greatest ground penetration will be used.

The following publications provide information and guidance on depth penetration of bombs, projectiles, and historic munitions:

- Department of the Army Technical Manual, TM 9-1907, *Ballistic Data Performance of Ammunition*, dated July 1948.
- Lehigh University, *Bomb Damage Analysis Vol II Part I Phase I-B*, dated 30 June 1949.
- Colorado School of Mines Research Foundation, Inc., *Bomb Penetration Project*, dated 15 June 1951.
- U. S. Army Engineering and Support Center, Huntsville, AL, *Penetration of Projectiles Into Earth, an Analysis of UXO Clearance Depths at Fort Ord*, revision 2, dated 19 August 1997.

1.5.3.4 Chemical Constituents

The U.S. Army Defense Ammunition Center (USADAC) at McAlester Army Ammunition Plant (MCAAP) manages the Munitions Items Disposition Action System (MIDAS) database. This relational database consists of munitions components and constituents developed to support demil execution, resource recovery and recycling, research and development technology application and environmental permitting. The MIDAS database is a "work in progress program" and contains only a portion of the current conventional ammunition inventory. The possibility exists that ammunition items may be analyzed and not yet loaded onto the database. Contact the MIDAS team at 918-420-8271 or DSN 956-8271 for further clarification. The database is accessible on the Web site at:

http://www.dac.army.mil/fd/midas/index/.htm

For a munition listed in the database, a complete inventory of all the constituents can be reproduced. A complete constituent output listing for a single item runs from a single page to dozens of pages. This report will not reproduce this information.

Additionally, MIDAS does not contain information on historic munitions. Available sources for constituents in these types of munitions involve researching item specific historical drawings, military specifications, and technical manuals.

1.5.3.5 Specific Munitions Safety Issues

Section 3.0 lists general safety precautions when dealing with UXO. These precautions will be used in addition to the general safety requirements of OP-5 Volume 1. Also, section 2.0 in the Preliminary Range Assessment identifies any item specific safety precautions.

2.0 RANGE SUMMARIES AND PRELIMINARY RANGE ASSESSMENTS

2.1 RANGE SUMMARY

This Archives Search Report identified twenty-nine ranges associated with MCRD ERR Parris Island, including some currently in use, historic ones and three of questionable existence:

- Khe Sanh/Range A
- Hue City/Range B
- Chosin/Range C
- Starlight/Range D
- Inchon/Range E
- Pusan Range, Nak Tong Range and Recreational Firing Range (Broad River Small Arms Ranges)
- Rocket and Mortar Impact Area
- Indoor Small Bore Range (Building 765)
- Miscellaneous Training Stations, Courses and Maneuver Areas
- Guadalcanal Hand Grenade Range
- Mine and Booby Trap and Practice Grenade and Mine Field Range
- Practice Grenade Range
- Combat Assault Course
- Gas Chamber (Bldg. 793)
- Aerial Bomb Target at Page Field
- Strafing Range at Page Field
- Aerial Bombing Target at Golf Course
- Trap and Skeet Ranges at Page Field
- Recreational Firing Range at Horse Island
- Aerial Bombing Target at Parade Deck
- Rifle Range at Ballast Creek
- Field Artillery West Main Range
- Field Artillery East Shrapnel Range
- Gas Chamber (Bldg. 685)
- Aerial Bombing Target at Southern Tidal Flats
- Gas Chamber at Elliott's Beach
- Grenade Range Near Old Swimming Pool at Weapons and Field Training Battalion Area
- Fuse Range at Elliott's Beach
- Hand Grenade Range near Elliott's Beach

The following subparagraphs include ASR sections 4.1.2, 4.1.3 and 4.1.4 which provide summaries of the Ordnance and Explosives, Chemical Warfare Material and Clearance Activities at Parris Island. Section 2.2 contains summairies of each of these ranges and further range information in a format consistent with the DoD proposed range rule, *Closed, Transferred, and Transferring Ranges Containing Military Munitions.*

2.1.1 Summary of Ordnance and Explosives Activities

The MCRD ERR Parris Island has a long and varied history of ordnance usage. Besides the small arms qualifications, pyrotechnics, simulators, and weapons familiarization (rockets, 40mm grenades and hand grenades) associated with the current basic training program, previous missions at Parris Island have included the use of coastal defense cannons, artillery firing, and aviation bombing and strafing.

This investigation found no specific evidence concerning the weapons used or emplaced at Parris Island prior to the late 19th century. Assumably the 16th century French and Spanish forts had cannon mounted for the protection of these works against rival European powers and attacks against Native Americans. The soldiers of these forts would also have been armed with small arm musketry of the period. It is likely that cannon balls and shells, musket balls and powder to shoot these arms were stored inside the forts.

No direct evidence was located concerning ordnance use at Parris Island during the next 300 years. The surrounding islands of Hilton Head and St. Phillips had fortifications and saw hostile action during the Civil War. No direct evidence was located that either army used Parris Island for this purpose, though Federal forces had patrols that occupied Parris Island during the war (Alverez 1998). The presence of ordnance related items remaining from these uses is conceivable but no evidence was located to indicate it.

Following the construction of the Naval Station, the first Marine detachment was assigned to guard the Parris Island facility. The specific types of weapons that accompanied this detail are unknown. With the outbreak of the Spanish-American War in 1898, the coastal defenses of Port Royal were not completely modernized with the Endicott period, breech-loading guns. The three 10-inch disappearing guns and two 4.7-inch rapid fire guns for Batteries Jesup and Fornance at Fort Freemont would not be transferred until the following year. As such, two Civil War era, muzzle loading 8-inch rifles were placed at the Hilton Head Military Reservation (War Department 1898, 1918). Temporary fortifications were also established on Parris Island. **Fort Haines** and **Fort MacKay** clearly show on contemporary site plans (see Appendix G-1). Secondary sources also indicate two additional sites: **Quarantine Fort** and **Station Fort** were also built and the military placed muzzle loading 10-inch Rodman guns, sleeved to 8-inches, on the island (Alverez 1998). This investigation found no corroborating documentation for this, nor could it determine the specific location of any gun emplacements at Parris Island. However, one site plan for Port Royal Sound shows "projected armament" in the Elliott's Beach area (see Appendix G-33).
Another unconfirmed possibility for the Spanish-American War time period was whether the Beaufort or Broad Rivers were mined. Fort Fremont had a casemate and Building 16 at Parris Island was a Magazine but no supporting documentation was found that indicated that the mining of the rivers occurred. Following this war, Parris Island had a second "temporary storage magazine, building XXI" though it's specific location could not be found on the site plans (see Appendix G-2).

The specific types of ordnance associated with the Marine Officers' School and the temporary recruit training facility operated at Parris Island between 1909 and 1911 is unknown.

Assuredly, it included small arms training but without locating any site plans for the time period, ascertaining the location of a Rifle Range is not possible. By 1916, site plans show the Rifle Range at Ballast Creek, with firing lines at 200, 300, 350, 400, 500 and 600 yards and a target butt at the southern end (see Appendix G-3). Presumably this is the same small arms range used earlier in 1910-11. No documentation was located concerning the use of grenades or firing areas for heavier weapons such as artillery during this period, though use of these items is conceivable. However, the firing of artillery would have required significantly more real estate than any sources imply the Marine Corps owned at Parris Island prior to WWI.

The World War I build up saw the expansion of the post to include the entire island allowing for additional training areas, including a Maneuver Grounds at the southern end of the island on the current golf course (see Appendix G-4). This appears to be the same location as the Sea-Going Depot, where marines fired artillery in a "grassy enclosed park named in honor of the former post commander, "Battery Pendleton"" (Alverez 1998). The location of the battery, direction of fire and the types of weapons used are unknown. The artillery may have included the 75mm howitzers or 3-inch guns but since the purpose of the training was for ship bound marines, typical naval guns of the time would also seem reasonable. The firing of artillery on Parris Island prior to the late 1930's would have been hampered by civilians who were allowed to remain in their homes on the southern parts of island following the seizure of the land in 1918. A map from 1937 shows the location of some of these residences (see Appendix G-9). Other collected but unreferenced documents also mention this issue.

The WWII expansion also allowed for the construction of a New Rifle Range on the western edge of the island (i.e. the current Weapons and Field Training Battalion area). The new rifle range actually consisted of three ranges: a 1,000 Yard Range, a 600 Yard Range and a Pistol Range (see Appendix G-4 & 6). Although the ranges have been modified and upgraded over the years, their location and use generally corresponds to the current Khe Sanh, Hue City, Pusan and Nak Tong ranges today. The earlier Rifle Range at Ballast Creek was converted to a flying field. The standard small arms at the time were M1903 Springfield rifle, 30 caliber Browning machine gun and the .45 caliber pistol.

By 1919, the ordnance storage of the post expanded to include Magazine, 48, Ammunition Storage and Building 85, Ammunition Salvage Storage, though the location of building 48 could not be ascertained from the map (see Appendix G-5). Assumably these were temporary uses, as latter maps did not indicate an OE mission for either site. Building 85 was latter razed to construct the current Headquarters building.

Besides the troops stationed at the post, Naval and Marine personnel on ships in the area would use the small arms ranges at Parris Island to qualify (USS Patoka 1923), a practice that continues today for military in the area. By 1927, there were 61 targets at the 600 Yard Range, 16 targets at the 1,000 Yard Range and 12 targets at the Pistol Range. The installation felt that these ranges were suitable for machine guns but not light mortars or 37mm firing. In 1930, the increased range of the caliber .30 M1 ammunition necessitated moving the 600 yard rifle range (see Plate 3) (MB PI 1927, 1930). By 1929, Building 20, Ammunition Storage had been constructed at the 600 Yard Range (see Appendix G-6).

Ordnance used in training during the mid-1930s included caliber .22, .45 ball cartridges; cartridges for VERY pistols; cartridges caliber .30, (ball, blank, dummy, tracer, and wooden for V.B. [Viven-Bessieres] rifle grenade); hand grenades (dummy and practice); V.B. rifle grenade (dummy and fragmentation); signals (M5, white star); flares (illuminating, parachute type for rifle grenades) (MB PI 1935; MB PI QM 1936, 1937). The location of a hand grenade or rifle grenade range was not highlighted on site plans of this period.

By 1937, the Marines Corps definitely conducted artillery firing at Parris Island, having set up two impact areas on the installation: an East Shrapnel Range and a West Main Range (see Appendix G-9 and Plate 2). Marines from Quantico traveled to Parris Island and fired 1,794 High Explosive and Shrapnel rounds from French 75mm guns and Pack Howitzers in July 1937. In 1938, Quantico Marines returned, firing 1,828 shrapnel and HE rounds. In 1939 they returned again, though the number of rounds fired is unknown. Annual service practice also occurred for antiaircraft battalions on Parris Island in this time frame, which required renting private property north of the gate for searchlight positions (MB Quantico, 1st Battalion, 10th Marines 1937, 1938; USMC HQ 1939; MB PI, 2nd AA Battalion 1938).

Even with these artillery ranges, the Marine Corps at Parris Island acquired additional land to fire weapons with a longer range than could be fired on the island. On 10 July 1937, the Department of the Agriculture granted the Department of the Navy use of the wildlife refuge that had been the Hilton Head Lighthouse Reservation. Subsequently, the Defense Battalions at Parris Island established Camp McDougal on the lighthouse reservation, using caliber .30 and .50 machine guns, 3 and 5-inch guns. Additional gun emplacements for 7-inch naval guns and the Panama mount for 155mm guns were also installed at Hilton Head, presumably at the lighthouse area but possibly at other Formerly Used Defense Sites (FUDS) on the island (see section 5.2). Artillery use of this site lasted at least through August 1942 when the last Defense Battalion left the area (see Appendix G-14, Heinl, 1940; MB PI 1942). This investigation did not find evidence of the use of the larger artillery weapons on Parris Island.

Although earlier aerial gunnery and bombing could not be documented, by 1938 aerial gunnery and bombing has occurred at Parris Island. This investigation identified four bombing targets on Parris Island:

Aerial Bombing Target at the Parade Deck (Swearengen 1999)
Aerial Bombing Target at Page Field (see Appendix G-15)
Aerial Bombing Target at the Golf Course (see Appendix G-21)
Aerial Bombing Target at the Southern Tidal Flats (site inspection)

By 1941, Army units in the area are also using the southern bombing target. The bombs known to have been used included 3 to-5 pound miniature practice bombs (i.e. AN-MK5, AN-MK-23 & AN-MK43) and the 100-pound sand or water filled practice bombs (i.e. the Navy's MK 15 and the Army's M38A2). The use of aerial rockets or other type of bombs, such as HE or fragmentation bombs, on the Parris Island targets could not be confirmed (see Plates 4 & 5; MB Quantico 1938; Swearengen 1999).

A Strafing Range also reportedly existed and consisted of a wooden platform at Page Field. Its exact location could not be ascertained since it is not shown on the reviewed site plans, but it is thought to have existed at the southeast end of the airfield (see Plate 4 and Appendix G-10). The use of other parts of the installation for bombing and gunnery practice could not be confirmed. The types of small arms recovered from the strafing range area included caliber .50 rounds and possibly 20mm rounds (Swearengen 1999).

By 1942, it appears that both the Parade Deck and Page Field bombing targets are no longer used, having succumbed to the further development of the base at that time. Also during the war, MCAS Parris Island along with Naval Air Station Beaufort acquired 5 water ranges and another 5 off site bombing, strafing and rocketry targets (see Plate 6). These FUDS sites (listed below, see section 5.2 for further details) provided the needed additional ranges for the war time expansion:

Bull Point Bombing and Strafing Target on Caper's or Pritchard's Island
Hunting Island/Fripp Island Bomb Target/Rocket Range
Egg Island Dive Bombing Target
Edisto Island's Bay Point Strafing Target
Impact Target on the northeastern beach of Hilton Head Island

Following the war, MCAS Parris Island had excess amounts of 2.25-inch Sub-Caliber Aerial Rockets (SCAR), caliber .50 ball and tracer rounds, aircraft engine starters, depth markers and AN-219 bomb fuzes. The closing of the airfield that same year appears to be the end of aerial range use at Parris Island. Additionally, the airfield had a Trap and Skeet Ranges (AS-47 & AS-48) to the north of the airfield's cantonment area during this period (see Appendix G-21 & 34; MCAS PI 1945, 1946a, 1946b).

WWII expansion at Parris Island also saw improvements to the Weapons and Field Training Battalion Area, with the addition of eight Small Bore Ranges along the Broad River upstream from the Pistol Range. They also built two more 600 yard ranges, Range "C" and Range "D", and a Hand Grenade Practice Area to the east of Range "D" (i.e. current Range "E"). Aerial imagery analysis of hand grenade practice area on Range E in 1945, indicates that there may be three undocumented range uses of the area. There is a 350 yard wide butt with firing lines at 100, 200 and 300 yards in line with Ranges B, C & D. Across Range D and E, there are ground features that are approximately 300 yards wide and possibly 600 yards long, which look like a range with a west, northwest direction of fire. Also present are two 150 foot diameter circles, which resemble snap-in or dry firing ranges (see ASR section 4.4.2.2). Also by WWII, the installation is also using parts of the 1,000 Yard Range for rifle and hand grenades (see Appendix G-13, 17 & 19). Reportedly another Hand Grenade Range existed near the old swimming pool in the Weapons and Field Battalion Training Area, but it was never located on site maps or confirmed by aerial photographs (Swearengen 1999).

Ammunition storage also greatly increased during the war. By 1946, the Weapons and Field Training Battalion area has four Ready Ammunition Stores (i.e. 721-724 and 784) and one

Ammunition Storehouse (i.e. 786). A larger ordnance storage complex was built northwest of Page Field and contained three Small Arms Magazine (A1-A3), three High Explosive Magazine (A4-A6), a Fuze Magazine (A7), Smoke Drum Magazine (A8), two Inert Magazines (A9-A10) and a Ready Magazine (A11). By the 1980's several of these buildings had been razed (see Appendix G-19 , 21 & 27)

None of the reviewed site maps denoted a mortar or a rocket range. Demonstrations of the trench mortar at Parris Island are reported to have occurred as early as the 1930s. The standard "trench" mortars of the time were the 3-inch Stokes Infantry Mortar or the 81mm Stokes-Brandt Mortar, though no primary source was located to confirm this use at Parris Island. However, by 1947 the installation was to receive 60mm HE, smoke (WP) and illumination rounds. In 1954 instructors demonstrated the use of the 60mm mortars along with the 3.5 inch rocket launcher. Historical imagery also shows the use of the earlier 2.36-inch rocket . Interviews and the site inspection indicate that Rocket and Mortar Impact Area was in the marshy area between the Broad River and Range "A". OE debris found in this area include 60mm and 81mm mortars, 2.36-inch and 3.5-inch rockets and rifle grenades. A retired EOD CW04 recalled clearing primarily practice rounds, particularly rockets from the area. The use of the 40mm practice grenades and AT-4 anti-tank rocket is currently allowed on Khe Sanh or Range "A", giving credence to its earlier use for rocket and grenade training. The impacting of mortars or rockets at other locations on base was not confirmed (Alverez 1998; MB PI c.1945; MCRD PI, 6th Battalion 1954; MCRD PI, W&FTB 1997; USMC HQ 1947c; Swearengen 1999).

Shipping records from 1947, indicate that the Parris Island was to receive 400 non-electric blasting caps. The specific use of these items could not be determined, though assumably it was for setting off HE charges for OE disposal or for training charges. This investigation found no evidence of a specified demolition area or pit, but an EOD detachment existed on the installation until the early 1970s. In lieu of a designated EOD area, dud rounds were probably destroyed in place (USMC HQ 1947a; Swearengen 1999).

By the early 1950s, there is one indoor ranges in the Weapons and Field Training Battalion area, a Small Bore Range in Building 765. The presence of other indoor ranges was not confirmed by the reviewed documents. Also by this time, a Grenade Pit exists northeast of the Hand Grenade Practice Range (see Appendix G-22 & 23).

By 1970, a new 600 Yard Range, Range "E" replaces the earlier Hand Grenade Practice Area, Grenade Pit and other ranges noted on aerial imagery. The Small Bore Ranges along the Broad River north of the Pistol Range have been merged, abandoned or converted to other ranges. The Page Field Trap and Skeet Range also appears abandoned (see Appendix G-25 & 26).

The reviewed site plans did not designate any specific maneuver training areas at Parris Island. However, the site inspection found numerous expended blank small arms cartridge cases in many of the undeveloped areas of Parris Island. The inspection team found these expended blanks cases south of the Weapons and Field Training Battalion Area and around Page Field.

Although not an exhaustive survey of the post, it appears to verify the use of the undeveloped areas for maneuver training in the past. Their presence in and around Page Field is hardly surprising given that area's development in the 1970s and 1980s as a training area, with specified courses. The majority of these course or stations do not involve the use of OE beyond blank ammunition, pyrotechnics and simulators. The exceptions include: the Guadalcanal Hand Grenade Range opened on Gibb's Island in 1974; the Practice Grenade & Mine Field, south of East-West runway; a later Practice Grenade Range, north of the East-West runway of Page Field; the 1990s Mine/Booby Trap area, which was earlier NBC Movement Course (1987) and a Practice Grenade Range and Mine Field (1983); and CAC (Combat Assault Course), which had been know as the Infiltration Course, south of the NW-SE runway of Page Field

As of the writing of this report, there are eleven active weapon ranges at Parris Island. The ranges are the multipurpose infantry weapon range, **Khe Sanh**, (i.e. Range "A"); the four known distance ranges, **Hue City, Chosin, Starlight, Inchon** (i.e. Range "B", "C", "D" & "E"); two pistol ranges **Pusan** and **Nak Tong**; an **Indoor Range (Building 765); Guadalcanal grenade Range** on Gibb's Island; the **CAC Range**; and the **Recreational Firing Range** on Horse Island (MCRD PI, W&FTB 1997). Section 7.0 Range Summary contains of a brief description of these ranges and other ranges identified in this report.

Of a minor OE note is the presence of saluting cannons on Parris Island. The type and size of these cannons have varied over time but they all use a blank smokeless powder charge, which fires no projectiles.

2.1.2 Summary of Chemical Warfare Material Activities

Chemical warfare training at Parris Island has primarily concerned introductory training and equipment familiarization using irritants and the use of screening smoke. However, it has also included the use of Chemical Agent Identification Sets (CAIS) and decontamination kits.

This investigation did not uncover any information regarding the use of chemical warfare materials (CWM) at Parris Island prior to 1936. While it may seem probable that gas mask fit training with irritants occurred before this, particularly during WWI, it may not have. The United States' chemical warfare training program was in its infancy in WWI and many of the troops sent overseas didn't received their gas mask training until they got there. Either way, no evidence was located to confirm the presence or use of CWM at Parris Island in the 1910s and 1920s.

The first documented discussion of chemical weaponry at Parris Island occurs on 27 January 1936. It concerned the building of a miniature range for the 4.2-inch Chemical Mortar for training mortar troops without the cost of ammunition. The miniature range used rubber bands instead of powder rings but the discussion implies the contemporary or eventual use of these items, as well as the contemporary 3-inch Stokes Infantry Mortar or the 81mm Stokes-Brandt Mortar. The demonstration use of trench mortars is reported to have occurred at Parris Island in the 1930s (Alverez 1998; MB PI 1936).

The next year the following items were requested added to the Allowances of Ammunition (Except Small Arms) to begin chemical warfare training in Fiscal Year 1938:

50 Grenades, hand, irritant, (CN-DM), M6
50 Grenades, hand, tear, CN, M7
50 Grenades, hand, smoke, (HC), M8
2 Pair Gloves, impervious
300 Candles, smoke, HC, M1
4 Masks, Diaphragm
1 Cylinder, chlorine gas
500 Capsules, CN (tear gas) (MB PI 1937)

Whether this indicates the beginning of CWM training or if it began earlier or later is undetermined. Site plans do not identify a Gas Chamber until Building 673 is shown as being added in Fiscal Year ending on 30 June 1945. By 1952 the Quonset Hut Gas Chamber appears to remain in the same spot but has been renumbered as Building 685. Nearby, Building 875 is the Gas Mask Storage Building. Building 685 remains standing today in use for the Close Combat Instruction training near the "Crucible" (see Appendix G-18 & 22). The gas chamber moved to building EB-11 at Elliott's Beach in the mid-1950s, before moving to its current location at building 793 near Page Field in the mid-1980s (Alvarez 1998; Naval Energy and Environmental Support Activity 1986).

The specific types of CWM on hand during WWII are unknown. However, following the war, the installation had 250 drums of surplus F.S. screening smoke at the airfield, which were to be dumped at sea after being shipped to the Naval Ammunition Depot Charleston. They were also requesting 250 tear gas hand grenades at that time (Bureau of Ordnance 1948; USMC HQ 1947b).

Sometime before the mid-1960s the installation received CAIS with war gases, and had already discontinued their use. According to an interviewee, in the 1965-67 time frame, EOD personnel from MCAS Beaufort destroyed about a dozen 8-inch diameter metal containers (i.e. "pigs") filled with glass tubes found in the a warehouse located near the gas chamber. The CAIS were reportedly WWII vintage and based upon their description appear to be the M1 detonation gas identification set with war gases. They were destroyed at MCAS Beaufort by burning them, the standard prescribed method at the time. They tested the area in the vicinity of the WWII gas chamber and detected mustard gas residue, and to a lesser extent lewisite. This was determined by using the glass tube inhaler type detection kits, where material changed color in the presence of different chemical warfare gases. This account is supported by events a decade late. The Army's Technical Escort Center dispatched a team to inventory, recap and escort a CAIS from Parris Island to MCAS Beaufort in 1975. Although the mission concerned one "pig" or less of ID sets, it took two operations: one in August and another in October. The specific type of CAIS was not identified on the operation reports (Swearengen 1999; USA TEU 1975a, 1975b).

During the 1970's, training at Parris Island included a Nuclear, Biological and Chemical (NBC) Warfare School. By 1981 the NBC program provided each recruit with greater knowledge of the NBC equipment utilized by the Marine Corps. The program included instruction on the NBC suit, decontamination kits and warning devices. Realism was facilitated by simulated chemical attacks utilizing smoke grenades and audible NBC alarms (Alverez 1998; MCRD Parris Island HQ 1982).

2.1.3 Certificates of Clearance

The archive search did not reveal any certificates of ordnance clearance, decontamination or dedudding associated with MCRD ERR Parris Island. The base had EOD troops on post through the early 1970s, which assumably responded to incidents and range clearance as required. Since that time the EOD unit at MCAS Beaufort has provided assistance as needed. They provided this investigation a review of their Parris Island incident reports from January 1995 to March 1999. There were nearly 50 incidents concerning items thought to relate to past range use. About 85% of the incidents concerned the Guadalcanal Grenade Range. The last response was on 31 October 1996. On 29 June 1997 the MCAS Beaufort EOD cleared the range. The other incidents concerned four practice bomblets (i.e. the 3-pound MK 23) from the golf course area, a flare from the ASP, an artillery simulator from Page Field, a .50 caliber AP round from Marsh's Landing, and a point detonating fuze from the golf course. Discussing the fuze with the staff, they thought it might have belonged to a 60mm mortar but couldn't say for sure.

2.2 RANGES[1]

2.2.1 Khe Sanh/Range A

This is an active, multipurpose infantry weapon, live fire range in the Weapons and Field Training Battalion area. The range began in 1918 as the 1,000 Yard Range of the "New Rifle Range", which replaced the earlier range at Ballast Creek. During World War II, additional uses included hand grenade courts and rifle grenade circles. Primarily used as a machine gun field firing range in 1999, it is also used for familiarizing troops with light anti-tank/anti-armor (subcaliber) weapons with the AT-4 9mm training device, an M16 rifle field firing range and an M203 range for 40mm practice grenades. In addition to these ranges, a day movement course was incorporated into the southern area in the 1990s. The location of this range is shown on historical maps in ASR Appendix G-4, 6, 13, 17, 19, 23-28, 30, and 32 and on ASR Plates 3 and 7.

2.2.1.1 Range Identification

Common Name of Range: Khe Sanh (1990's), Range A (1940s-1980s), 1,000 Yard Range (1920s-1930s), New Rifle Range (1918)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 firing line is NR 269775 (MGRS new). This range is approximately 1,000 yards by 150 yards in size.

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition, the 9mm tracer cartridge for the AT-4 trainer, 40mm practice grenades, practice hand and rifle grenades

[1]. Section 2.2 Ranges includes the copies of the Archives Search Report's Section 7.2 Ranges, appended with additional information

and various types of pyrotechnic munitions. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.1.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .30	None
Cartridge, caliber 7.62mm	None
Cartridge, caliber 5.56mm	None
Cartridge, 9mm practice (AT-4)	None
Cartridge, 40mm practice	None
Grenade, rifle, V.B. [Viven-Bessieres]	Friction igniter
Grenade, rifle, practice	None
Grenade, hand, practice	Pyrotechnic delay-igniting

Note: Research indicates the use of practice grenades. There is no recorded use of high explosive munitions, although their use cannot be precluded. In addition, all standard pyrotechnic munitions were authorized for use in the past.

Range Time Frame of Use: The approximate time frame of use is 1918 to present (i.e. 1999).

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: The density estimate is low. A high density of bullets , or spent projectiles, can be expected in the target butt (berm) area, but these are not UXO.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
.30 Caliber, Ball, M1 (NOTE: Only complete rounds represent an explosive hazard and	1.3	1.7	2.6	0.1

complete rounds are found on the surface)				
Rifle Grenade	0.1	0.2	0.2	1.7
40mm practice	0.2	0.3	0.4	1.1
Pyrotechnics	Surface	Surface	Surface	n. a.

Note: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. The 40mm practice grenade M781 (B519) contains an orange dye that should not come in contact with skin. Practice grenades may contain small pyrotechnic charges. Pyrotechnic munitions such as M49 surface trip flares present a burn hazard. General safety issues are discussed in SECTION 3.0.

Types of Targets: In 1999, there are a number of targets for various weapons systems, including barrel targets, plywood silhouettes and mock buildings. There are 36 Portable Infantry Targeting System (PITS) remote control targets spaced at variable distances. Firing points also vary from grassy firing lines to bunkers and fighting holes. Details of earlier targets systems was not determined.

Other Past Uses: The archive search identified only ordnance related uses associated with this range. This range began as a rifle range in 1918 and continued in use, being modified to include hand and rifle grenade ranges during World War II.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.2 Hue City/Range B

This is an active, 600 yard known distance rifle range in the Weapons and Field Training Battalion area. It is the western most of the four parallel known distance ranges at Parris Island. The range began in 1918 as the 600 Yard Range of the "New Rifle Range". In 1930, the range was reconstructed at approximately the same location to allow for the longer-ranging caliber of the .30 M1 ammunition adopted by the Marine Corps. This required reorienting the range in a more northwesterly direction. Improvements and modifications have been made over the years since then. The location of this range is shown on historical maps in ASR Appendix G-6, 13, 17, 19, 23-28, 30 and 32 and on ASR Plates 3 and 7.

2.2.2.1 Range Identification

Common Name of Range: Hue City (1990's), Range B (1940's-1980's), 600 yard Range (1930's), New Rifle Range (1918)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 firing line is NR 276774 (MGRS new). This range is approximately 800 meters by 100 meters in size.

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition and various types of pyrotechnic munitions. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.2.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .30	None
Cartridge, caliber 7.62mm	None
Cartridge, caliber 5.56mm	None
Flare, Surface, Trip	Pyrotechnic delay-ignition
Cartridge, 40mm white star parachute	Pyrotechnic delay ignition

Note: Research also indicates the use of M49 trip flares. The ASR did not confirm the use of high explosive or other types of munitions on this range.

Range Time Frame of Use: The approximate time frame of use is 1918 to present (i.e. 1999).

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: The density estimate is low. A high density of bullets , or spent projectiles, can be expected in the target butt (berm) area, but these are not UXO.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
.30 Caliber, Ball, M1 (NOTE: Only complete rounds represent an explosive hazard and complete rounds are found on the surface)	1.3	1.7	2.6	0.1
40mm White Star Parachute	Surface	Surface	Surface	Surface
Pyrotechnics	Surface	Surface	Surface	n. a.

Note: For pyrotechnics and the 40mm WSP, these munitions possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. The 40mm white star parachute grenade, M583A1 (B535) contains a pyrotechnic candle. Other pyrotechnic munitions such as the M49 surface trip flare present a burn hazard. General safety issues are discussed in SECTION 3.0.

Types of Targets: In 1999, there are 49 combination sliding frame targets. There are 49 firing points with firing lines at 50, 75, 100, 150, 200, 300, 500 and 600 yards.

Other Past Uses: The archive search identified only ordnance related uses associated with this range. This range began as a rifle range in 1918 and has continued in use as such.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.3 Chosin/Range C

This is an active, 500 yard known distance rifle range in the Weapons and Field Training Battalion area. It is the western, middle range of the four parallel known distance ranges at Parris Island. The Marine Corps built the range in 1942, during the World War II era facility expansion. The range appears to originally have had 600 yard firing lines. The location of this range is shown on historical maps in ASR Appendix G-17, 19, 23-28, 30 and 32 and on ASR Plates 3 and 7.

2.2.3.1 Range Identification

Common Name of Range: Chosin (1990's), Range C (1942-1980's)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 firing line is NR 278774 (MGRS new). This range is approximately 700 yards by 100 yards in size.

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.3.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .30	None
Cartridge, caliber 7.62mm	None
Cartridge, caliber 5.56mm	None

Range Time Frame of Use: The approximate time frame of use is 1942 to present (i.e. 1999).

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: The density estimate is low. A high density of bullets , or spent projectiles, can be expected in the target butt (berm) area, but these are not UXO.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
.30 Caliber, Ball, M1 (NOTE: Only complete rounds represent an explosive hazard and complete rounds are found on the surface)	1.3	1.7	2.6	0.1

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: In 1999, there are 49 sliding combination frame targets. There are 49 firing points with firing lines at 200, 300 and 500 yards. Details of earlier targets systems was not determined.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.4 Starlight/Range D

This is an active, 500 yard known distance rifle range in the Weapons and Field Training Battalion area. It is the eastern, middle range of the four parallel known distance ranges at Parris Island. The Marine Corps built the range in 1942, during the World War II era facility expansion. The range appears to originally have had 600 yard firing lines. Aerial photo analysis of 1945 imagery indicates that a range with a westerly direction of fire existed across Ranges D and E, possibly in the 1930s. No other documentation was found to confirm this use. The location of this range is shown on historical maps in ASR Appendix G-17, 19, 23-28, 30 and 32 and on ASR Plates 3 and 7.

2.2.4.1 Range Identification

Common Name of Range: Starlight (1990's), Range D (1942-1980's)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 firing line is NR 279774 (MGRS new). This range is approximately 700 yards by 100 yards in size.

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.4.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .30	None
Cartridge, caliber 7.62mm	None
Cartridge, caliber 5.56mm	None

Range Time Frame of Use: The approximate time frame of use is 1942 to present (i.e. 1999), though a range potentially existed earlier to this based on 1945 aerial imagery.

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: The density estimate is low. A high density of bullets , or spent projectiles, can be expected in the target butt (berm) area, but these are not UXO.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
.30 Caliber, Ball, M1 (NOTE: Only complete rounds represent an explosive hazard and complete rounds are found on the surface)	1.3	1.7	2.6	0.1

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: In 1999, there are 49 sliding combination frame targets. There are 49 firing points with firing lines at 200, 300, 500 and 600 yards. Details of earlier targets systems was not determined.

Other Past Uses: The archive search identified only ordnance related uses associated with this range. This range began as a rifle range in 1942 and continues in use today (1999).

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.5 Inchon/Range E

This is an active, 500 yard known distance rifle range in the Weapons and Field Training Battalion area. It is the eastern most of the four parallel known distance ranges at Parris Island. Construction on the known distance range was completed by 1970 but the location had several earlier ranges present. Site plans show a hand grenade practice area at this location from approximately 1944 to 1968 and a grenade pit from 1953 to 1970. Aerial photo analysis from 1945 to the 1960s, show a less developed range paralleling Ranges B, C and D with firing lines at about 100, 200 and 300 yards. Another less distinct range is visible in 1945, with a westerly direction of fire across Ranges D and E. Two circular Snap-In or Dry Fire ranges also are discernable in the 1945 imagery. The 1937 Artillery Firing Concrete Firing Position H also appears to have been located on this range. The location of this range is shown on historical maps in ASR Appendix G-9, 10, 17, 19, 23-28, 30 and 32 and on ASR Plate 3 and 7.

2.2.5.1 Range Identification

Common Name of Range: Inchon (1990's), Range E (1970-1980's), Grenade Pit (153-1970), Hand Grenade Practice Area (1944-1968), other range names are unknown.

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 firing line is NR 279777 (MGRS new). This range is approximately 650 yards by 100 yards.

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition, practice hand grenades, possibly high explosive hand grenades. This area also served as a firing point for artillery. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.5.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .30	None
Cartridge, caliber 7.62mm	None
Cartridge, caliber 5.56mm	None
Cartridge, 75mm Gun, HE	Point Initiating
Grenade, hand, practice	Pyrotechnic delay-igniting
Grenade, hand, fragmentation	Pyrotechnic delay-detonating

Range Time Frame of Use: The approximate time frame of use is 1944 to present (i.e. 1999), though a range potentially existed earlier to this based on 1945 aerial imagery).

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: The density estimate is low. A high density of bullets , or spent projectiles, can be expected in the target butt (berm) area, but these are not UXO. The density for grenades would also be low as the range has been completely been redeveloped since that range use, which would have had only surface penetration.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
.30 Caliber, Ball, M1 (NOTE: Only complete rounds represent an explosive hazard and complete rounds are found on the surface)	1.3	1.7	2.6	0.1
Cartridge, 75mm Gun, HE	4.9	6.4	9.8	2.5
Grenade, hand, practice	Surface	Surface	Surface	Surface

Grenade, hand, fragmentation	Surface	Surface	Surface	Surface

For hand grenades, the ground depth estimate is surface, less than 6 inches; the munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. Fragmentation grenades that fail to function can be very sensitive and must be considered extremely hazardous. Practice grenades may contain small pyrotechnic charges. : Hazards for complete rounds of artillery ammunition at the firing point represent far less of a hazard than dud-fired rounds. The impact area within the range fan would have received the majority of any dud ammunition. General safety issues are discussed in SECTION 3.0.

Types of Targets: In 1999, there are 50 sliding combination frame targets. There are 50 firing points with firing lines at 100, 200, 300, and 500 yards. Details of earlier targets systems were not determined.

Other Past Uses: The archive search identified only ordnance related uses associated with this range. This range began as a rifle range around 1945 and continued in use, being modified to include hand grenade ranges during World War II.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.6 Pusan Range, Nak Tong Range and Recreational Firing Range (Broad River Small Arms Ranges)

These three pistol ranges are part of a complex of active and historical small arms ranges with target butts arrayed along the Broad River shoreline, west of Range A in the Weapons and Field Training Battalion area. The ranges have been modified and reconfigured a number of times, since a **Pistol Range** was completed here in 1918, as one of the three ranges associated with the "New Rifle Range." By 1941, a **.22 caliber Range** was added but the World War II expansion saw the development of the site for **Small Bore Ranges Nos. 1 through 8**. Some of these ranges were later reconfigured into other ranges [i.e. Nos. 7 and 8 became the **Skeet Range** (1946-1953) and later a **900 inch Range** (1973)] or abandoned. By 1952, Building 788 has been constructed as an **Electric Pistol Range**. As of 1999, most of the ranges have been abandoned, dismantled or reconstructed and only three remain. The Marine Corps uses **Pusan Range** for service pistol practice and qualification. The **Nak Tong Range** is a close combat pistol range that is also used for shotgun and handgun qualification. The **Recreational Firing Range** dates back to at least 1989 and is used solely for recreational firing of privately owned handguns, no magnum calibers being permitted. The location of this range is shown on historical maps in ASR Appendix G-6, 13, 17, 19, 23-28, 30, 32 and on ASR Plate 3 and 7.

2.2.6.1 Range Identification

Common Name of Ranges: New Rifle Range (1918); Pistol Butts (1929-1999); Small Bore Ranges Nos. 1 to 8 (1944-70); 22 Range (1941); Skeet Range (1946-53); 900" Range (1973); Electric Pistol Range, Building 788 (1952-1980s); Pusan Range (1990's), Nak Tong (1990's), Recreational Firing Range (1990's).

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the Pusan, Nak Tong and Recreational Firing Ranges remain in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate locations in 1999 for the firing lines are: Pusan Range - NR 271769; Nak Tong – NR 270772; Recreational Firing Range – NR 269778 (coordinates are MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Small arms ammunition, to include non-magnum commercial calibers. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.6.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .22 rimfire	None
Cartridge, caliber 9mm	None
Cartridge, caliber .45	None
Cartridge, .38 Special	None
Cartridge, 12-gage shotgun	None
Various commercial calibers*	None

Note: Only non-magnum commercial calibers are permitted on the Recreational Firing Range.

Range Time Frame of Use: The approximate time frame of use is 1918 to present (i.e. 1999).

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: The ground density estimate is low for small arms ranges. The parapet (berm) area may contain a high density of spent projectiles, which are not UXO.

Estimated Depth of Munitions: The ground depth estimate for small arms ranges is surface, less than 6 inches. In the target butt (berm) areas, caliber 9mm bullets possess a penetration capability of 30 inches in uncompacted earth. A small arms projectile contains no explosives and therefore is not considered UXO.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: In 1999, at Pusan there are six electrical tracked metal target carriages, each holding five target frames. There are 30 firing points with firing lines at 7, 10, 15, and 25 yards. At Nak Tong there are 10 E-silhouettes on wood frames in a metal boot. There are 10 firing points with firing lines at 7, 10, 15, and 25 yards. At the Recreational Firing Range

there are 40 wood frame targets in metal boot to hold E-silhouettes. There are firing lines at 7, 10 and 15 yards.

Other Past Uses: The archive search identified only ordnance related uses associated with this range. The entire Broad River Small Arms Range complex originated in 1918 and has gone through a number of evolutionary changes.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.7 Rocket and Mortar Impact Area

This indistinct range is located on the Broad River Shore line south of Ribbon Creek in the Weapons and Field Training Battalion area. Recovered site plans and maps did not designate either a rocket or a mortar range on Parris Island, though historical documents indicate the Marine Corps used both types of weapons there, though details are sparse. Demonstrations of the trench mortar occurred as early as the 1930s. Presumably, this included the 3-inch Stokes mortar, or possibly the newer 81mm mortar. The installation received 60mm mortars in 1947 and continued mortar demonstrations through at least the mid 1950s. Mortar ammunition on-hand included high explosive, white phosphorus smoke and illumination rounds. Installation photographs show the use of both the World-War II-era 2.36-inch bazooka rockets and the Korean War-era 3.5-inch anti-tank rockets, apparently practice rounds but this was unconfirmed. The location and breadth of this range is based on accounts of EOD removal actions in the 1960s and confirmed by the OE debris located during the ASR site inspection, therefore range boundaries are only estimates. The location of this range does not appear on any of the historical maps collected for the ASR though the approximate location is shown on ASR Plate 3.

2.2.7.1 Range Identification

Common Name of Range: None

Range Identification Number: To be Determined

Current Range Status: The original range use has been discontinued, but the property remains in service, as of May 1999, as part of the Khe Sanh/Range A area as well as the northern limits of the Broad River Small Arms Range area. training area.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location is NR 26417775 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included the firing of 60mm mortars, 2.36-inch and 3.5-inch anti-tank rockets, and may have included 3-inch "Stokes" or 81mm mortars. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.7.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
2.36 Inch HEAT Rocket	Point Initiating Base Detonating
2.36 Inch Practice Rocket	Inert
3.5-Inch Practice Rocket	None
3.5 Inch HEAT Rocket (Ground)	Base Detonating
81mm HE	Point Detonating
81mm Practice	Point Detonating
60mm HE	Point Detonating & Time
60mm Illum	Time
60mm WP	Point Detonating
3-Inch Trench (Stokes)	All-ways Acting

Range Time Frame of Use: The approximate time frame of use is 1930's to present (i.e. 1999).

Locations Within Range of Known Munitions Use: The firing points for this range are not known, although the 2.36-inch rocket had a nominal effective range of 300 yards. This impact area would be the expected terminus for any munitions fired on this range.

Estimated Density of Munitions: Given the facts that this range was reportedly cleared, yet that the boundaries are not known, the density is estimated to be moderate.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
2.36" Rocket, M6	0.4	0.5	0.8	1.9
3.5" Rocket M28	0.8	1.1	1.7	3.2

81mm M43	2.7	3.5	5.4	2.8
60mm M49	1.1	1.5	2.3	1.9

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. A credible interviewee stated that this area had received a range clearance during the 1960's (Swearengen 1999).

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. The 40mm practice grenade M781 (B519) contains an orange dye that should not come in contact with skin. Practice grenades may contain small pyrotechnic charges. Pyrotechnic munitions such as M49 surface trip flares present a burn hazard. General safety issues are discussed in SECTION 3.0.

Types of Targets:. Details of targets was not determined, but may have included bunkers or mock buildings.

Other Past Uses: In addition to the ordnance related uses associated with this range, the archive search identified the presence of wooden pilings across the marches of the range, which may supported a boardwalk or water or sewage pipes.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a training area as required.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.8 Indoor Small Bore Range (Building 765)

By the early 1950s, a small bore range resides within Building 765 in the Weapons and Field Training Battalion area. Primarily used as a pistol range, it also saw the use of caliber .22 target rifles. As of 1999, it is actively used only for air rifles. The location of Building 765 is shown on historical maps in ASR Appendix G-13, 17,19, 23, 25, 30 and 32 and on ASR Plate 3.

2.2.8.1 Range Identification

Common Name of Range: Small Bore Range (circa 1952-1990)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The range is located within Building 788 [NR 277772 (MGRS new)].

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.8.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .22	None
Cartridge, caliber .38 Special	None
Cartridge, caliber 9mm	None
Cartridge, .45 Auto	None

Note: In recent years, only air rifles have been fired on this range.

Range Time Frame of Use: The approximate time frame of use is 1950's to present (i.e. 1999).

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: No UXO is expected on this range..

Estimated Depth of Munitions: Bullet traps are used to capture the fired projectiles.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: During the time period when firearms were used, there were 10 NRA 50 foot pistol targets. There were 10 firing points at 25, 33 and 50 feet.

Other Past Uses: Located in a building, this indoor pistol range constructed in the 1950s surely had an earlier use but the archive search did not determine what it was.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.9 Miscellaneous Training Stations, Courses and Maneuver Areas

Like most military installations, MCRD ERR Parris Island has less developed areas, which have used been used for maneuvers and various other types of training. Maneuvers grounds are first designated at the south end of the island during WWI on what will become the golf course (see ASR Appendix G-4). Most recently, the former Page Field area has seen most of the development of these training stations, though others areas, such as Elliott's Beach, have also been used. These areas are not strictly "firing ranges", but Marines have used blank ammunition and/or various pyrotechnic munitions, smoke and simulators on them. Generally speaking, any areas of Parris Island not fully developed are suspect for this type of ordnance use. These miscellaneous training stations include the following:

- Tactical Bivouac Area [*]
- Field Fortification Display (Bldg. 4026) [*]
- Field Fortification Display (1994) [*]
- NBC Movement Course (1987)
- Infiltration Course (Bldg. 4024)
- Night Movement Course (south of page Field, 1983)
- Wire Entanglement Display (1987)
- Day Movement Stations (1984)
- Squad Offense Course (1987)
- Night movement Course (1987)
- Day Movement 1 and Day Movement 2 (1994) [*]
- Fire Team/NBC Movement Course (1987)
- NBC Field Course (1994)
- Combat Town (1994)
- Booby-trap Course (1994)

*- These areas are actively used As of May 1999

Areas used for these types of activities were not identified on historical maps and data prior to 1984 is meager. Because of the lack of adequate backstops and danger zones, it is believed that no live, service rounds were fired in these areas, unless part of another range such as the two late 1930s Field Artillery ranges. Earlier, WWI era artillery firing also occurred at Parris Island but at an undetermined location. The location of the known training stations and courses listed above are shown on historical maps in ASR Appendix G-4, 27-28, 30, 32 and on ASR Plate 4.

2.2.9.1 Range Identification

Common Name of Range: [None]

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the Page Field training complex remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The Page Field training complex is defined by the coordinates NR 293766, NR 306767, NR 306752, NR 293751 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included blank small arms ammunition, simulators, other pyrotechnics and smoke. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.9.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Pyrotechnics, simulators	Various friction fuses
Cartridge, caliber 7.62mm, blank	None
Cartridge, caliber 5.56mm, blank	None

Range Time Frame of Use: The time frame of use for most of these training stations and courses dates back to at least 1980 and most probably much earlier, 1918, for other sites.

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO

Estimated Density of Munitions: The density estimate is low. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
Pyrotechnics, simulators	Surface	Surface	Surface	n. a.
Blank small arms	Surface	Surface	Surface	n. a.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. Pyrotechnic munitions such as artillery simulators and booby-trap simulators present a severe burn hazard. General safety issues are discussed in SECTION 3.0.

Types of Targets: No specific targets are associated with these training stations and courses, although various obstacles may have been used during simulated combat as targets.

Other Past Uses: Prior to the range related uses associated with this site, Page Field was an active airfield between the mid-1930s and the 1940s.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.10 Guadalcanal Hand Grenade Range

This live, fragmentation hand grenade range is on Gibb's Island east of Page Field, Building 4020, and dates back to about 1974. It replaced an earlier hand grenade range in the Weapons and Field Training Battalion Area, which was razed to construct the Inchon/Range E. The Guadalcanal Hand Grenade Range has been in use since then, although an accident in 1993 reduced the use frequency down to two or three times per year in 1999. The location of this range is shown on historical maps in ASR Appendix G-27-28, 30, 32 and on ASR Plate 4.

2.2.10.1 Range Identification

Common Name of Range: Guadalcanal (1974-1999)
1
Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 range is NR 313765 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use includes fragmentation hand grenades. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.10.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Grenade, Hand, Fragmentation, M67	Pyrotechnic delay-detonating

Range Time Frame of Use: The approximate time frame of use is 1974 to present (i.e. 1999).

Locations Within Range of Known Munitions Use: Throwing positions are the protective concrete structures from which the grenade is thrown. The target pit is the intended terminus of said thrown grenade.

Estimated Density of Munitions: Density estimate is low due to the controllability of grenade ranges. Because of the inherent danger associated with live hand grenades and the requirement to call EOD whenever a grenade fails to function, a minimal potential for complete rounds exists within the range

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island. A review of the incidents between January 1995 and 1999 indicated a handful of grenade incidents at this location.

Specific Munitions Safety Issues: Grenades that fail to function can be very sensitive and are considered extremely hazardous. General safety issues are discussed in SECTION 3.0.

Types of Targets: Typically, live grenade ranges use a number of targets, such as rubber automobile tires

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.11 Mine and Booby Trap and Practice Grenade and Mine Field Range

Site plans in 1983 denote this portion of the former Page Field, south of the east-west runaway as a **Practice Grenade and Mine Field** area. By 1987 it became the **NBC Movement Course**, only to be reconfigured and expanded into a **Mine/Booby-Trap** area by 1994. Practice hand grenades, ground flares, simulators and practice landmines are known to have been used in this area, with distinct evidence to indicated the use of live mine fuzes, HE grenades, actuators or other pyrotechnics. The location of this range is shown on historical maps in ASR Appendix G-27-28, 30 and 32 and on ASR Plate 4.

2.2.11.1 Range Identification

Common Name of Range: Mine and booby-trap (1994), NBC Movement Course (1987); Practice Grenade and Mine Field (1983)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of these ranges is NR 305760 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice hand grenades, practice landmines and various types of pyrotechnic munitions, such as booby-trap simulators. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.11.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Mine, Anti-tank, practice	Practice fuze, Practice activator
Firing Devices	Percussion primers
Mine, Anti-personnel, inert	Inert fuze
Booby-trap Simulators	Friction igniters
Grenade, Hand, Practice	Pyrotechnic delay-igniting
Various pyrotechnics	Friction igniters

Note: Landmines used in training can either be completely inert (no explosive/pyrotechnic components) or be fitted with practice fuzes and activators..

Range Time Frame of Use: The approximate time frame of use is circa 1983 to present (i.e. 1999).

Locations Within Range of Known Munitions Use: The entire area must be considered to have been used for training with munitions.

Estimated Density of Munitions: The density estimate is low. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: For practice hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities. Landmines that are designed to be buried are normally placed in hand-excavated holes that may be 18 inches deep. It is possible that not all practice mines would have been recovered.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Practice grenades may contain small pyrotechnic charges. Pyrotechnic munitions such as booby-trap simulators present a burn hazard. Landmines may be fitted with practice fuzes and activators. These devices produce smoke and noise when activated by stepping on the mine or triggering a boob-trap (trip wire, etc.). Since practice

mines left in the ground often cannot be distinguished from live high explosive versions, extreme caution must be used when unearthing these mines. General safety issues are discussed in SECTION 3.0.

Types of Targets: Details of targets systems was not determined.

Other Past Uses: Prior to the range related uses associated with this site, Page Field was an active airfield between the mid-1930s and the 1940s.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.12 Practice Grenade Range

By 1987, site plans denote this portion of the former Page Field, north of the east-west runway as a Practice Grenade Range. It apparently replaced the 1983 practice hand grenade range area, immediately to the south of the east west runway, when it became a NBC Movement Course. This site remains the practice hand grenade range in 1999 and is used for distance and accuracy throwing. The location of this range is shown on historical maps in ASR Appendix G-28, 30 and 32 and on ASR Plate 4.

2.2.12.1 Range Identification

Common Name of Range: Practice Grenade (1987)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 firing line is NR 269775 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice hand grenades. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.12.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Grenade, hand, practice	Pyrotechnic delay-igniting

Note: Research indicates the use of practice grenades. There is no recorded use of high explosive munitions.

Range Time Frame of Use: The approximate time frame of use is circa 1987 to present (i.e. 1999).

Locations Within Range of Known Munitions Use:. Practice hand grenades are thrown at or into mock structures, such as bunkers, or thrown for accuracy into a target pit or ring. Therefore, their use was probably not restricted to any one portion of this range.

Estimated Density of Munitions: The density estimate is low. Practice grenades can be recovered and reused, therefore it is unlikely that any remain on the site.

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Practice grenades may contain small pyrotechnic charges. General safety issues are discussed in SECTION 3.0.

Types of Targets: There are three throwing points and six targets: two mock buildings, two circular pits and two enemy soldier silhouettes.

Other Past Uses: Prior to the range related uses associated with this site, Page Field was an active airfield between the mid-1930s and the 1940s.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.13 Combat Assault Course

This portion of the former Page Field was established as an **Infiltration Course** in 1987. The range was expanded and modified by 1994 as the Combat Assault Course (CAC), This course uses blanks, pyrotechnics, smoke and simulators, such as the M115A2 simulator, projectile, airburst, to simulate battlefield conditions. In addition, several pits can be rigged with a quarter-pound block of TNT, which when electrically initiated simulate noise and confusion. The range remains in use as of 1999. The location of this range is shown on historical maps in ASR Appendix G-28, 30 and 32 and on ASR Plate 4.

2.2.13.1 Range Identification

Common Name of Range: Combat Assault Course (1994), Infiltration Course (1987)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the CAC is NR 301757 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included blank small arms ammunition, Pyrotechnic signals ("slap flares"), artillery simulators, ¼-pound blocks of TNT and electric blasting caps. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.13.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber 7.62mm, blank	None
Cartridge, caliber 5.56mm, blank	None
Signal, Illumination, Ground ("slap flare")	Black Powder Expelling Charge
Charge, Demolition, ¼-lb. TNT	None
Cap, Blasting, Electric	None
Simulator, Projectile, Ground Burst (Artillery simulator)	Friction igniter
Grenade, Hand: Smoke, Colored	Pyrotechnic delay-igniting

Note: The TNT demolition charges were placed in pits and detonated to create noise and confusion during recruit training.

Range Time Frame of Use: The approximate time frame of use is 1994 to present (i.e. 1999).

Locations Within Range of Known Munitions Use:. With the exception of the TNT charges, the use of various munitions was not restricted to any one portion of this range.

Estimated Density of Munitions: The density estimate is low. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: None of the munitions used possess any ground penetration capabilities. TNT contamination may exist in and around the pits where the demolition charges were used.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Electric blasting caps are sensitive to heat, shock and friction. It is unlikely that bare (unexploded) TNT charges remain, but they present a significant explosive hazard if primed with a blasting cap. Pyrotechnic munitions such as

flares and smoke grenades present a burn hazard. Blank small arms ammunition presents no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: Details of targets systems was not determined, but typically consist of obstacles such as concertina wire, logs and trenches.

Other Past Uses: Prior to the range related uses associated with this site, Page Field was an active airfield between the mid-1930s and the 1940s. This site later became the Infiltration Course in 1987.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.14 Gas Chamber (Bldg. 793)

Building 793 was established as a gas chamber within the former cantonment area of Page Field in approximately 1984, replacing earlier gas chambers. This facility uses riot control agents, such as CS, to instruct recruits in the proper fitting and donning of the protective mask. The location of this range is shown on historical map in ASR Appendix G-32 and on ASR Plate 5.

2.2.14.1 Range Identification

Common Name of Range: Gas Chamber (1984)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the former gas chamber is in the north central region of the Page Field area; NR 301765 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included riot control agent (tear gas), such as CS capsules or grenades. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.14.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Capsule, Riot Control, Agent: CS	None
Grenade, Hand: Riot Control	Pyrotechnic delay-igniting

Note: CS capsules are the preferred means of dispensing tear gas for use in gas chamber training. The capsules are aerosolized by placing them on a up-ended tin can, which is placed over a burning candle.

Range Time Frame of Use: The approximate time frame of use is 1984 to present (i.e. 1999).

Locations Within Range of Known Munitions Use: Within Building 793.

Estimated Density of Munitions: The density estimate is low. The likelihood of any CS powder remaining in the area is low and for capsules or grenades, it is extremely unlikely.

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: CS is a powerful lachrymatory agent and is irritating to the upper respiratory passages. General safety issues are discussed in SECTION 3.0.

Types of Targets: No targets are associated with this range.

Other Past Uses: Prior to the range related uses associated with this site, Page Field was an active airfield between the mid-1930s and the 1940s.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.15 Aerial Bomb Target at Page Field

This bombing target, located on the eastern edge of Page Field, dates back to at least 1937. The target consisted of three concentric circles, 50 , 100 and 200 feet in diameter. The target predates the establishment of runways on the open airfield and lasted in use until around late 1941-early 1942. Miniature practice bombs have been recovered in the area by EOD units and there was no evidence that other types of bombs were used. The location of this range is shown on historical maps in ASR Appendix G-10 and 15 and on ASR Plates 4 and 7.

2.2.15.1 Range Identification

Common Name of Range: Aerial Bomb Target (1937)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued, but the property remains in service as part of the Page Field training area.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the bomb target is NR 306761 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice bombs of the miniature type. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.15.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Bomb, Practice , Miniature	Pyrotechnic Signal Cartridge

Note: There are several versions of miniature practice bombs, differing in material (e.g. cast iron, Zinc alloy) and hence, weight (3-lb., 4-lbs.). They use an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact.

Range Time Frame of Use: The approximate time frame of use is late-1930s to 1941.

Locations Within Range of Known Munitions Use: In and around the target circles.

Estimated Density of Munitions: The density estimate is low. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
Bomb, 3 lb., Practice, MK 3, 4, & AN-Mk5[2]	1.0	1.4	2.1	2.1

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: The Practice Signal Cartridge, AN-Mk4 consists of an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact. There is an ejection hazards as well as a burn hazards associated with this item. General safety issues are discussed in SECTION 3.0.

Types of Targets: The bomb target consisted of concentric circles outlined on the ground (sometimes with lime), that were be visible from the air.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a part of the Page Field training area.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.16 Strafing Range at Page Field

During the late 1930's a portion of Page Field was used as an air-to-ground strafing target. The exact location could not be ascertained but is thought to have been on the southeast end of the airfield. The target consisted of an approximately 100 foot by 100 foot plywood deck that was shot at by aircraft whose ammunition was color-coded to be able to score hits. Range use is thought to have ceased with the expansion of Page Field and the establishment of distinct runways in 1940. The location of this range is not delineated on any historical maps but can possibly be distinguished on ASR Appendix G-10, is also included on ASR Plate 4.

2.2.16.1 Range Identification

Common Name of Range: Strafing Range (late-1930s)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued, but the property remains in service as part of the Page Field training area.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the former strafing range is NR 306755 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition, specially color-coded to aid in scoring. Weapons used would have been caliber .30 and .50 aircraft machine guns. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.16.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .30, Ball	None
Cartridge, caliber .50, Ball	None

Range Time Frame of Use: The approximate time frame of use is late 1930s-1941.

Locations Within Range of Known Munitions Use: In and around the plywood target area.

Estimated Density of Munitions: The ground density estimate is low for small arms ranges. The target area may contain a high density of spent projectiles, which are not UXO.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
.30 Caliber, Ball, M1 (NOTE: Only complete rounds represent an explosive hazard and complete rounds are found on the surface)	1.3	1.7	2.6	0.1
.50 Caliber, Ball, M2 (NOTE: Only complete rounds represent an explosive hazard and complete rounds are found on the surface)	1.6	2.2	3.3	0.2

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: The target has been described as a plywood platform, approximately 100 feet by 100 feet, which was shot at by aircraft performing strafing runs with machine guns.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as part of the Page Field training area.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.17 Aerial Bombing Target at Golf Course

This bombing target was established as a replacement for the **Aerial Bombing Target at Page Field** in 1942. Like that target, miniature practice bombs have been recovered in the area by EOD units and there was no evidence that other types of bombs were used. Range use is thought to have ceased around the time Page Field was placed on caretaker status in July 1946. The golf course was completed over the target by 1948. The location of this range is shown on historical maps in ASR Appendix G-21 and on ASR Plate 4 and 7.

2.2.17.1 Range Identification

Common Name of Range: Aerial Bomb Target (1940s)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location Parris Island, Beaufort County, South Carolina. The approximate location is near the 12th hole of the golf course; NR 303745 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice bombs of the miniature type. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.17.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Bomb, Practice , Miniature	Pyrotechnic Signal Cartridge

Note: There are several versions of miniature practice bombs, differing in material (e.g. cast iron, Zinc alloy) and hence, weight (3-lb., 4-lbs.). They use an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact.

Range Time Frame of Use: The approximate time frame of use is 1942 to 1946.

Locations Within Range of Known Munitions Use: In and around the target circles.

Estimated Density of Munitions: The density estimate is low. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
Bomb, 3 lb., Practice, MK 3, 4, & AN-Mk5[2]	1.0	1.4	2.1	2.1

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 listed several miniature practice bombs having been recovered during archaeological excavations at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: The Practice Signal Cartridge, AN-Mk4 consists of an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact. There is an ejection hazards as well as a burn hazards associated with this item. General safety issues are discussed in SECTION 3.0.

Types of Targets: The bomb target consisted of concentric circles outlined on the ground (sometimes with lime), that were be visible from the air.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a golf course.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.18 Trap and Skeet Ranges at Page Field

A trap and skeet range was established north of the cantonment area of Page Field by 1946, though it was probably in use in the early 1940s. The range contained two structures, buildings AS47 and AS48, with a field of fire over the marsh around Ballast Creek. The closing of the airfield after the war likely limited its use and the ranges are not delineated on site plans after 1953. The ASR site inspection did not locate any physical evidence of its existence in March 1999. The location of this range is shown on historical maps in ASR Appendix G-21 and 23 and on ASR Plates 5 and 7.

2.2.18.1 Range Identification

Common Name of Range: Trap Range AS-47 and Skeet Range AS-48 (circa 1940s)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the former structures, AS47 and AS48 is NR 300769 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition for shotguns. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.18.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, 12-gage shotgun	None

Range Time Frame of Use: The approximate time frame of use is 1940-1953.

Locations Within Range of Known Munitions Use: Firing was done from the firing line out over the swampy area.

Estimated Density of Munitions: The ground density estimate is low for small arms ranges. The target area may contain a high density of lead pellets, which are not UXO.

Estimated Depth of Munitions: Shotgun shells have no ability to penetrate when fired in trap and skeet sporting events. However, due to the swampy nature of the tidal area, lead pellets may be embedded in the mud.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: Clay pigeons are typically used for trap and skeet targets.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a training area as required.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.19 Recreational Firing Range at Horse Island

This range first appeared on site plans in 1988 as a **Skeet Range** on Horse Island. The ASR site inspection did not locate a skeet house but only a series of five-foot high posts, set close together, peppered with small-size shot (possibly number six), indicating a possible restriction on the loads that can be fired. A set of bleachers indicates a military use, rather than purely one for civilian or off-duty recreational firing. In 1999 the range is primarily a shotgun range, and may be used for familiarization fire for the military police. The location of this range is shown on historical maps in ASR Appendix G-29 and 32 and on ASR Plate 5.

2.2.19.1 Range Identification

Common Name of Range: Recreational Firing Range (1990s); Skeet Range (1980s)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, this range remains in service at MCRD ERR Parris Island.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location Parris Island, Beaufort County, South Carolina. The approximate location of the 1999 firing line is NR 269799 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition for shotguns. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.19.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, 12-gage shotgun	None

Range Time Frame of Use: The approximate time frame of use is 1980s-present (i.e. 1999).

Locations Within Range of Known Munitions Use: Firing was done from the firing line at the wooden piling targets.

Estimated Density of Munitions: The ground density estimate is low for small arms ranges. The target area may contain a high density of lead pellets, which are not UXO.

Estimated Depth of Munitions: Shotgun shells have no ability to penetrate when fired in trap and skeet sporting events. However, due to the swampy nature of the tidal area, lead pellets may be embedded in the mud.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: Clay pigeons are typically used for trap and skeet targets. In addition, there may have been static targets, perhaps of fiberboard attached to wooden pilings, for military police training.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a training area as required.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.20 Aerial Bombing Target at Parade Deck

This bombing target, although not positively located on site plans or aerial photography, was located on the parade deck as early as 1937. The target use ceased with the paving of the parade field completed in the early 1940s. Miniature practice bombs are reported to have been the ordnance used at the time. The location of this range is not shown on any historical maps collected in ASR but the general location of the target is shown on ASR Plate 5.

2.2.20.1 Range Identification

Common Name of Range: Aerial Bombing Target (1937)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the former bombing target is NR 299793 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice bombs of the miniature type. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.20.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Bomb, Practice , Miniature	Pyrotechnic Signal Cartridge

Note: There are several versions of miniature practice bombs, differing in material (e.g. cast iron, Zinc alloy) and hence, weight (3-lb., 4-lbs.). They use an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact.

Range Time Frame of Use: The approximate time frame of use is late 1930s-1940.

Locations Within Range of Known Munitions Use: In and around the target circles.

Estimated Density of Munitions: The density estimate is low. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
Bomb, 3 lb., Practice, MK 3, 4, & AN-Mk5[2]	1.0	1.4	2.1	2.1

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any occurring at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: The Practice Signal Cartridge, AN-Mk4 consists of an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact. There is an ejection hazards as well as a burn hazards associated with this item. General safety issues are discussed in SECTION 3.0.

Types of Targets: The bomb target consisted of concentric circles outlined on the ground (sometimes with lime), that were be visible from the air.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a parade ground.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.21 Rifle Range at Ballast Creek

This was the first identified range in use at Parris Island and it was located on the high ground of an inside bend of Ballast Creek, south of the contemporary Quarantine / Receiving Station. This 600 yard rifle range first appeared on site maps in 1916 but may it have been constructed earlier. The site is also thought to have contained a small pistol range. The site was sometimes referred to as the "Old Rifle Range" to differentiate it from the rifle and pistol ranges constructed in the Weapons and Field Training Battalion Area in 1918. Following World War I through 1922, this range was used as a flying field, though portions of the target butts remained through the late 1930s. Most of the land for this range has since been covered by dredge fill, although evidence of the concrete target foundations remain. The location of this range and the 1920s changes is shown on historical maps in ASR Appendix G-3, 4, 6 and 7 and on ASR Plates 5 and 7.

2.2.21.1 Range Identification

Common Name of Range: Rifle Range or 600 yard Range (1916), Old Rifle Range (1918-1920s)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the former firing lines are NR 310775 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included small arms ammunition. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.21.2Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, caliber .30	None

Note: Although no documentation exists to support this, rifle ranges during this time frame have been known to have had 3-inch trench mortars fired on them, using smoke ammunition to obscure the targets.

Range Time Frame of Use: The approximate time frame of use is 1916 to 1919.

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO..

Estimated Density of Munitions: The ground density estimate is low for small arms ranges. The target butt (berm) area may contain a high density of spent projectiles, which are not UXO.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
.30 Caliber, Ball, M1 (NOTE: Only complete rounds represent an explosive hazard and complete rounds are found on the surface)	1.3	1.7	2.6	0.1

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Small arms ammunition without explosive projectiles present no specific safety hazard down range. General safety issues are discussed in SECTION 3.0.

Types of Targets: Details of earlier targets systems was not determined, but typically consist of metal or wood frames. The remains of several concrete pilings are still visible and may have held the target frames.

Other Past Uses: Following this range use as a rifle range during the 1910s, it became a flying field in the early part of the 1920s. Maps also indicate portions served a borrow material. Later, warehouses and storage structures were built and remain, as does the dredge spoil place on the site..

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a dredge fill area.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.22 Field Artillery West Main Range

In 1937 the Marines established two impact areas for field artillery firing, the largest being the **West Main Range**. This range had a concrete observation point and a total of nine firing positions, including three concrete points. Firing point R on Horse Island provides the apex of the surface danger zone (range fan). The impact area is 9,000 feet in length and the range fan extends 16,500 feet. Artillery use is known to have included High Explosive and Shrapnel rounds from the 75mm gun, Model 1897, known as the "French 75", as well as the 75mm pack howitzer, M1. Other calibers such as 2.95-inch mountain gun, 37mm anti-tank and 105mm howitzer may have been fired, but no evidence was uncovered to support this. No direct evidence was uncovered that this impact area was used for aerial bombing or had been used for artillery training prior to 1937. The location of this range is shown on historical maps in ASR Appendix G-9 and 10 and on ASR Plate 2.

2.2.22.1Range Identification

Common Name of Range: Field Artillery West Main Range (late 1930s)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. This range occupied a large fan-shaped area, with its apex on Horse Island (NR 272800) and extending south-southeast to approximately NR 294750 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included artillery ammunition for 75mm guns and howitzers, M1897 and M1, respectively. Types included high explosive and shrapnel. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.22.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, 75mm, Gun, HE	Point Detonating
Cartridge, 75mm Gun, Shrapnel	Combination (Time and Impact)

Range Time Frame of Use: The approximate time frame of use is 1937-1940.

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO.

Estimated Density of Munitions: A minimal potential for complete rounds exists at the firing line. The impact area within the range fan would have received the majority of any dud ammunition. The density estimate is moderate. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
75mm Gun, HE	4.9	6.4	9.8	2.5

Shrapnel rounds that failed to function would have similar penetration to the above HE round. Expended shrapnel rounds have little ability to penetrate and can often be found on the surface.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Unexploded high explosive munitions present specific safety issues in accordance with the type of fuzing installed. The condition of the fuze and at what state the arming process has reached will determine the sensitivity of that item. Each item must be treated as a fully armed item. Any item fuzed with a mechanical time fuze is sensitive

to any jarring. Combination fuzes can increase the hazards associated with the UXO. General safety issues are discussed in SECTION 3.0.

Types of Targets: The archive search did not determine any details concerning the targets used for this range.

Other Past Uses: Following the only ordnance related uses associated with this range, the site has been developed for housing (i.e. Argonne Trailer Park), Page Field, ordnance storage and for borrow material.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as currently developed.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.23 Field Artillery East Shrapnel Range

Established in 1937 as one of two field artillery ranges, the East Shrapnel Range consisted of a single firing position at Ballast Creek with a southerly direction of fire. The surface danger zone was approximately 17,00 feet long and extended along the marshes of Parris Island, east of Page Field. Unlike the West Main Range, this range did not have any concrete observation points or firing points and no specific records of weapon firing were found. Presumably, the ordnance used included 75mm gun ammunition, which was the most common caliber during this time. The location of this range is shown on historical maps in ASR Appendix G-9 and 10 and on ASR Plate 2.

2.2.23.1 Range Identification

Common Name of Range: Field Artillery East Shrapnel Range (late 1930s)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. This range occupied a narrow fan-shaped area, with its apex near the officer's club (NR 313778) and extending almost due south to the Ribaut Monument, approximately at NR 303741 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included artillery ammunition for 75mm guns and howitzers, M1897 and M1, respectively. Types included shrapnel. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.23.2Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Cartridge, 75mm Gun, Shrapnel	Combination (Time and Impact)

Range Time Frame of Use: The approximate time frame of use is 1937-1940.

Locations Within Range of Known Munitions Use: A minimal potential for complete rounds exists at the firing line, though anywhere within the range would have minimal potential for UXO..

Estimated Density of Munitions: A minimal potential for complete rounds exists at the firing line. The impact area within the range fan would have received the majority of any dud ammunition. The density estimate is moderate. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
75mm Gun, HE	4.9	6.4	9.8	2.5

Shrapnel rounds that failed to function would have similar penetration to the above HE round. Expended shrapnel rounds have little ability to penetrate and can often be found on the surface.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Unexploded high explosive munitions present specific safety issues in accordance with the type of fuzing installed. The condition of the fuze and at what state the arming process has reached will determine the sensitivity of that item. Each item must be treated as a fully armed item. Any item fuzed with a mechanical time fuze is sensitive to any jarring. Combination fuzes can increase the hazards associated with the UXO. General safety issues are discussed in SECTION 3.0.

Types of Targets: The archive search did not determine any details concerning the targets used for this range.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as currently developed.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.24 Gas Chamber (Bldg. 685)

In the fiscal year ending 1945, the Marines constructed **Building 673** as the first identified gas chamber on base. By 1952, this Quonset hut structure appears at the same location renumbered as **Building 685**. The structure was primarily used for protective gas mask training, though the use of chemical agent identification sets (CAIS) is suspected in the area. Obsolete CAIS were recovered by Marine Corps EOD some time between 1965-1967 and again, by an U.S. Army Technical Escort Unit in 1975. Based on the description of these kits, they are believed to have been the M1 Gas Instructional Set. As of 1999, Building 685 remains in use as the center of the Close Combat Instructional area. This range is noted a gas chamber on historical maps in ASR Appendix G-18 and 22, though it is shown on many others. ASR Plates 5 and 7 also show the location of the range.

2.2.24.1 Range Identification

Common Name of Range: Gas Chamber (1940s-1950s); Building 673; Building 685 (1952-present).

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued, but this property continues to be part o the Close Combat Instruction area.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The location of the former gas chamber is in Building 685; NR 287786 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included riot control agent (tear gas), such as CS capsules or grenades. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.24.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Capsule, Riot Control, Agent: CS	None
Chemical Agent Identification Set	None
Grenade, Hand: Riot Control	Pyrotechnic delay-igniting

Note: CS capsules are the preferred means of dispensing tear gas for use in gas chamber training. The capsules are aerosolized by placing them on an up-ended tin can, which is placed over a burning candle.

Range Time Frame of Use: The approximate time frame of use is 1945 to 1950s.

Locations Within Range of Known Munitions Use: Within Building 685.

Estimated Density of Munitions: The density estimate is low. The likelihood of any CS powder remaining in the area is low and for capsules or grenades, it is extremely unlikely. Although chemical agent identification sets (CAIS) have been recovered here in the past, it is unlikely that any remain.

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit MCAS, Beaufort, recovered chemical agent identification sets (CAIS) around 1965-1967. A Technical Escort Unit again recovered another CAIS in 1975 at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: The chemicals contained in CAIS are often live (neat) agents packaged in glass vials or bottles. Some of the these chemicals, such as blister agents, are extremely hazardous by inhalation or skin contact. CS is a powerful lachrymatory agent and is irritating to the upper respiratory passages. General safety issues are discussed in SECTION 3.0.

Types of Targets: No targets are associated with this type of range.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as part of the Close Combat Instruction area..

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.25 Aerial Bombing Target at Southern Tidal Flats

Although not located on any of the reviewed historical site plans, a bombing target existed on the tidal flats south of the golf course. Presumably, the time frame of range use covered World War II, though the target is barely discernable on 1945 aerial imagery. The ASR site inspection located two ten-foot tall metal posts, which formed the target's center. The inspection team also found rusty sheet metal debris apparently from 100 lb. practice bombs scattered around the target. They did not find any debris from 2.25-inch subcaliber aerial rockets (SCAR) or HE bombs at this location, though the Parris Island air station had these items and used them at other locations in the Port Royal Sound area (i.e. FUDS). The location of this range is not shown on any of the historical maps collected in the ASR but it is shown on ASR Plates 4 and 7.

2.2.25.1 Range Identification

Common Name of Range: Aerial Bombing Target (circa 1942)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The approximate location of the former bombing target is at the southernmost tip of Parris Island; NR 302739 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice bombs such as 100 pound bombs and probably the miniature type as well. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.25.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Bomb, Practice, 100 lb., Mk15	Spotting Signal (Impact inertia)
Bomb, Practice , Miniature	Pyrotechnic Signal Cartridge

Note: The Mk 15 Bomb uses the Mk 7 Spotting Signal and contains one pound of black powder. There are several versions of miniature practice bombs, differing in material (e.g. cast iron, Zinc alloy) and hence, weight (3-lb., 4-lbs.). They use an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact.

Range Time Frame of Use: The approximate time frame of use is early 1940s, but may have been early as well.

Locations Within Range of Known Munitions Use: In and around the target area.

Estimated Density of Munitions: The density estimate is low. This estimate is based on quantities of munitions from records reviewed and regulation allowances, previous range clearance operations and number of years the range has been in service.

Estimated Depth of Munitions: The following table gives the estimated maximum penetration depth based upon type of soil:

Munition	Maximum Penetration in sand (ft)	Maximum penetration in loam (ft)	Maximum penetration in clay (ft)	Maximum Detection Depth (ft)[1]
Bomb, 100 lb. Prac, MK 15[2] (This is a light case munition which normally breaks up on impact, penetration depth is for intact round)	3.2	4.2	6.4	9.7
Bomb, 3 lb., Practice, MK 3, 4, & AN-Mk5[2]	1.0	1.4	2.1	2.1

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any occurring at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: The Spotting Signal Mk7 is an impact inertia fuze that contains one pound of black powder. The Practice Signal Cartridge, AN-Mk4 consists of an extra-long 10 gage shotgun shell, which emits a puff of smoke upon impact. There is an ejection
hazards as well as a burn hazards associated with this item. General safety issues are discussed in SECTION 3.0.

Types of Targets: The bomb target consisted of concentric circles outlined on the ground (sometimes with lime), that were be visible from the air.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a parade ground.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.26 Gas Chamber at Elliott's Beach

Building EB-11 at Elliott's Beach was used as a gas chamber, since razed,. The time frame of use appears to be from the mid-1950s to the early 1980s, when the building appears on site plans, though it is not specifically referenced as a gas chambers. Like the other gas chambers, the structure was primarily used for protective gas mask training, though given the time frame of use, potentially chemical agent identification sets (CAIS) may also have been used. The location of Building EB-11 is shown on historical maps in ASR Appendix G-23, 26 and 27 and on ASR Plate 5.

2.2.26.1 Range Identification

Common Name of Range: Unknown

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The location of the gas chamber is not known, other than it is along Elliott's Beach.

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included riot control agent (tear gas), such as CS capsules or grenades. No information was found to substantiate the use of chemical agent identification sets (CAIS), but their use cannot be ruled out. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.26.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Capsule, Riot Control, Agent: CS	None
Grenade, Hand: Riot Control	Pyrotechnic delay-igniting

Note: CS capsules are the preferred means of dispensing tear gas for use in gas chamber training. The capsules are aerosolized by placing them on an up-ended tin can, which is placed over a burning candle. No information was found to substantiate the use of chemical agent identification sets (CAIS), but their use cannot be ruled out.

Range Time Frame of Use: The approximate time frame of use is circa 1950s-early 1980s.

Locations Within Range of Known Munitions Use: Within the gas chamber building (which may have been a tent).

Estimated Density of Munitions: The density estimate is low. The likelihood of any CS powder remaining in the area is low and for capsules or grenades, it is extremely unlikely.

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The archive search did not uncover any information concerning range clearances at this location.

Specific Munitions Safety Issues: The chemicals contained in CAIS are often live (neat) agents packaged in glass vials or bottles. Some of the these chemicals, such as blister agents, are extremely hazardous by inhalation or skin contact. CS is a powerful lachrymatory agent and is irritating to the upper respiratory passages. General safety issues are discussed in SECTION 3.0.

Types of Targets: No targets are associated with this range.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as part of the Close Combat Instruction area..

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.27 Grenade Range Near Old Swimming Pool at Weapons and Field Training Battalion Area

Identification of this range relies completely on a credible interviewee, who indicated that an area near the old swimming pool at Weapons and Field Training Battalion Area had been used as a grenade range during his recruit training in 1943 (Swearengen 1999). He recalled it being used primarily for throwing inert training grenades through 2 by 4 simulated window frames, however he thought they also may have used practice or HE grenades. Contemporary maps do not designate any ranges in the described area, which had officer housing within 500 feet. A careful review of aerial photography from 1945 did not reveal any distinct ground features of harden grenade courts as would be used with HE rounds, further casting doubt on their use. The location of this range is not shown on any historical maps collected for the ASR but the general area is denoted on ASR Plates 5 and 7.

2.2.27.1 Range Identification

Common Name of Range: Unknown

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified range use has been discontinued, if it ever occurred at all.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. See aerial extent on Plate 5 The approximate location of the former range is NR 275767 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice hand grenades and possibly high explosive (fragmentation) grenades as well, though this conclusion is highly suspect. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

2.2.27.2Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Grenade, Hand, Practice	Pyrotechnic delay-igniting
Grenade, Hand, Fragmentation, MkII	Pyrotechnic delay-detonating

Range Time Frame of Use: The approximate time frame of use is circa 1943.

Locations Within Range of Known Munitions Use: Throwing positions are the protective concrete structures from which the grenade is thrown. The target pit is the intended terminus of said thrown grenade.

Estimated Density of Munitions: Density estimate is low due to the controllability of grenade ranges. Because of the inherent danger associated with live hand grenades and the requirement to call EOD whenever a grenade fails to function, a minimal potential for complete rounds exists within the range

.

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island. A review of the incidents between January 1995 and 1999 indicate no incidents at this location.

Specific Munitions Safety Issues: Grenades that fail to function can be very sensitive and are considered extremely hazardous. Practice grenades may contain small pyrotechnic charges. General safety issues are discussed in SECTION 3.0.

Types of Targets: Typically, live grenade ranges use a number of targets, such as rubber automobile tires

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.28 Fuse Range at Elliott's Beach

Identification of this range relies completely on a previous range investigation prepared by the DoD Training and Performance Data Center (TPDC) in 1991[2] and could not be confirmed by other information. Reportedly, the range was a practice hand grenade range, consisting of two throwing points and a target pit area. Based on grid coordinates in the report, the range lies near the Tactical Bivouac Area, inland from Elliott's Beach. Conversations with current personnel whose experience at MCRD ERR Parris Island dates before the writing of the report can not confirm the range use or location. The location of this range is not shown on any historical maps collected for the ASR but is shown on ASR Plate 5. The existence of this range is suspect. Possibly the TPDC report confused it with one of the Practice Grenade Ranges at Page Field.

2.2.28.1 Range Identification

Common Name of Range: Fuse Range (1991)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified use of this range has been discontinued, if it ever occurred at all.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The TPDC report gives the location of the range as NR 286757 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use included practice hand grenades. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

[2] Department of Defense Training and Performance Data Center
1991 *United States Marine Corps Weapon Training Range, Unit Training Areas and Unit Training Facilities, Marine Corps Recruit Depots located at San Diego, California, Parris Island, South Carolina.* dated May 1991.

2.2.28.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Grenade, hand, practice	Pyrotechnic delay-igniting

Range Time Frame of Use: The approximate time frame of use is circa 1991.

Locations Within Range of Known Munitions Use: Practice hand grenades are thrown into a target pit.

Estimated Density of Munitions: The density estimate is low. Practice grenades can be recovered and reused, therefore it is unlikely that any remain on the site.

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island, though a review of the incidents between January 1995 and 1999 did not indicate any at this location. The archive search did not uncover any other information concerning range clearances at this location.

Specific Munitions Safety Issues: Practice grenades may contain small pyrotechnic charges. General safety issues are discussed in SECTION 3.0.

Types of Targets: There are two throwing points and a circular target pit.

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a training area as required.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

2.2.29 Hand Grenade Range near Elliott's Beach

Like the Fuze Range at Elliott's Beach, identification of this range relies completely on the 1991 TPDC range investigation[3] and could not be confirmed by other information. Reportedly, the range was a live, fragmentation hand grenade range used for familiarization and qualification. It is described as being 200 by 180 meters in size, with two throwing bunkers, a platform for controlling the range and six tire targets. Based on grid coordinates in the report, the range lies near the boat launch near Elliott's Beach. Conversations with current personnel whose experience at MCRD ERR Parris Island dates before the writing of the report can not confirm the range use or location. The location of this range is not shown on any historical maps collected for the ASR, but is shown on ASR Plate 5. The existence of this range is highly suspect and is believed to have been confused with the Guadalcanal Hand Grenade Range, which existed in 1991, but was omitted in that report.

2.2.29.1 Range Identification

Common Name of Range: Hand Grenade Range (1991)

Range Identification Number: To be Determined

Current Range Status: As of May 1999, the specified use of this range has been discontinued, if it ever occurred at all.

DOD Point of Contact: Marine Corps Recruit Depot Eastern Recruiting Region Parris Island, Natural Resources and Environmental Affairs Office, P. O. Box 19003, Parris Island, SC 29905-9003; 843-525-3423.

Location: Parris Island, Beaufort County, South Carolina. The TPDC document gives the location of the range as NR 286753 (MGRS new).

Ownership Interests: The Department of the Navy administers the real estate holding for the U.S. Marine Corps.

Known Deed Restrictions: The archive search did not identify any deed restrictions.

General Types of Munitions Used: Munition use includes fragmentation hand grenades. Appendix A contains ordnance data sheets on specific ammunition groups and items.

Information Current as of: May 1999.

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[3] Department of Defense Training and Performance Data Center
1991 *United States Marine Corps Weapon Training Range, Unit Training Areas and Unit Training Facilities, Marine Corps Recruit Depots located at San Diego, California, Parris Island, South Carolina.* dated May 1991.

2.2.29.2 Preliminary Range Assessment

TYPES OF MUNITIONS EMPLOYED	FUZE TYPE
Grenade, Hand, Fragmentation, M67	Pyrotechnic delay-detonating

Range Time Frame of Use: The approximate time frame of use is 1991.

Locations Within Range of Known Munitions Use: Throwing positions are the protective concrete structures from which the grenade is thrown. The target pit is the intended terminus of said thrown grenade.

Estimated Density of Munitions: Density estimate is low due to the controllability of grenade ranges. Because of the inherent danger associated with live hand grenades and the requirement to call EOD whenever a grenade fails to function, a minimal potential for complete rounds exists within the range.

Estimated Depth of Munitions: For hand grenades, the ground depth estimate is surface, less than 6 inches. The munitions used possess no ground penetration capabilities.

Information on Past Range Clearances: The local EOD unit at MCAS Beaufort renders safe any reported UXO on Parris Island. A review of the incidents between January 1995 and 1999 indicated a handful of grenade incidents at this location.

Specific Munitions Safety Issues: Grenades that fail to function can be very sensitive and are considered extremely hazardous. General safety issues are discussed in SECTION 3.0.

Types of Targets: Typically, live grenade ranges use a number of targets, such as rubber automobile tires

Other Past Uses: The archive search identified only ordnance related uses associated with this range.

Anticipated Future Use: The MCRD ERR Parris Island envisions continued use of this site as a range.

Public Access: Access to Parris Island is controlled at the main entrance and the surrounding rivers, swamps and tidal flats make additional ingress difficult.

3.0 GENERAL MUNITIONS SAFETY ISSUES

In addition to the general safety guidance provided by NAVSEA OP-5, Volume 1, *Ammunition and Explosives Ashore*, the following provides explosive safety guidelines. These guidelines are extracted from an SOP entitled *Site Safety and Health Plans* developed by the Huntsville Engineering and Support Center, U.S. Army Corps of Engineers, dated 26 May 1994.

3.1 GENERAL

Observe the "cardinal principle" when exposed to explosives, ammunition, severe fire hazards or toxic materials. This principle states to limit the exposure to a minimum number of personnel, for a minimum amount of time, to a minimum amount of hazardous material consistent with a safe and efficient operation.

The age or condition of an ordnance item does not decrease its effectiveness. UXO exposed to the elements for extended periods of time can become more sensitive to shock, movement, and friction.

When the possibility of chemical agents exists, further precautions are necessary. Munitions with green markings may indicate a chemical filler. Personnel should leave the area immediately.

Consider ordnance exposed to fire as extremely hazardous. Chemical and physical changes may occur to the contents rendering it more sensitive than in its original state.

3.2 ON-SITE GUIDANCE

- DO NOT TOUCH or MOVE any ordnance items regardless of the markings or apparent condition.
- DO NOT conduct a site visit during an electrical storm or an approaching electrical storm. If a storm approaches during the site visit, leave the site immediately and seek shelter.
- DO NOT use a radio or cellular phone in the vicinity of a suspect ordnance item.
- DO NOT walk across an area where the ground cannot be seen.
- DO NOT drive a vehicle into a suspected OE area; use clearly marked lanes.
- DO NOT carry matches, cigarettes, lighters or other flame producing devices into a OE site.
- DO NOT rely on color codes for positive identification of ordnance items or their contents.

Approach ordnance items from the side, avoid approaching from the front or rear. Always assume ordnance items contain a live charge until it can be determined otherwise. Dead vegetation and animals may indicate potential chemical contamination. If a suspect area is encountered, personnel should leave the immediate area and evaluate the situation.

3.3 SPECIFIC ACTION UPON LOCATING ORDNANCE

- DO NOT touch, move or jar any ordnance item, regardless of its apparent condition.
- DO NOT be misled by markings on the ordnance item stating "practice", "dummy", or "inert". Practice munitions may contain an explosive charge used for spotting the point of impact. The item may also be mismarked.
- DO NOT roll the item over or scrape the item to read the markings.

Clearly mark the location of any ordnance items found. Report UXO to the proper authorities on the installation or to local law enforcement. Only Military EOD personnel should render-safe UXO.

APPENDIX A

ORDNANCE TECHNICAL DATA SHEETS

ORDNANCE TECHNICAL DATA SHEETS

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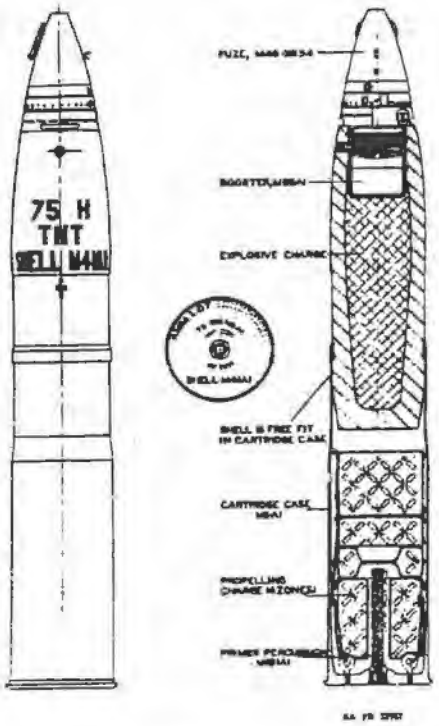
SHELL, 75MM, HIGH EXPLOSIVE, M41A1



Shell, Semifixed, H.E., M41A1

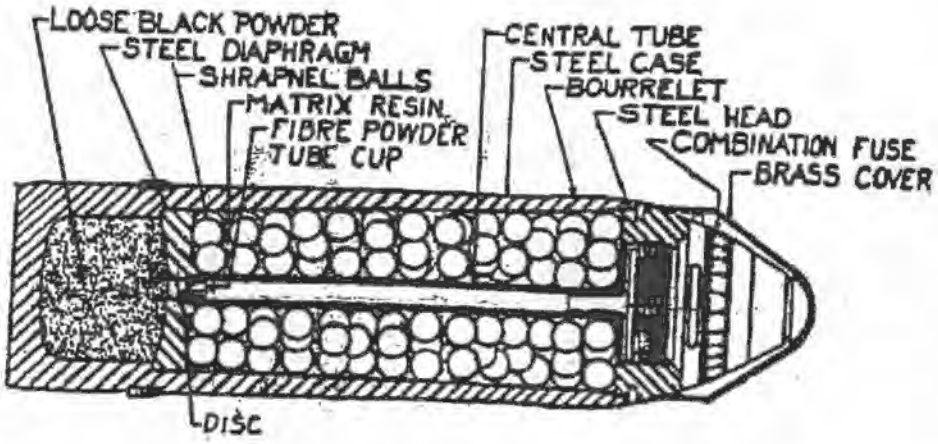
General. This round is a substitute for the M48 H.E. Shell in the 75-mm howitzer. This projectile is made by cutting off the nose of the Mk. IV, H.E. Shell and rethreading it to take the M48, M48A1, M54 fuzes, and the M20 Booster.

Description. This projectile has an 11-caliber radius of ogive and a boat-tail base with a 9-degree 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

PROJECTILE, 75MM, SHRAPNEL, MKI



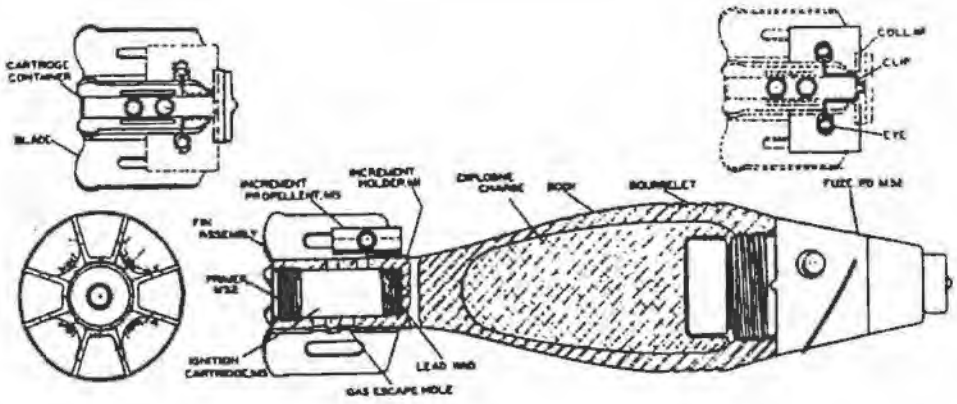
Description. This projectile consists of a steel case, near the base of which a shoulder is formed on the interior surface. A base charge of 3 ounces of black powder is packed in the base of the projectile beneath a diaphragm of steel which rests on the shoulder. This diaphragm also supports a flash 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
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 75-mm field gun only.

Reference: TM 9-1904, *Ammunition Inspection Guide*, March 1944

MORTAR, 60-MM, HE, M49A2



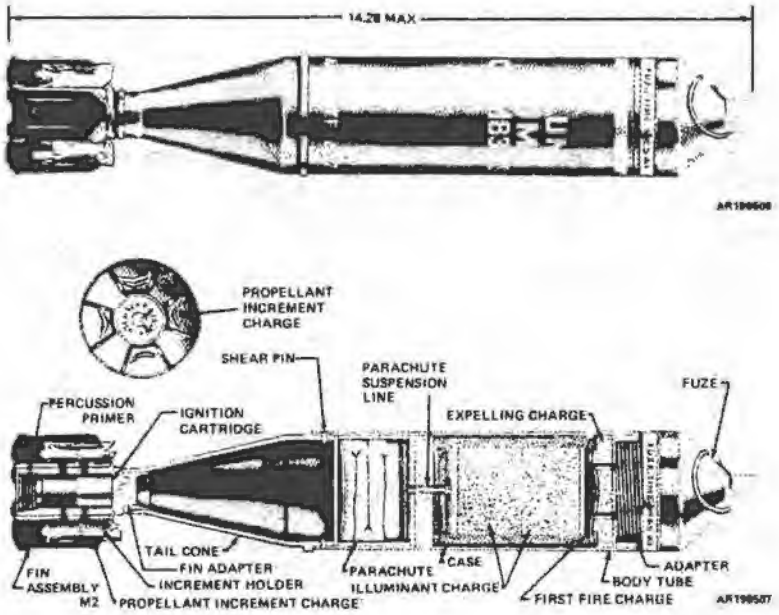
Description: The body of this shell may be constructed of forged steel, cupped-rolled, plate-welded longitudinally, or a machined casting. It is tear-dropped in shape, having a blunt nose and tapered tail. Near the nose end of the shell is a machined bourrelet which acts as a forward bearing surface 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 propellent 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 stencilled in yellow.

Shell, Practice, M50A2 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 stencilling.

Over-all Length.....9.5 inch
Diameter (body) .....2.34 inch
Total Weight .....2.94 pound
Filler .....TNT (flaked)
Filler weight.....0.34 pounds
Propellent..... 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, 60-MM, ILLUMINATING, M83A3, M83A2, & M83A1

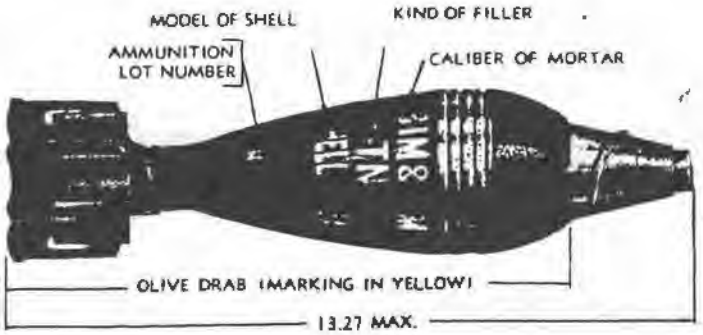


Use: This cartridge provides illumination for observation during night missions.

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
Propellent
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, April 1977

MORTAR, 81-MM, HE & PRACTICE, M43A1



Shell, HE, M43A1. *Shell Body,* 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.

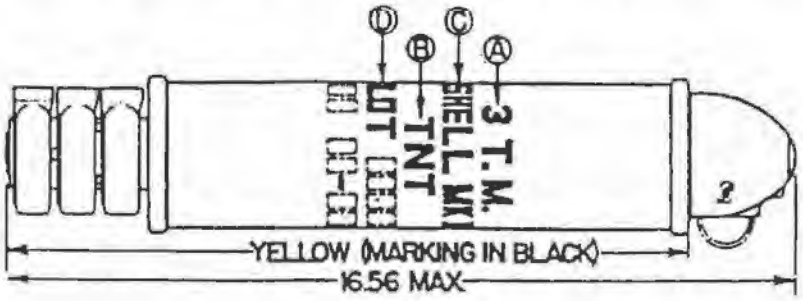
Fin assembly. The fin assembly consists of a machined cartridge container to which are attached six stationary fins. One end is threaded so as to be screwed on to the body of the shell. The other end is machined and hollow inside so as to receive the ignition cartridge. Several holes leading from the interior to the exterior periphery of the cartridge container serve to conduct the flames from the ignition cartridge to the propellent 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 inch
Diameter (body): ..... 3.16 inch
Total Weight: ..... 7.05 pounds
Filler:
HE ..... TNT, 1.22 pound
Practice ..... Black powder, 0.16 pound
Propellent: ..... 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

TRENCH MORTAR, HE, 3-INCH, MK I, MK II, and PRACTICE MK III



A - CALIBER OF MORTAR
B - TYPE OF FILLER
C - MODEL OF SHELL
D - AMMUNITION LOT NUMBER

The 3-inch trench mortar, often called the Stokes mortar, uses the following projectile and components:

Shell, Mark I, is made up of a cylindrical steel casing, into which a forged steel base, and head, are screwed. To the base is attached a short steel tube, or cartridge container which has 16 holes drilled in it to permit the flash from the cartridge to ignite the powder rings. The head has a hole through the center which permits the insertion of the drawn steel booster casing and has a threaded recess for the fuze. This recess is plugged with a threaded fuze hole plug to protect the threads from dirt and damage during storage and shipping.

Shell, Mark II, differs from the Mark I only in the shell body construction, as the casing, head, and base are welded together. Both shells are loaded with a high explosive charge of either TNT or Nitostarch.

Practice Shell, Mark III, is made up of a cast-iron body with a threaded hole in the upper end for assembling a dummy fuze similar to the trench-mortar fuze, Mark VI. The complete round consists of one Shell, Mark III, a dummy fuze, and propellant charges as used with the high explosive round.

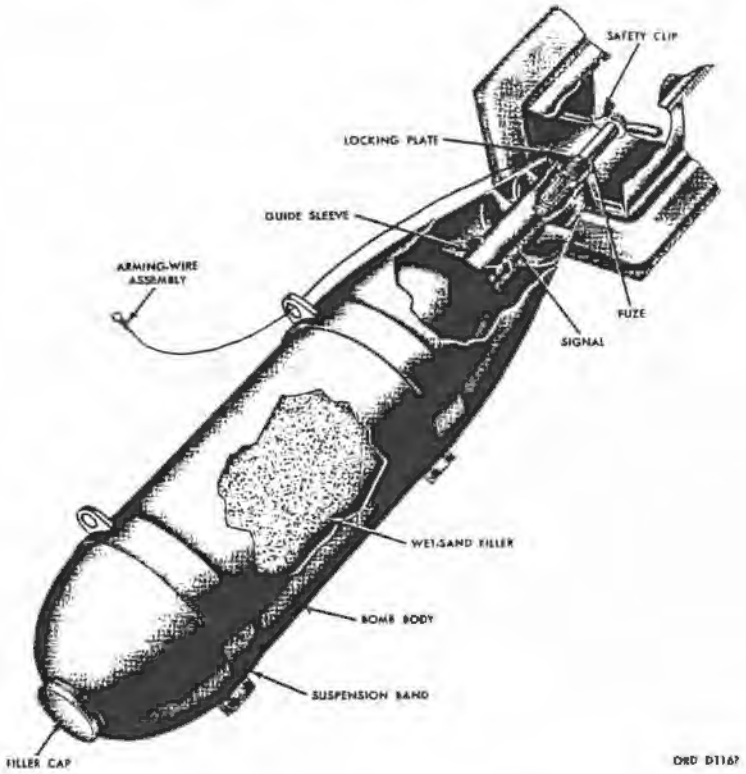
Fuze, Mark VI., is an "all-ways acting" fuze, designed to function upon impact, regardless of the manner in which the shell strikes the ground. The safety pin is withdrawn by means of a safety pin ring immediately before dropping the shell into the muzzle of the gun.

Mark I Booster is made up in cartridge form and is placed in the body casing in the shell, upon assembling the round immediately before firing. The booster consists of a paper cartridge which supports the detonator. The detonator is a commercial detonator or a No. 8 blasting cap.

Propellant Charge consists of one green paper brass-tipped cartridge, loaded with 120 grains of sporting ballistite powder, and from one to three ring-shaped silk bags, each containing 110 grains of M.R. 31 ballistite powder.

Reference: TM 9-1904, Ammunition Inspection Guide, March 1944
Hand Book of the 3-inch Stokes Trench Mortar, Jul 1921

BOMB, PRACTICE, 100-LBS, Mk 15 Mod 3

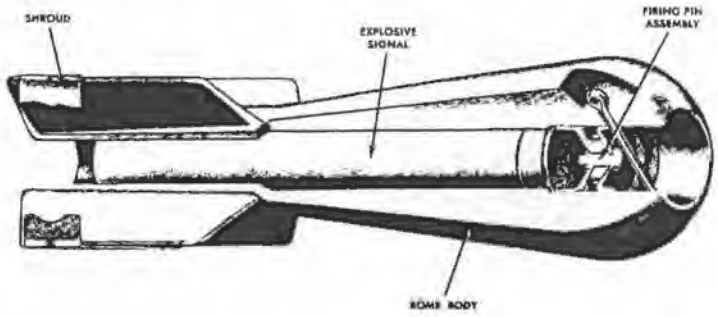


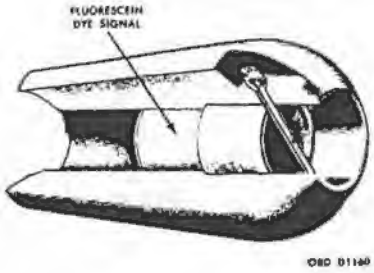
Description The Mk 15 Mod 3 Practice Bomb is a light-cased, cylindrical body with a threaded filling hole in its rounded nose. A box fin assembly consisting of four metal vanes attached to a cone is welded to the aft end of the body. The bomb has two metal suspension band assemblies (each consisting of a circular clamp, a suspension lug, and two cap screws) for tightening the band to the bomb. The bomb is used with the practice bomb signal, Mk7 Mod 0 and inert fuze Mk 247 Mod 0 both of which are secured to the aft of the bomb. Upon impact of the bomb with the target, the signal is detonated, producing a flash and a large puff of smoke. The bomb is filled with wet sand and when fully assembled weighs approximately 100 pounds

Length of assembled bomb.....41.2 inches
Diameter.....8.0 inches
Fin Span.....11.24 inches
Weight, assembled.....100 pounds
Filler.....Sand, Wet sand, or water
Signal.....Mk 7 Mod 0
Color.....Black

Reference: TM 9-1325-200, Bombs and Bomb Components, April 1966
NAVSEA OP 1664 Vol 2, U.S. Explosive Ordnance, February 1954

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 which 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 which contains a fluorescein dye and is actuated by impact on water. When the Mk5 signal is installed, the firing pin assembly is not used.

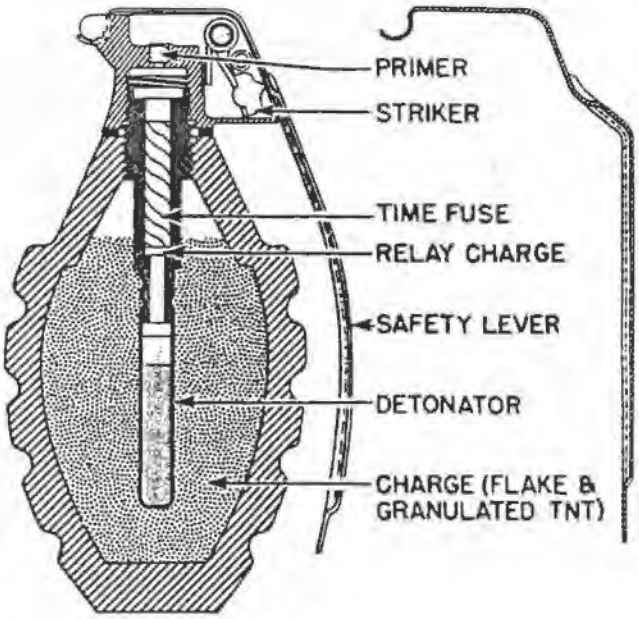
Over-all length .....8.25 inches
Body Diameter .....2.18 inches
Fin Dimension .....2.5 inches
Weight .....AN-Mk 5 Mod 1 - 2 lb. 11 oz. ± 1 oz

AN-Mk 23 -3 lb. ± 2 oz
AN-Mk 43 - 4 lb. 7 oz. ± 2 oz.

Signal .....AN-Mk 4, Black powder/pyrotechnic charge Mk 5, Fluorescein dye

Reference: OP 1280, Aircraft Bombs, February 1945
TM 9-1325-200, Bombs and Bomb Components, April 1966

GRENADE, FRAGMENTATION
Mk II, Mk IIA1



Description:

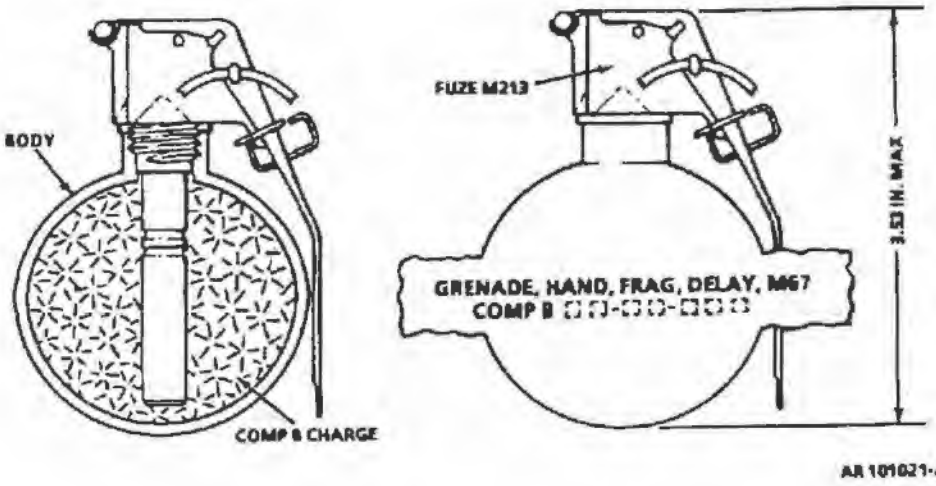
Mk II The grenade has a serrated cast-iron body of the familiar "pineapple" design. The groves run both horizontally and vertically to assist in the formation of uniform fragments of effective size. The grenade is issued with Igniting Fuze M204.

Mk IIA1 Identical to the Mk II except for the Fuze M10A3. The only external difference is that the safety lever fits over rather than under the lip of the fuze body.

DODAC	1330-G890
Length	4.5 inches
Diameter	2.25 inches
Color	Olive Drab, with or without yellow band
Weight	21 ounces
Filling	TNT, Flaked or granular, older models used E.C. Blank Smokeless Powder
Weight of filling	2 ounces
Fuze	M204A1, M204A2

Reference TM 43-0001-29, Ammunition Data Sheets for Grenades October 1977
TM 9-1904, Ammunition Inspection Guide, March 1944
NAVSEA OP 1664 Vol 1&2 w/change 1, U.S. Explosive Ordnance, February 1954

GRENADE, FRAGMENTATION, DELAY, M67



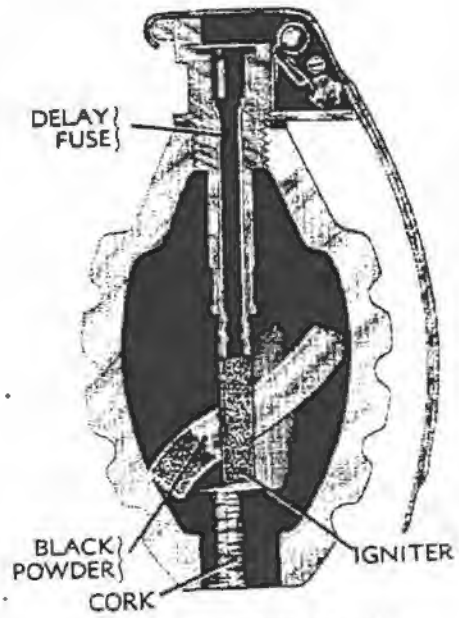
Use: The M67 fragmentation hand grenade is used to supplement small arms fire against the enemy in close combat. The grenade produces casualties by high velocity projection of fragments in a uniform distribution pattern..

Description: The grenade body is a 2.5-inch diameter steel sphere which is designed to burst into numerous fragments when detonated. The grenade body contains 6.5 ounces of high explosive, Composition B. Each grenade is fitted with a fuze that initiates the explosive charge.
The M67 grenade uses the M213 fuze which is a pyrotechnic delay-detonating fuze. It will function the grenade 4 to 5 seconds after release of the safety lever. The body of the fuze contains a primer and a pyrotechnic delay column. Assembled to the body are a striker, striker spring, safety lever, safety pin, pull ring, and a detonator assembly. The M213 fuze is equipped with a steel safety pin and pull ring. The split end of the safety pin is either spread approximately 40 degrees or diamond-shaped to prevent accidental removal and arming during shipping and handling. The pull ring is provided to facilitate easy removal of the safety pin. A second safety feature is the steel safety clip.

Length ..... 3.53 inches
Diameter ..... 2.5 inches
Weight ..... 14 ounces
Color ..... Olive Drab, with yellow markings
Filler ..... Comp B
Weight ..... 6.5 ounces
Fuze ..... M213 Pyrotechnic delay

Reference TM 43-0001-29, Ammunition Data Sheets for Grenades October 1977

GRENADE, HAND, PRACTICE, M21



PRACTICE GRENADE, M21

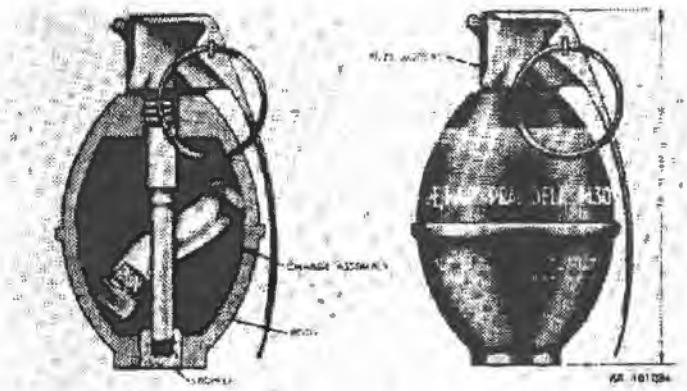
Description and Use: The M21 practice grenade is made of cast iron and is the same shape, size, and weight as a loaded fragmentation Hand Grenade Mk II. The fuze for the grenade has a primer, a combustible time-delay train and igniter. When the grenade is thrown, the safety lever is pushed off by the 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 know as the Grenade, Practice, MkI1.

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

GRENADE, HAND, PRACTICE, DELAY, M30



Use: The grenade M30 is used for training in care, handling and throwing of fragmentation hand grenade M26A1 and M26.

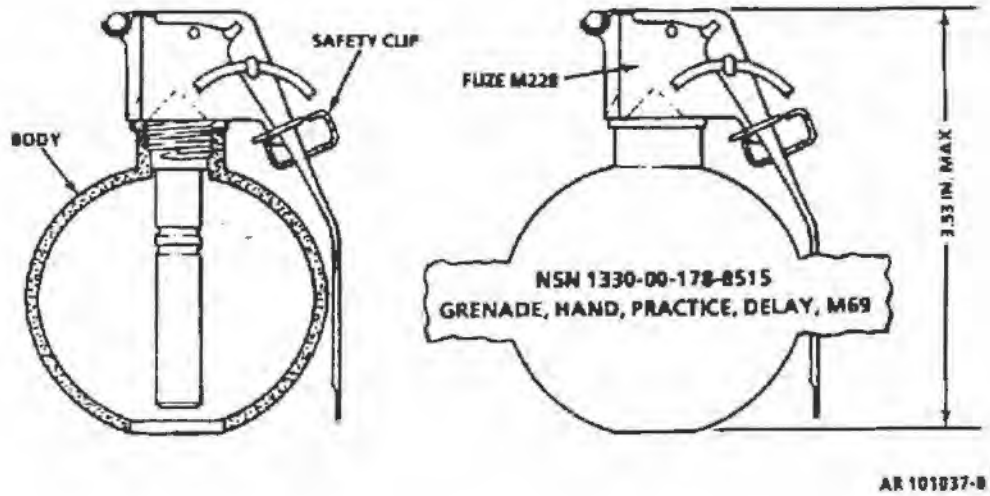
Description: The body is not loaded with a high-explosive filler but may have a small, separate black powder charge. The hand grenade fuzes M205A1 and M205A2 are pyrotechnic delay-igniting fuzes. They differ in body construction only. The body contains a primer and a pyrotechnic delay column. Assembled to the body are a striker, striker spring, safety lever, safety pin with pull ring, and an igniter assembly. The split end of the safety pin has an angular spread or a diamond crimp.

The grenade safety clip is designed to keep the safety lever in place, should the safety pin be unintentionally removed from the grenade. It is an additional safety device used in conjunction with the safety pin.

Length ..... 3.9 inches
Diameter ..... 2.25 inches
Weight ..... 16 ounces
Color ..... Blue, with brown band with white
or
no markings
Filler ..... Black Powder
Filler Weight ..... 21 grains
Fuze M205A1, M205A2

Reference TM 43-0001-29, Ammunition Data Sheets for Grenades, October 1977

GRENADE, HAND, PRACTICE, DELAY, M69



Use: Delay practice hand grenade M69 is the practice version of the M67 fragmentation delay grenade.

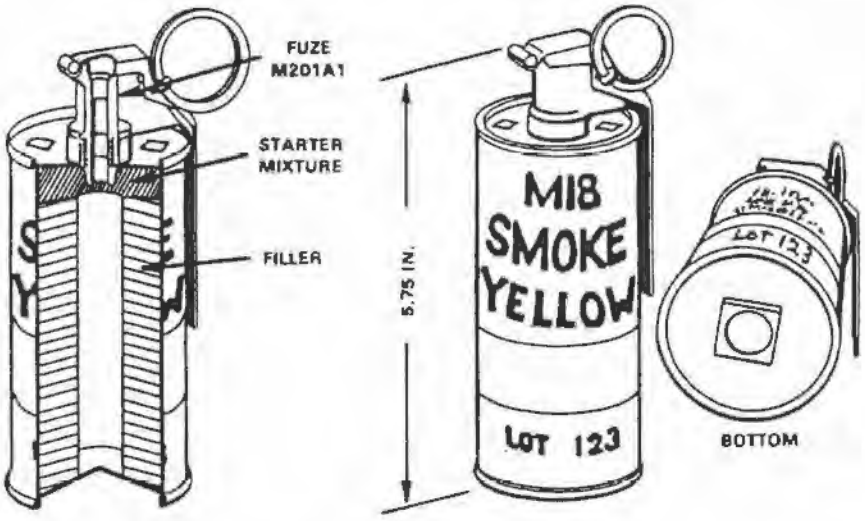
Description: The grenade body, of steel, is essentially spherical in shape. The body is empty, i.e., without any explosive filler. there is a hole in the base of the body. (This vents the gases generated from the fuze igniter and permits removal of residual metal that remains in the grenade body from the igniter case. The grenade body may be recovered and reloaded with a new fuze and safety clip.

Fuze: Hand grenade practice fuze M228 is a pyrotechnic delay-igniting fuze. The body contains a primer and a pyrotechnic delay column. Assembled to the body are a striker, striker spring, safety lever, safety pin with a pull ring, safety clip, and igniter assembly. (Older models do not have the safety clip).

Length ..... 3.53 inches
Diameter ..... 2.5 inches
Weight ..... 14 ounces
Color ..... Blue w/brown band and white markings
Filler ..... None **Fuze** M228 Pyrotechnic delay
Igniter ..... Black powder (2.5 oz)

Reference TM 43-0001-29, Ammunition Data Sheets for Grenades October 1977

GRENADE, SMOKE, M18, with FUZE, M201, M201A1



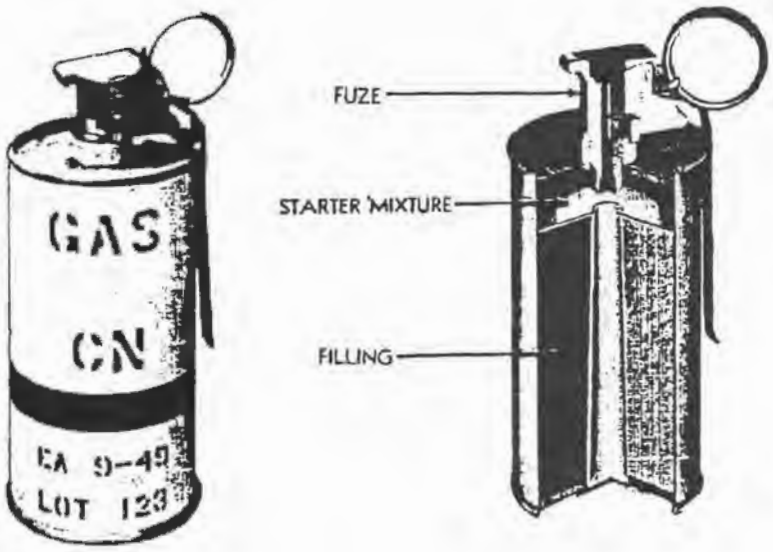
Description: These grenades may be filled with any one of seven smoke colors; red, orange, blue, green, black, violet, and yellow. The grenade body is of thin sheet metal and filled with a smoke composition. Emission ports are covered with small squares of adhesive tape and vary in quantity and location 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 inch
Diameter ..... 2.5 inch
Color ..... Blue grey 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, Oct 77
NAVSEA OP 1664, U.S. Explosive Ordnance, May 47

GRENADE, HAND, TEAR, CN
M7 and M7A1



Description:

M7A1 grenade is a cylindrical thin sheet metal container with four emission holes in the top and one in the bottom. The filler is a mixture of CN, sugar, potassium chlorate, potassium bicarbonate, and a finely divided inert substance (diatomaceous earth). The emission holes are covered with adhesive tape to protect the filling from moisture. filled with CN. The Fuze M201A1 is a pyrotechnic-igniting fuze.

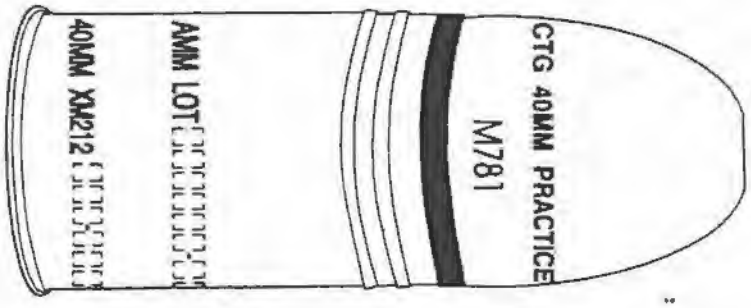
M7 grenade is similar to the M7A1 grenade, except that the M7 grenade has 18 emission holes in the sides and none in the bottom. It also contains less filler and produces about half as much effective CN gas as the M7A1. The grenade operates and functions in the same manner as the M7A1.

DODAC 1330-G960
Length ..... 5.7 inches
Diameter ..... 2.5 inches
Color ..... Blue grey or grey with 1 red band & red markings

Weight
M7 ..... 17 ounces
M7A1 ..... 18.5 ounces
Filler ..... CN- Pyrotechnic composition
Weight of filler
M7 ..... 10.25 ounces
M7A1 ..... 12.5 ounces
Fuze M201A1

Reference TM 43-0001-29 w/change 11, Ammunition Data Sheets for Grenades, Oct 77
TM 3-300, Miscellaneous Chemical Munitions, Mar 50

CARTRIDGE, 40-MM, PRACTICE, M781



General: This cartridge is a fixed, practice type ammunition designed to be fired from 40mm Grenade Launchers M79 and M203 (attached to the M16 series rifle).

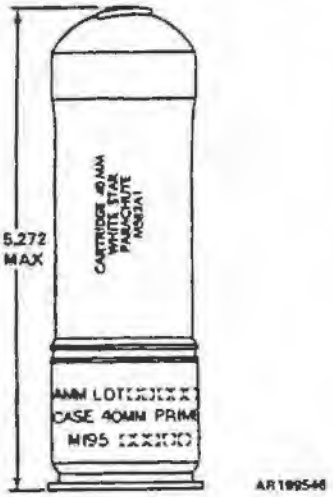
Description: This cartridge is a fixed round of ammunition consisting of a metal projectile body with a rotating band and a cartridge case assembly. a hollow plastic ogive is filled with a high visibility yellow-orange dye. The projectile assembly is attached to a cartridge case with an attached adhesive substance. The case is a hollow bichambered plastic cylinder. A .38 caliber blank cartridge is press-fitted into the base of the cartridge case and provides the gas pressure needed to propel the projectile through the launcher barrel.

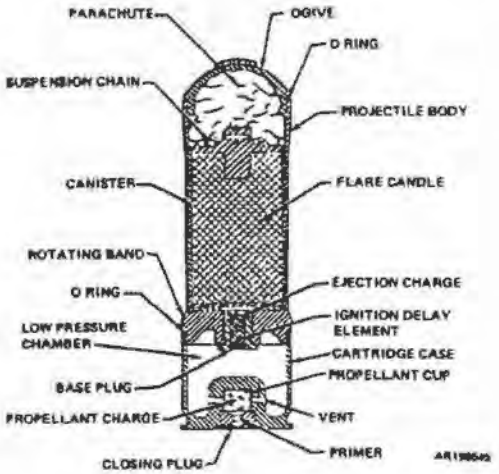
Functioning: The weapon firing pin strikes the .38 caliber blank cartridge primer igniting the propelling charge. Upon impact with the target, the frangible ogive ruptures and releases the dye causing a puff of yellow-orange smoke which simulates explosive impact.

Length ..... 405 in.
Weight ..... 205 g.
Propelling Charge ..... M9, 340 mg.
Color ..... Blue with white markings
Maximum Range ..... 400 meters

Reference TM 43-0001-28, Army Ammunition Data Sheets, April 1994

CARTRIDGE, 40-MM, PARACHUTE, WHITE STAR, M583A1; GREEN STAR, M661; RED STAR, M662





General: These cartridges are designed for illumination and signaling with less weight and bulk and greater accuracy than comparable hand-held signals. They are fired rom 40mm Grenade Launchers M79 and M203.

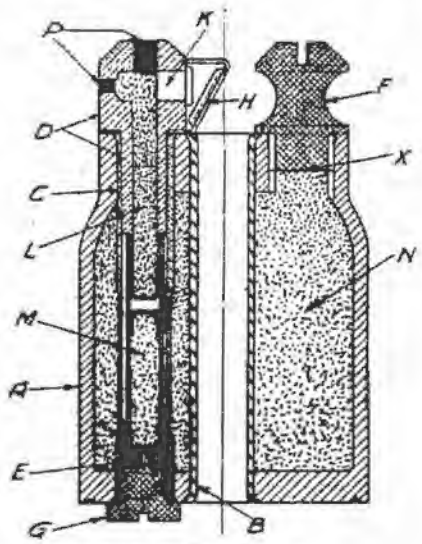
Description: The cartridge is a fixed round of ammunition consisting of a projectile assembly and a cartridge case assembly. The projectile has a one piece, hollow aluminum body with a metal rotating band. A plastic ogive, embossed with a raised letter for night identification of payload, is snapped into an O-ring in the front opening of the projectile cavity. The cavity contains a pyrotechnic flare candle assembly, and an integral ignition/ejection charge attached to a 20-inch diameter parachute. The projectile has a 4- to 5-second delay ignition element crimped into the center opening of a metal delay carrier.

Functioning: The weapon firing pin strikes the primer igniting the propelling charge. Gases from the burning propellant propels the projectile forward with the velocity required to reach burst altitude. The burning propellant also ignites the 5-second delay element in the base of the projectile. At the end of the delay, the delay element ignites the ejection charge. The ejection charge ignites the candle and blows the candle assembly out through the top of the projectile body. The candle burns for approximately 40-seconds.

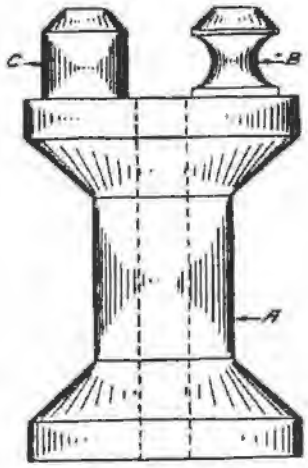
Length ..... 5.272 inches
Weight ..... 0.49 pounds
Propelling charge ..... M9, 330 milligrams
Filler and weight ..... Illum comp:
M583A1 - 93 g
M661 & M662 - 85 g
Color ..... White with Black markings

Reference TM 43-0001-28, Army Ammunition Data Sheets Artillery Ammunition Guns, Howitzers, Mortars, Recoilless Rifles, Grenade Launchers, and Artillery Fuzes, April 1977

V.B. RIFLE GRENADE, MARK I



CROSS SECTION OF V-B. RIFLE GRENADE.



DUMMY V.B.RIFLE GRENADE

Description: The V.B. Rifle Grenade, Mark I is copied from the French V.B. grenade. The grenade is approximately 2½ inches in length by 2 inches in diameter, and weighs, when loaded ready to fire, 17¼ ounces. *The body* (A) is divided on the inside surface into 40 parts by deep grooves in order to insure proper fragmentation. The *central tube* and the *lateral tube* © are expanded into the machined holes of the body, the central tube having its ends beveled on the inside to permit the free passage of the bullet. The *fuze container* (D) is provided with a hole for the primer, a loading hole in the top through which the meal and loose powder are inserted, and a vent opposite the primer. The fuze container carries the primer at its upper end, with the striker projecting obliquely over the end of this bullet tube. When the bullet from the rifle cartridge has passed through the tube it hits the striker and thus fires the primer; from the primer the flash is transmitted to the fuze, which runs longitudinally through the center of the fuze container into the interior of the grenade, and is timed to burn 8 seconds. The fuze in turn fires the detonator attached to its lower end, which bursts the walls of the detonator tube and detonates the main charge. The grenade is fired from a discharger by the gasses behind the bullet from the rifle cartridge, which exerts their pressure on the flat base of the grenade. The normal range is aimed at 45 degrees is about 200 yards.

Dummy V.B. Riffle Grenade The dummy rifle grenade is an iron casting with a hole left through the center to represent the central tube and to allow the bullet to pass through when using the grenade. The filling plug and the top of the fuze container are cast with the body, making the whole grenade one piece. The weight of the dummy, 17¼ ounces. The weight is regulated by cutting out the sides of the body. The dummy rifle grenade is used in the same manner as the loaded grenade.

Reference: No. 1743, Description and instructions for the use of V.B. Rifle Grenade, Mark I, October 25, 1917
No. 1861, Handbook of Ordnance Data, November 15, 1918

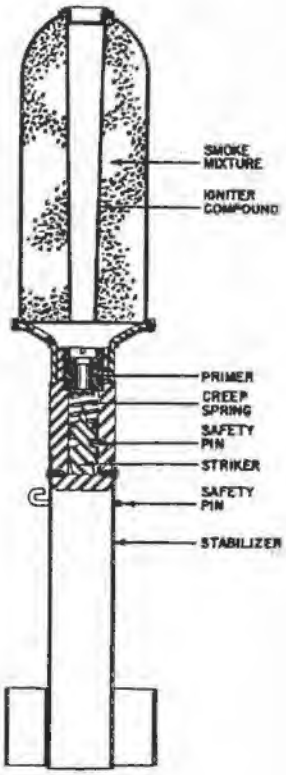
GRENADE, RIFLE PRACTICE, M11A2

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

RIFLE GRENADE, SMOKE, M22

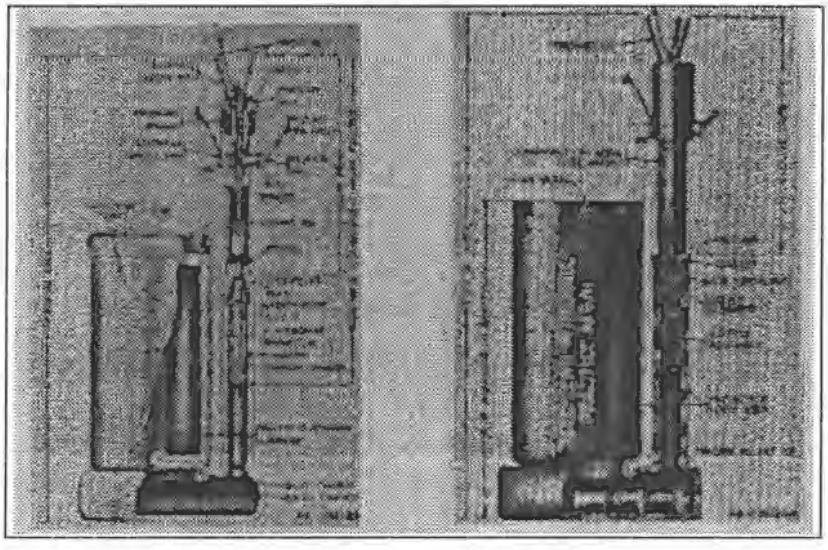


The grenade consists of a body, a stabilizer assembly, and a fin. The body is cylindrical. In an outward appearance, it is similar to the Anti-Tank Grenade M9A1, except that is does not have the joining rib. The nose of the body has a small circular opening which is closed with a light metal cover. The stabilizer contain the Fuze M9A1 Type. The body is filled through the nose. After filling, a tool is inserted longitudinally through this nose opening, and the filling is packed against the sides of the body, leaving a central channel. This channel is coated with an igniting composition. The smoke-emission holes are through the base shoulder of the grenade body.
Four colors were issued: red, green, violet, and yellow.

Length: ..... 10.72 inches
Diameter ..... 2.0 inches
Color ..... Blue Grey
Filler ..... Smoke mixture

Reference: NAVSEA OP 1664, U.S. Explosive Ordnance, May 1947

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.

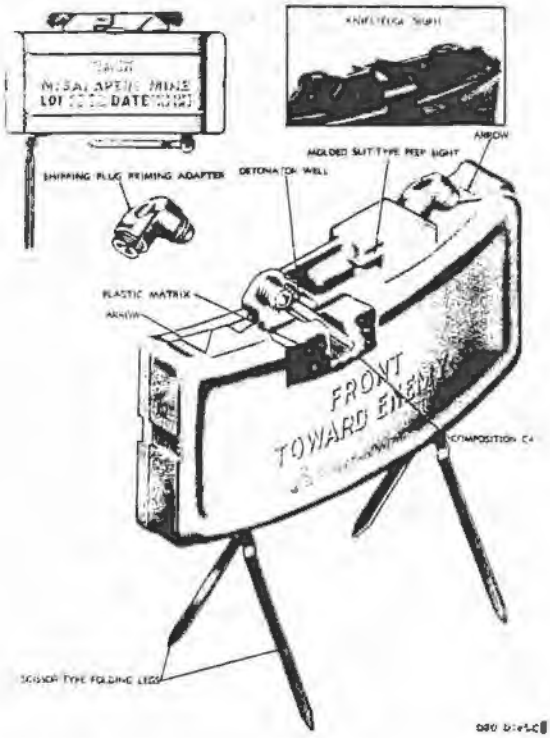
Functioning. Mine M8 with Fuze M10 or M10A1—The fuze firing mechanism is activated by an applied load of 8 to 20 pounds on any of the prongs or by pull of 3 to 10 pounds of the trip wire. The fuze firing train ignites the delay element in the projectile and also propels it about 2 meters into the air. The delay initiates the spotting charge which explodes with a loud report and emits smoke.

Mine M8A1 with Fuze M10A2—The fuze firing mechanism is activates in the e same 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

MINE, ANTIPERSONNEL, M18A1



Use: The M18A1 mine is used when a directional, fixed, fragmentation mine is rewired for the defense of bivouac areas, outposts, and against infiltration tactics. It is also used against thin-skinned vehicles.

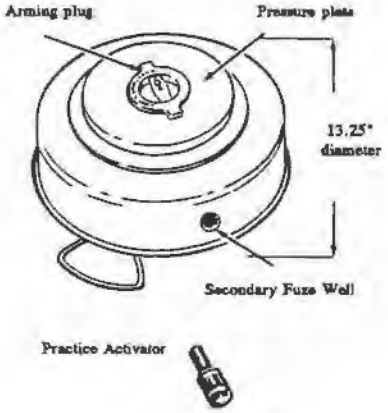
Description: The mine has a curved, rectangular, molded case of fiberglass filled plastic. The front face is lined with steel spheres embedded in a plastic matrix. The back portion of the case, behind the matrix, contains C4 explosive. The fragmentation face is convex, horizontally, to direct the fragments in a 60 degree arc, and concave, vertically, to control the vertical dispersion of the fragments. Two detonator wills located in the top of the mine enable the mine to be fired from two locations. The mine is shipped with the M4 assembly consisting of an M6 electric blasting cap and 30 meters of firing wire, terminating in an electrical connector and shorting plug. The firing device is an M57 hand held pulse generator with an electrical connector and dust cover. The test set M40 is used to visually test the circuit continuity. The bandoleer M7 is constructed to carry one complete set of components.

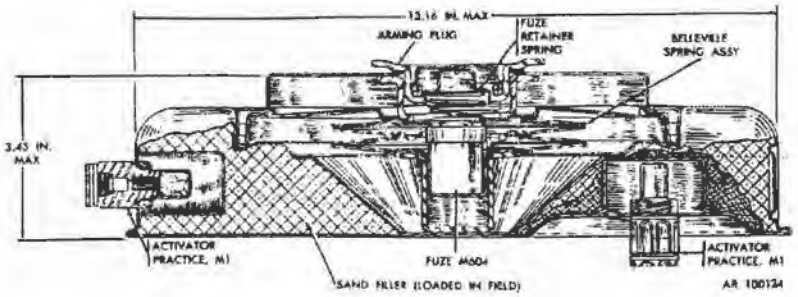
Dimensions

Height	3.25 inches
Width	8.5 inches
Thickness	1.375 inches
Material	Plastic
Filler	C4
Weight of Filler	1.5 pounds
Color	Olive Drab

Reference TM 43-0001-36, Army Ammunition Data Sheets for Landmines, February 1977

MINE, ANTI-TANK, PRACTICE, M12 SERIES





Use: The antitank practice mine M12 (M12A1, M12B1) is used for training personnel in the precautions and proper methods to be observed in the care, handling, laying and arming, booby trapping, and disarming of the high explosive antitank mine M15.

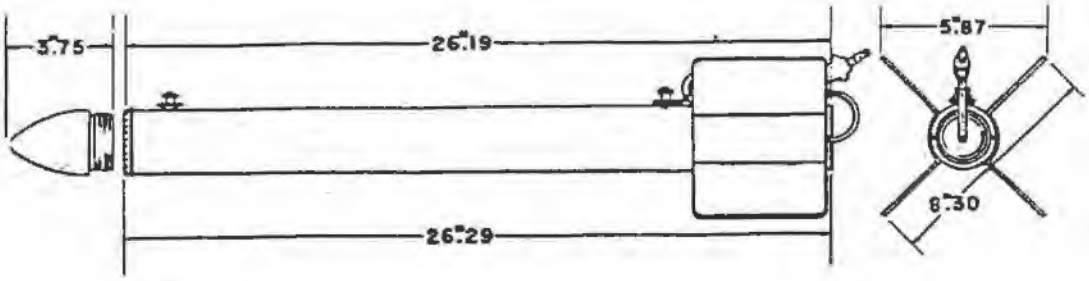
Description: The M12 practice mine is a flat, cylindrical, steel casing externally similar to the high explosive mine M15. The mine is shipped empty, with arming plug M4 assembled over the primary fuze well, but without primary or secondary fuzes. It is loaded with sand and fuzed in the field. The mine is inert, but explosive components will be found in the primary fuze, and if used, in the secondary fuze and activator. The arming plug has a steel shutter which moves from a side position to a center position as the setting knob is moved from SAFE through DANGER to ARMED position. The words are appropriately color coded, green red, red respectively. A wire carrying handle is provided.

Functioning: The mine is activated by a force of 565± 174 ponds on the pressure plate of the mine. This force overcomes both mine and fuze spring systems. Functioning of the practice fuze M604 ignites a smoke charge which emits a cloud of smoke and creates a noise. When booby trapped, the mine may be functioned by a pull or by release of trip wires attached to either of the secondary fuzes. Functioning of the secondary fuzes ignites a small smoke charge in the M1 practice activator.

Height	3.5 inches
Diameter	13.25 inches
Weight	20.0 pounds
Material	Steel
Fuze	M604 practice
Primer	PA #100, 1.62 grs
	Black Powder, 262.3 grs
Color	Blue with White markings

Reference: TM 43-0001-36, Army Ammunition Data Sheets for Land Mines, February 1977

ROCKET, 2.25 INCH PRACTICE



Use. These rockets were used for practice firing against surface targets. The rocket is forward fired from aircraft and simulated the trajectories of the 5 inch rockets.

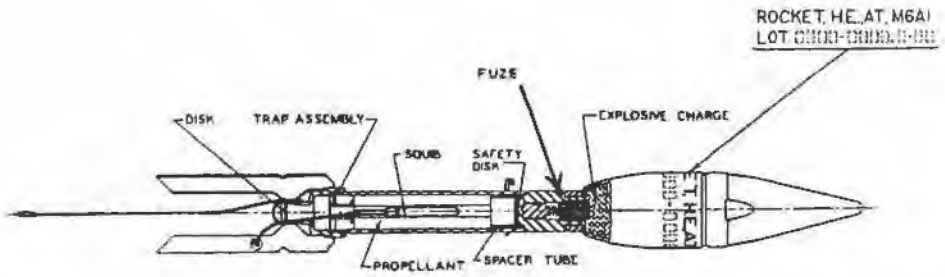
Description. The 2.25 inch practice rockets originally came in two different Marks (Mk) or models, the Mk II and Mk III. The acronym associated with them was SCAR, or sub-caliber aerial rocket. Other models followed. They consisted of a head, rocket motor, fins, igniter, and an electrical cable. The heads are solid steel, zinc die cast, or cast iron and contain no fuzes,

Motor. Mk 15 Mod 0,2, is 26.18 inches long and weighs to 10.90 pounds (max). The item's explosive hazard is the propellant (Mk 16 Mod 0,1) in the rocket motor and the igniter (Mk 112 Mod 0,1,2).

Weight ..... 12.47 pounds
Diameter of Body ..... 2.25 inches
Length ..... 29.07 inches

Reference: NAVSEA OP 1415, Rocket Assemblies, May 1955

ROCKET, 2.36-INCH ANTITANK, M6A1
PRACTICE, M7



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 propellent 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 lustreless olive drab and stenciled in yellow.

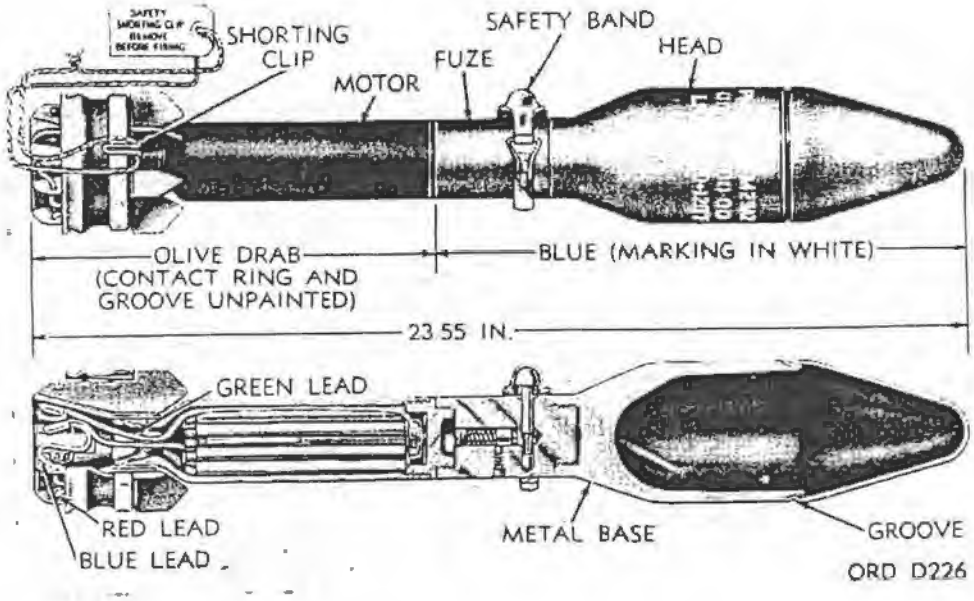
Practice Rocket, M7A1 is similar to the service round in shape, size, and weight. However, it is provided with only a propellent charge, the head is inert and no fuze is provided. The end of the stabilizer tube is extended to counter-weight the head and make ballistics similar. A safety pin passes through the stabilizer to simulate realism during training. The rocket is painted black and stenciled in white.

Over-all Length: .....21.6 inches
Diameter (body): .....2.23 inches
Total Weight: .....3.5 pounds
Filler: .....Pentolite
Propellent: .....ballistite
Fuze: M400
Painting and markings: .....M6A1- olive drab w/ yellow markings

M7A1- black w/ white markings

Reference: TM 9-1904, Ammunition Inspection Guide, March 1944
OS 9-69, Ordnance School Text, Rockets & Launchers, February 1944

ROCKET, PRACTICE, 3.5-INCH, M29

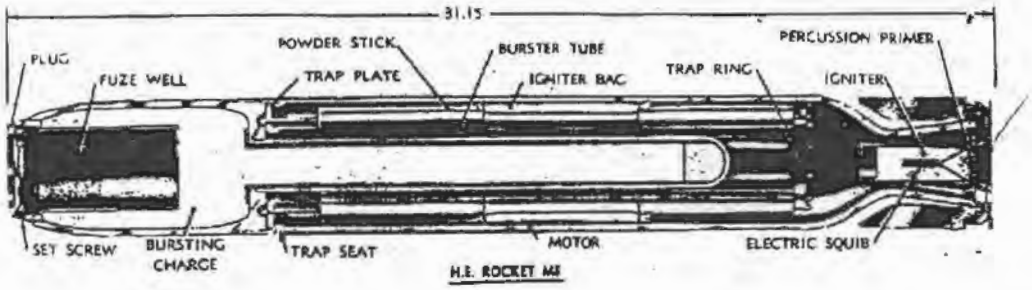


Description: This rocket generally is similar to the M28 High-explosive rocket except that it is provided with an inert bursting charge and the inert dummy fuze M405. The head is of light steel construction. It is cylindrical in shape, 3.5 inches in diameter, with a conically shaped ogive, and tapers 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

ROCKET, HE 4.5 INCH, M8



This type of rocket is cylindrical except for the ogival nose and nozzle constriction at the tail. It is issued as unfuzed complete rounds.

Head. The head consists of a shell body and a burster tube . The burster tube extends about 15 inches from the base of the shell body into the motor. In addition to increasing the explosive capacity of the head, the burster tube has the advantage of using the motor as a n additional source of fragments. The bursting charge consists of 4.3 lb. Cast TNT.

Fuze. The standard impacct fuze for the service rocket is point-detonating rocket fuze M4A2 with auxiliary booster M1A1.

Motor. The basic components of the motor are the motor tube, propellant, the propellant support, and the igniter with electric squib and leads, nozzle closure, and nozzle and fin assembly.

Over-all length ..... 31.15 inch
Diameter ..... 4.5 inch
Weight ..... 38.1 pound
Filler ..... Cast TNT
Filler weight ..... 4.3 pounds
Propellant ..... Double-base powder
Propellant weight ..... 4.65 pounds
Igniter ..... Squib

Reference: TM 9-1950, Rockets, July 1945

SMALL-ARMS AMMUNITION

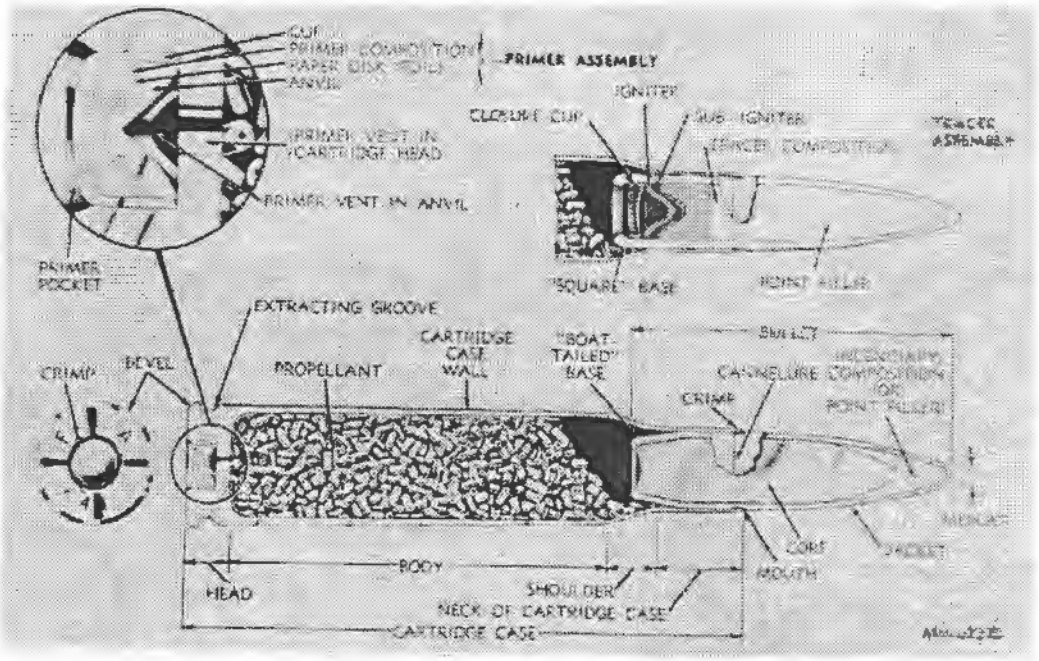


Figure 1. Typical cartridge (sectional)

1. 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.

2. 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.

a. 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 and aluminum is used for military-type .410 gage shotshell bodies. Configurations of cartridges and bullets are illustrated in figures 2 through 11.

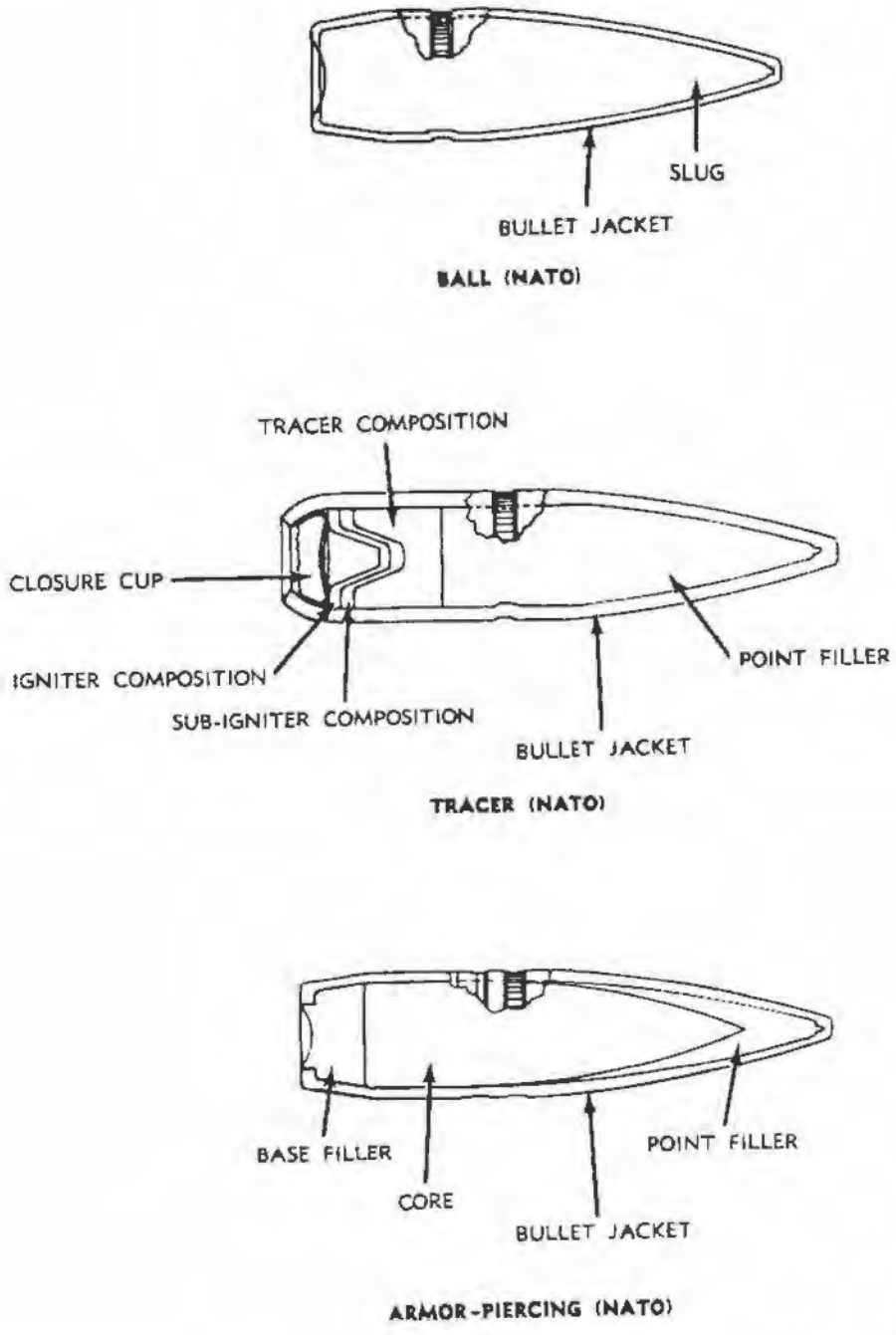
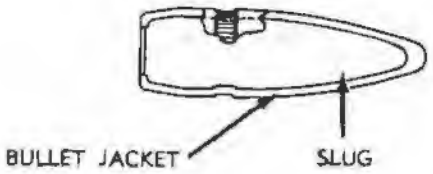
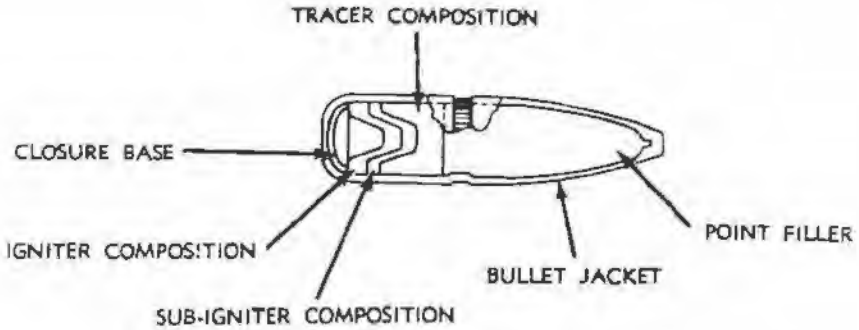


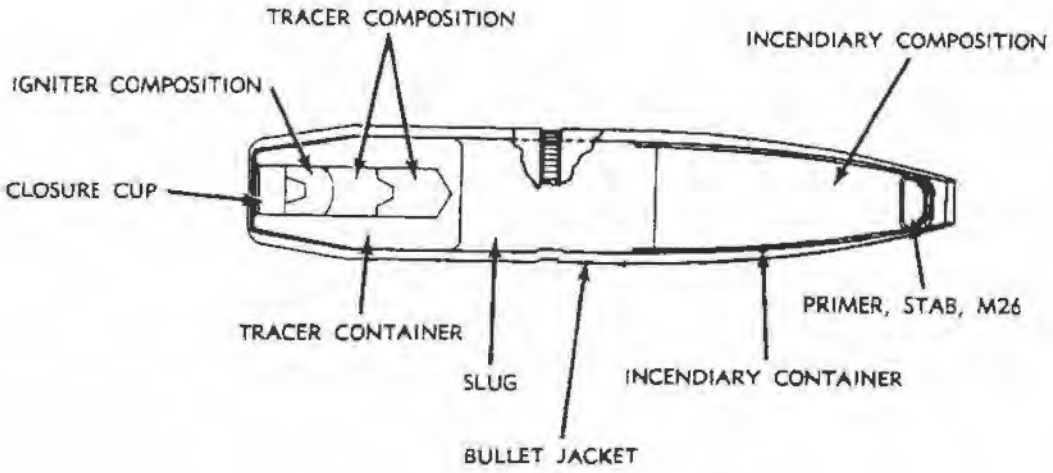
Figure 2. 7.62 MM bullets (sectional)



5.56 MM BALL



5.56 MM TRACER



CALIBER .50, SPOTTER TRACER

MU-D 2234

Figure 3. 5.56MM and caliber .50 spotter tracer bullets (sectioned).

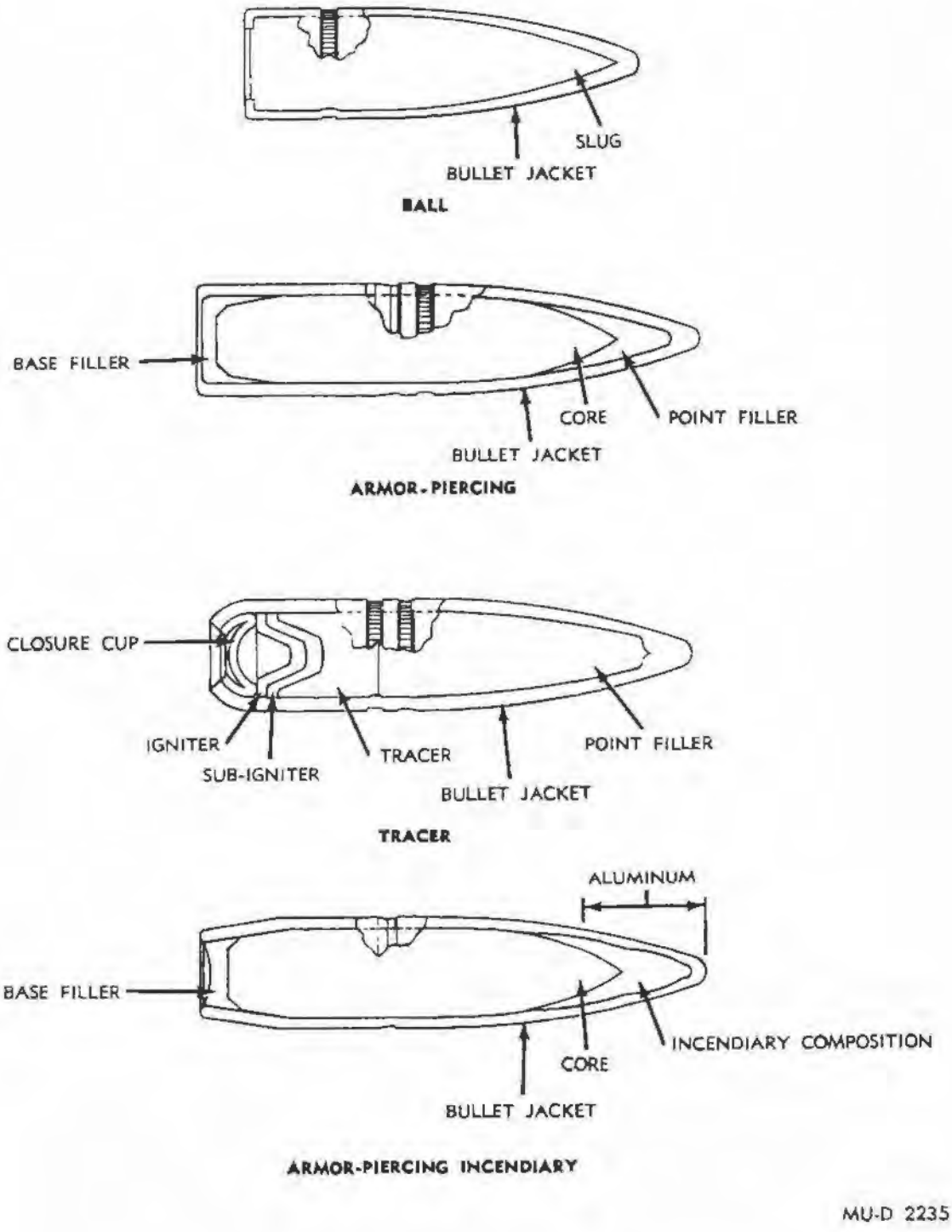


Figure 4. Caliber .30 bullets (sectional).

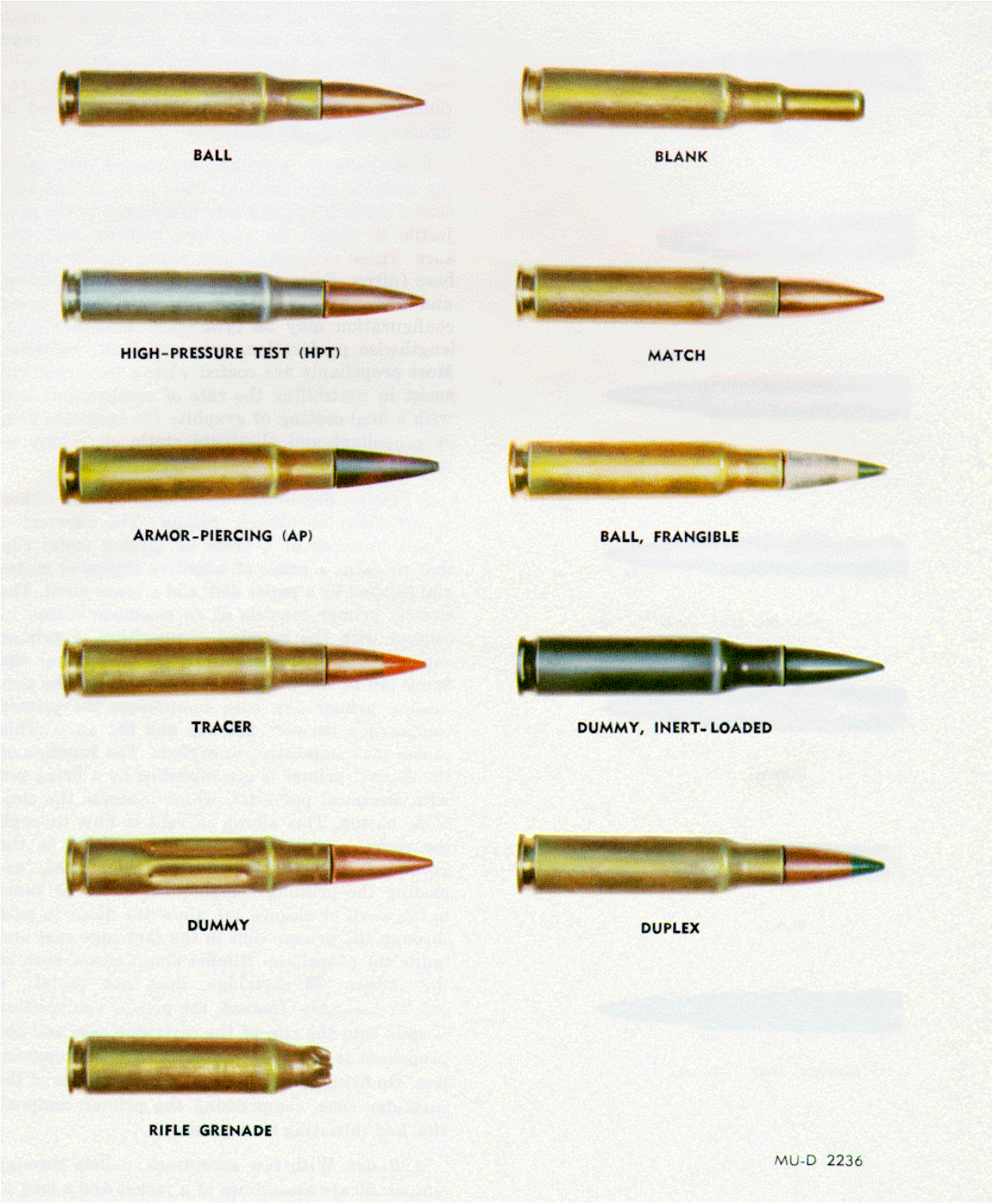


Figure 5. 7.62MM cartridges

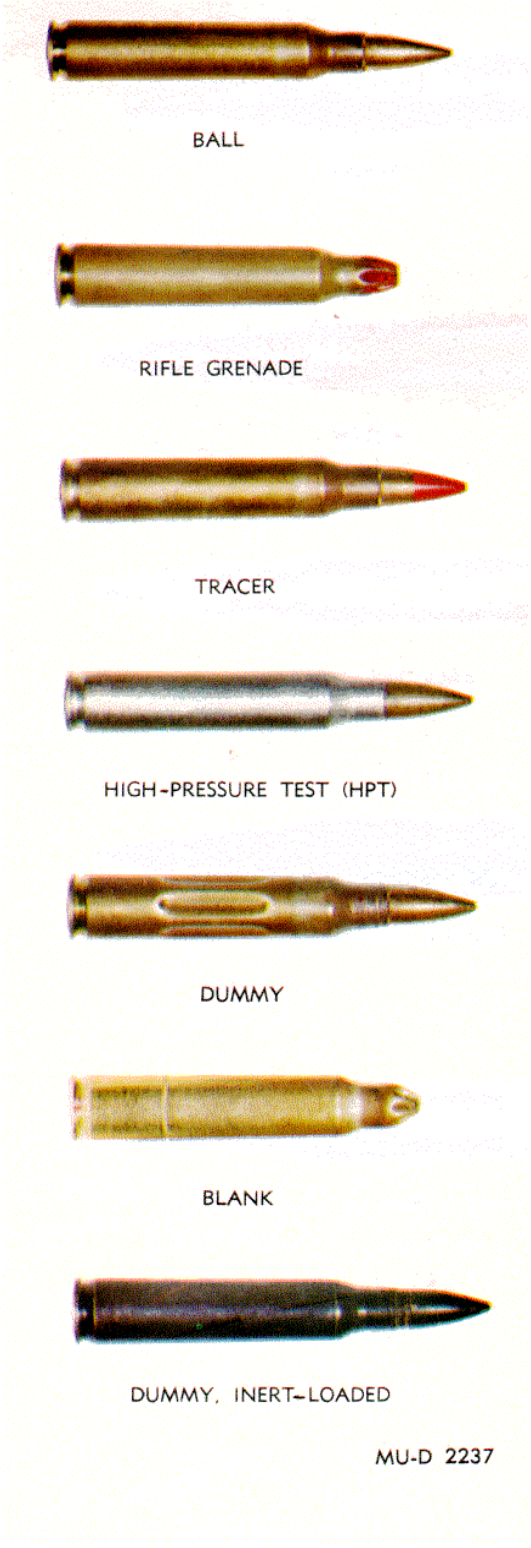


Figure 6. 5.56mm cartridges

b. 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).

c. 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.

d. Bullet With few exceptions, bullets through caliber .50 are assemblies of a jacket and a lead or

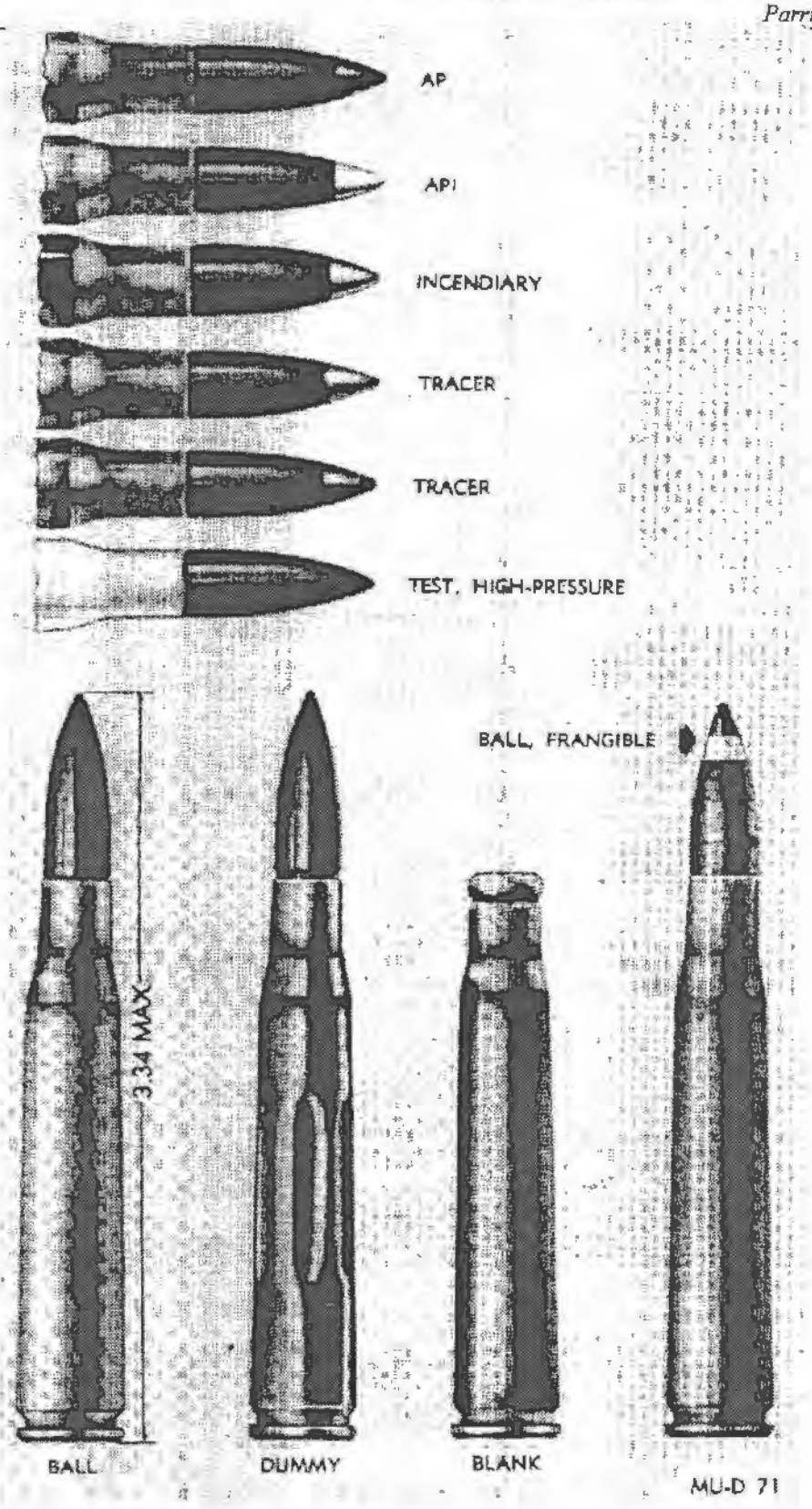


Figure 7. Caliber .30 cartridges

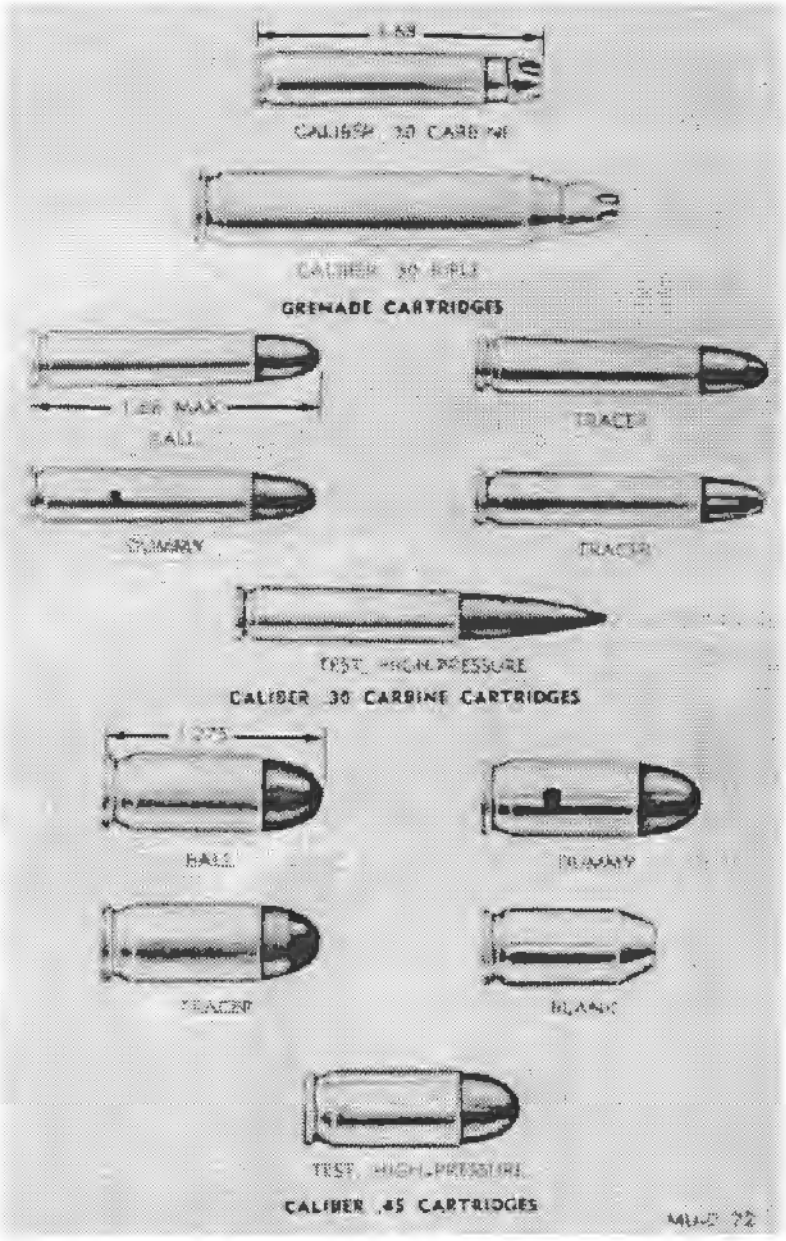


Figure 8. Caliber .30 carbine and caliber .45 cartridges

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

e. Projectile All 20mm and 30mm projectiles are assemblies of a steel shell containing a brass rotating band and a point-detonating nose fuze or an aluminum, steel or plastic nose plug

Figure 9. Caliber .50 cartridges

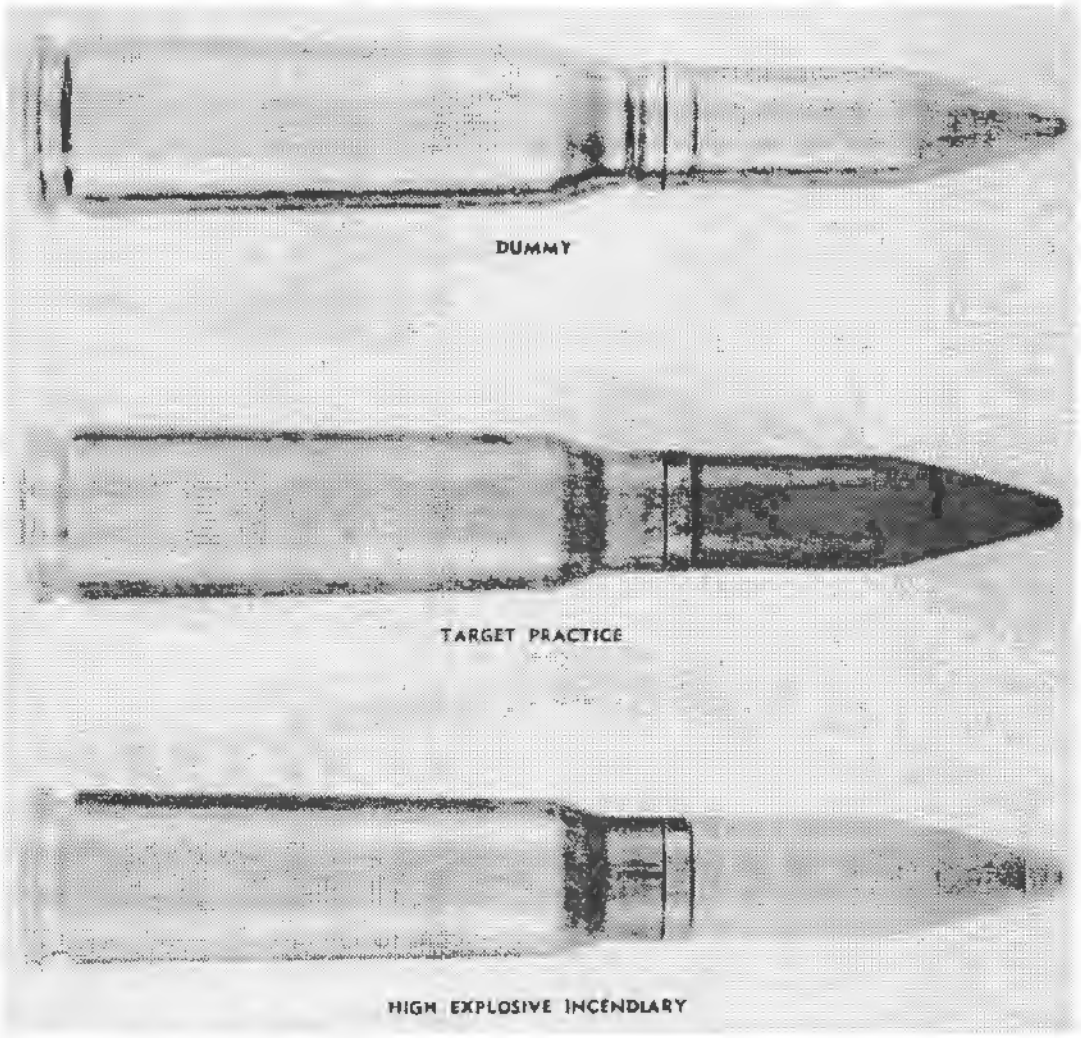


Figure 10. 20MM cartridges

3. 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 .60 ball bullet and 7.62-mm, Ball M59 bullet contain soft steel cores.

4. 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.

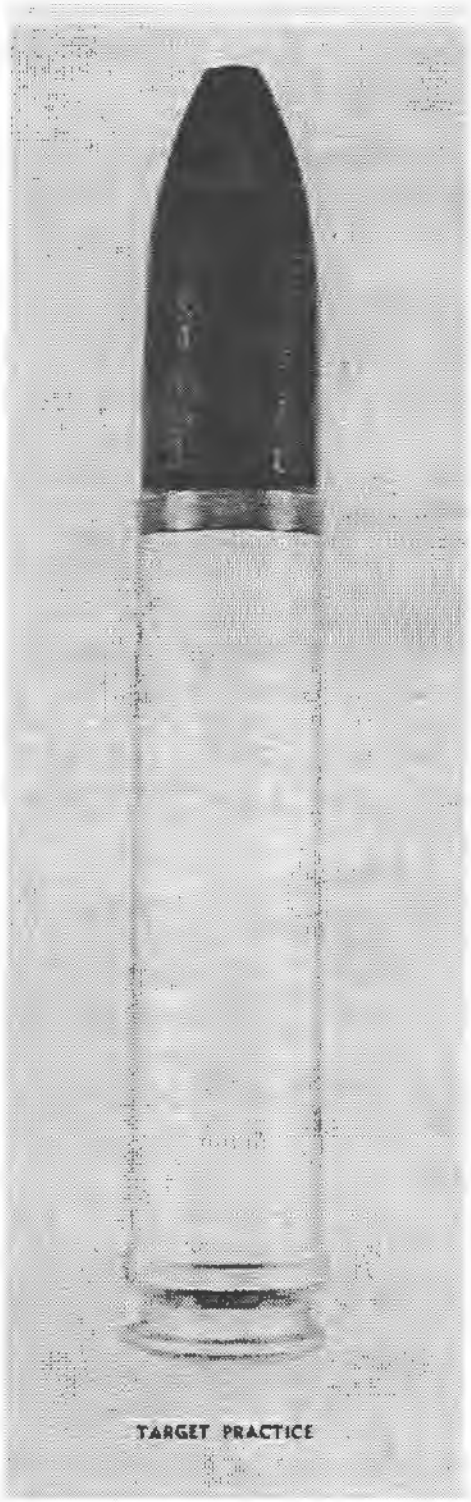


Figure 11. Typical 30mm cartridge

5. 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.

6. 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.

7. 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.

8. 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.

9. 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

10. 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.

11. 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.

12. 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.

13. 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

14. 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

15. High-Explosive-Incendiary Cartridge The 20mm high-explosive-incendiary cartridge is a combat round used on aircraft and ground vehicles. It contains a projectile consisting of a steel body and point-detonating fuze. The steel body contains a high-explosive incendiary mixture which is detonated on impact as the fuze strikes the target. The fuze, a high-precision device, arms shortly after leaving the muzzle of the weapon. On impact, the fuze releases a small firing pin which sets off the charge in the fuze and detonates the HEI

16. Target-Practice Tracer Cartridge The 20mm target-practice-tracer cartridge contains a target-practice projectile with a tracer cavity. The cavity, filled with pyrotechnic composition, is in the rear of the body. This cartridge is generally linked with the target-practice cartridge in a ratio of 1 to 7.

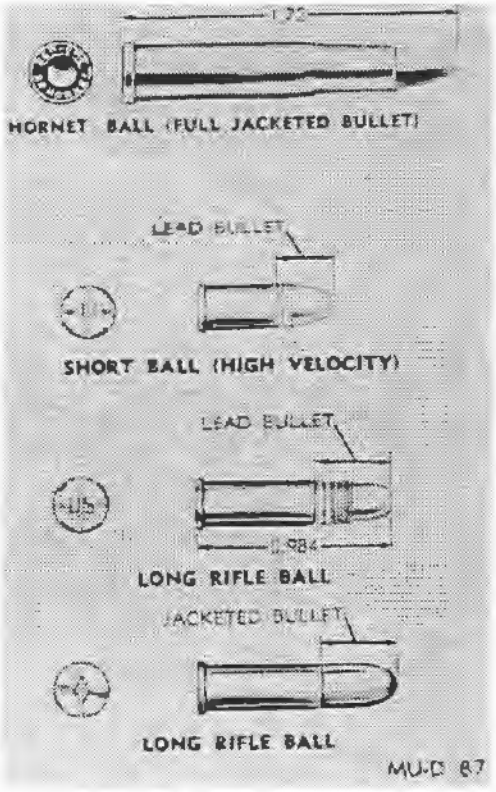


Figure 12. Caliber .22 cartridges

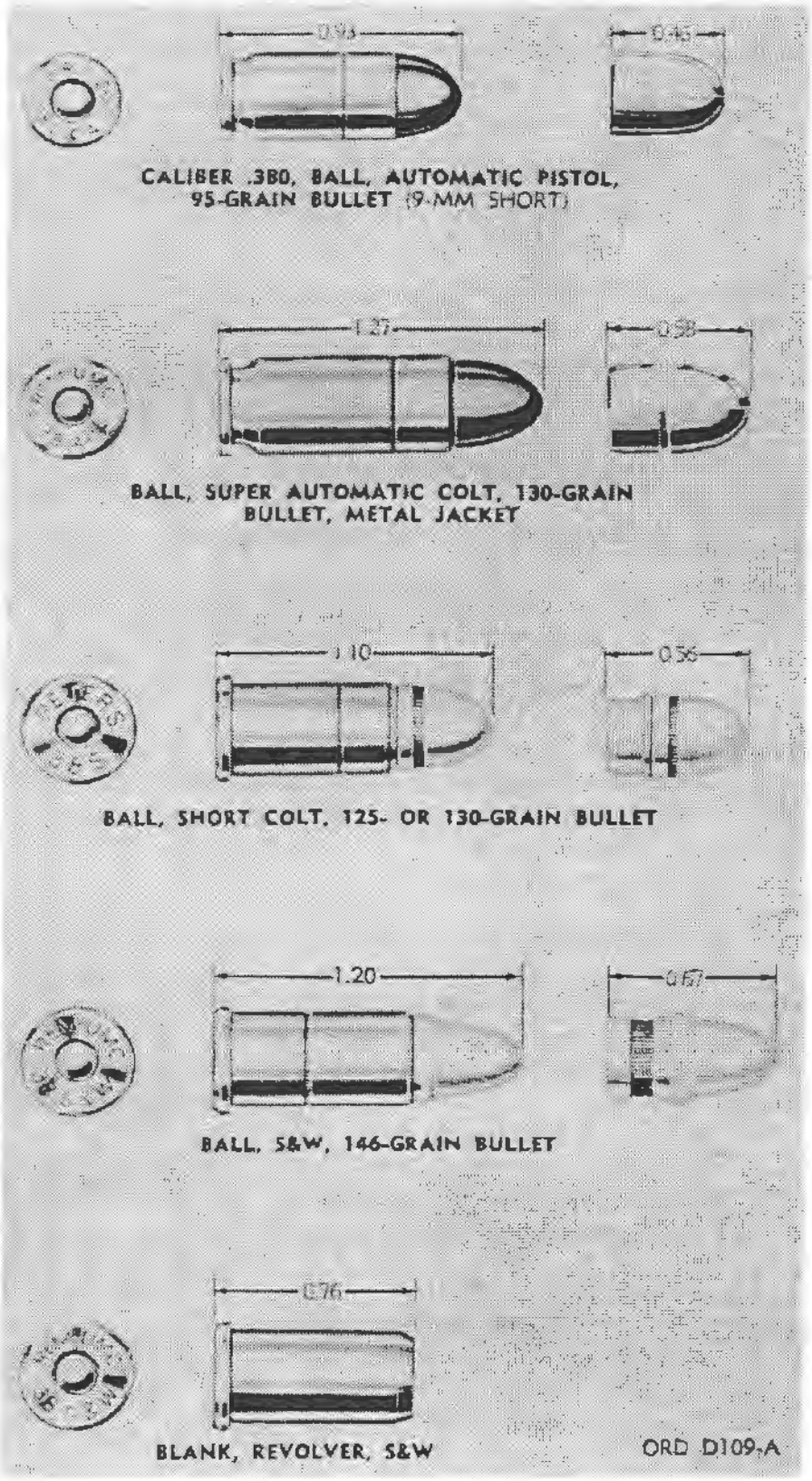


Figure 13. Caliber .38 cartridges.

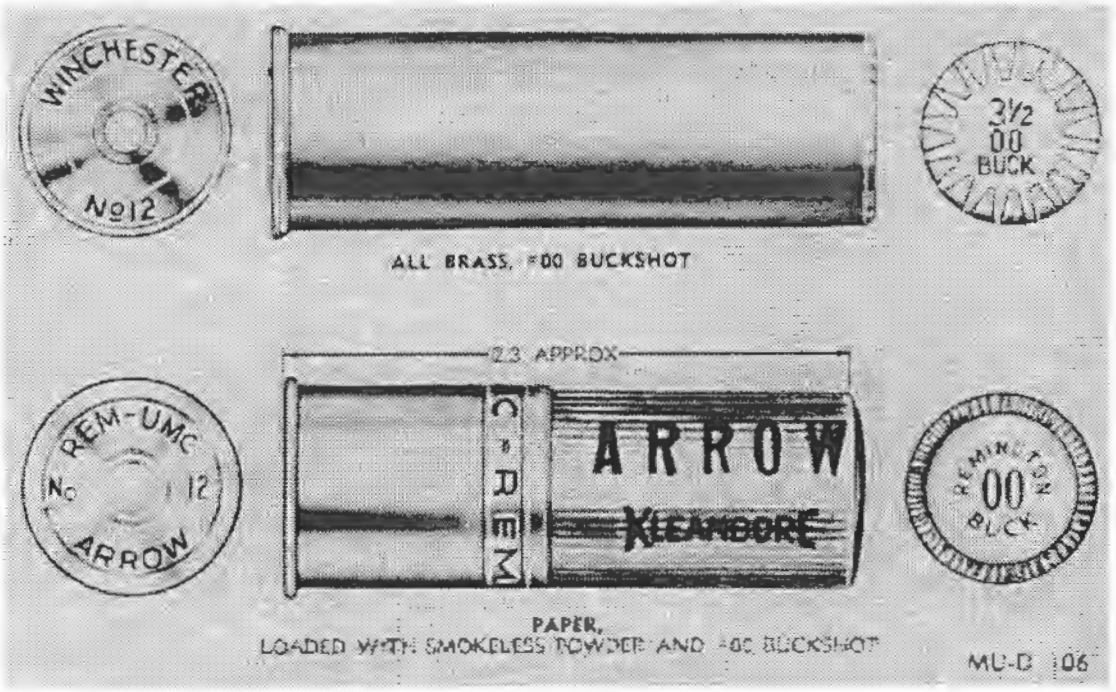


Figure 14. 12 gage shotgun shells.

17. Target-Practice Cartridge The 20mm target-practice cartridge is the conventional steel shell with steel nose plug. It is used primarily for training purposes. This is not a combat cartridge; hence, no fuze is used in the assembly.

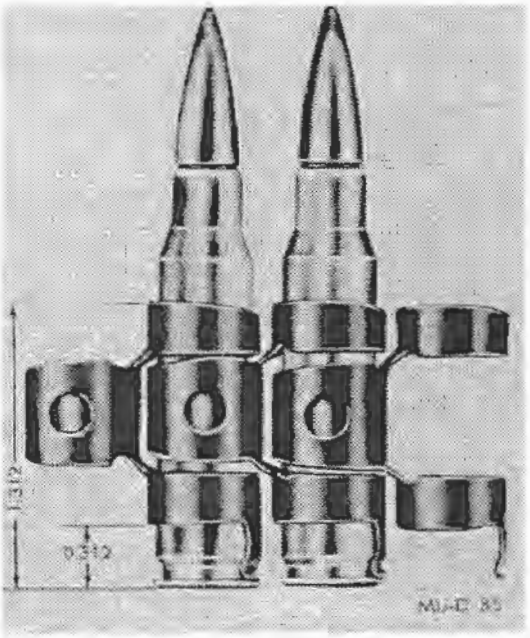


Figure 15. Linked 7.62-mm cartridge

18. Special Purpose Cartridge

a. Cartridges of various calibers (fig. 12 through 14), 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

(5) Shotshells containing the designated shot sizes as required for the following:

(a) 12 gage #00 Buck for guard duty

(b) 12 gage #4 Buck for guerrilla purposes.

(c) 12 gage #6, 7½ and 8 shot for clay target shooting for training purposes.

(d) .410 gage #7 shot for caliber .22/.410 survival weapons maintained by aircraft.

b. 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.

19. Metallic Links and Clips

a. Metallic links (fig. 15 and 16) 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.

b. Different configurations of cartridge clips 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

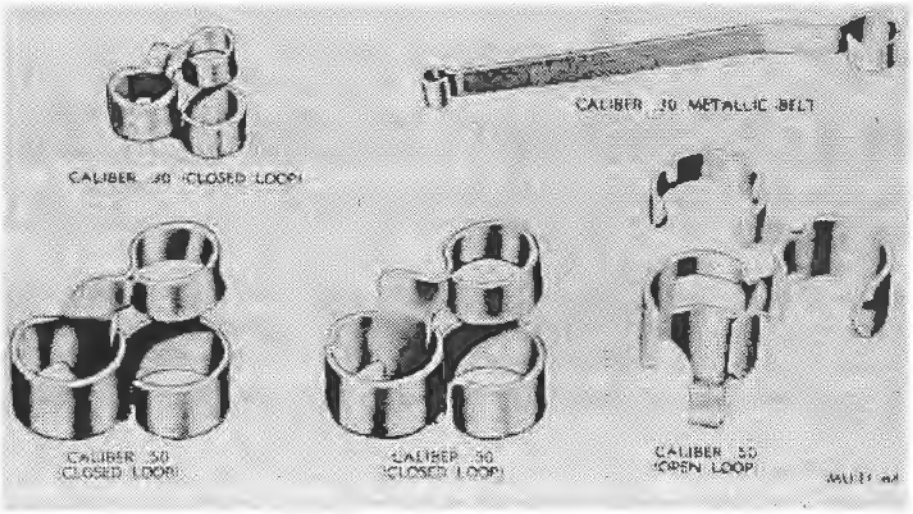


Figure 16. Links for caliber .30 and caliber .50 ammunition

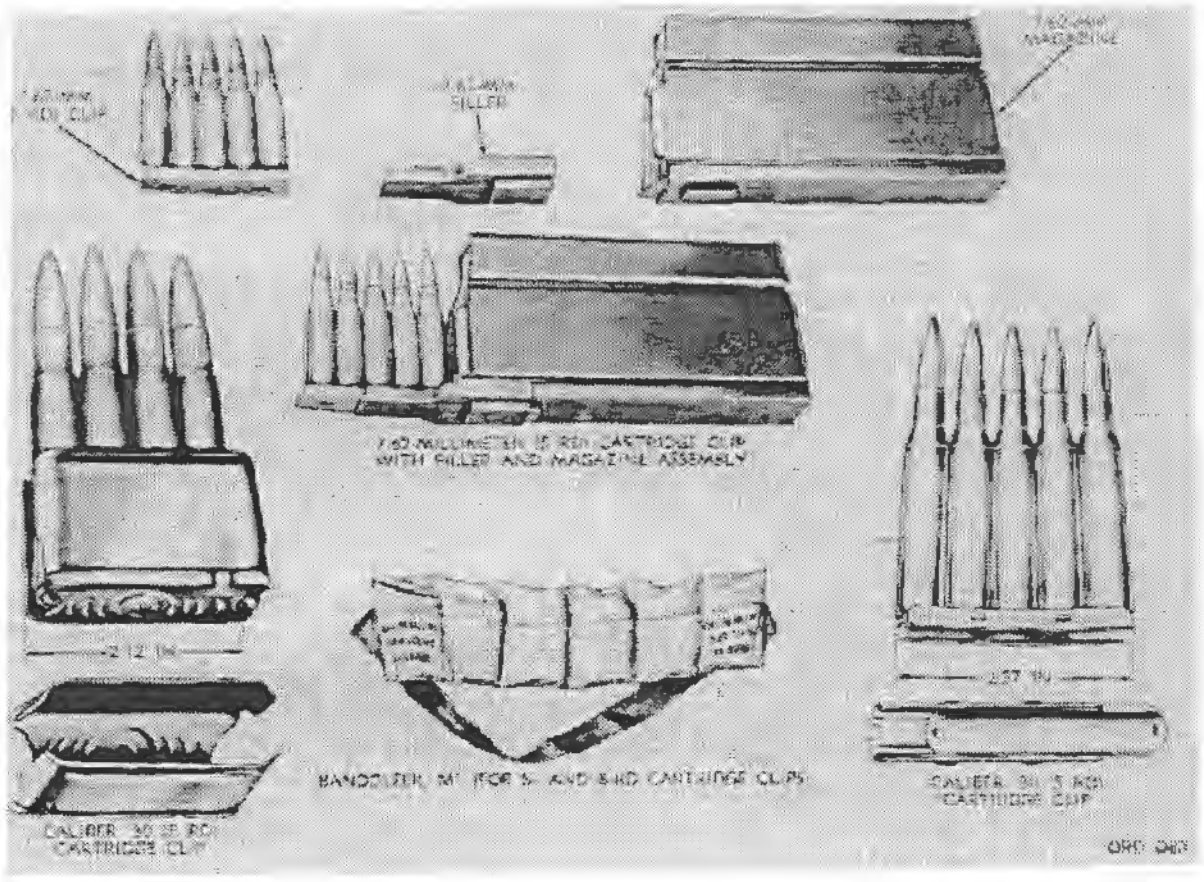


Figure 17. Cartridges in 20-round cartons in ammunition box

20. Packing and Identification Marking

a. Packing Containers and methods for packing military small-arms ammunition are specified in drawings, specifications or, as required, in the procurement contract. Military containers presently being manufactured have been limited to a few standard types designed to withstand all conditions commonly encountered in handling, storage and transportation of ammunition. Military cartridges, except 20mm, are packed in metallic ammunition boxes, over- packed in wooden wire-bound crates. Twenty millimeter cartridges are packed in ammunition boxes only. When commercial cartridges are not packed in a military pack, they are packed in accordance with standard commercial practices.

b. 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 17 and 18.

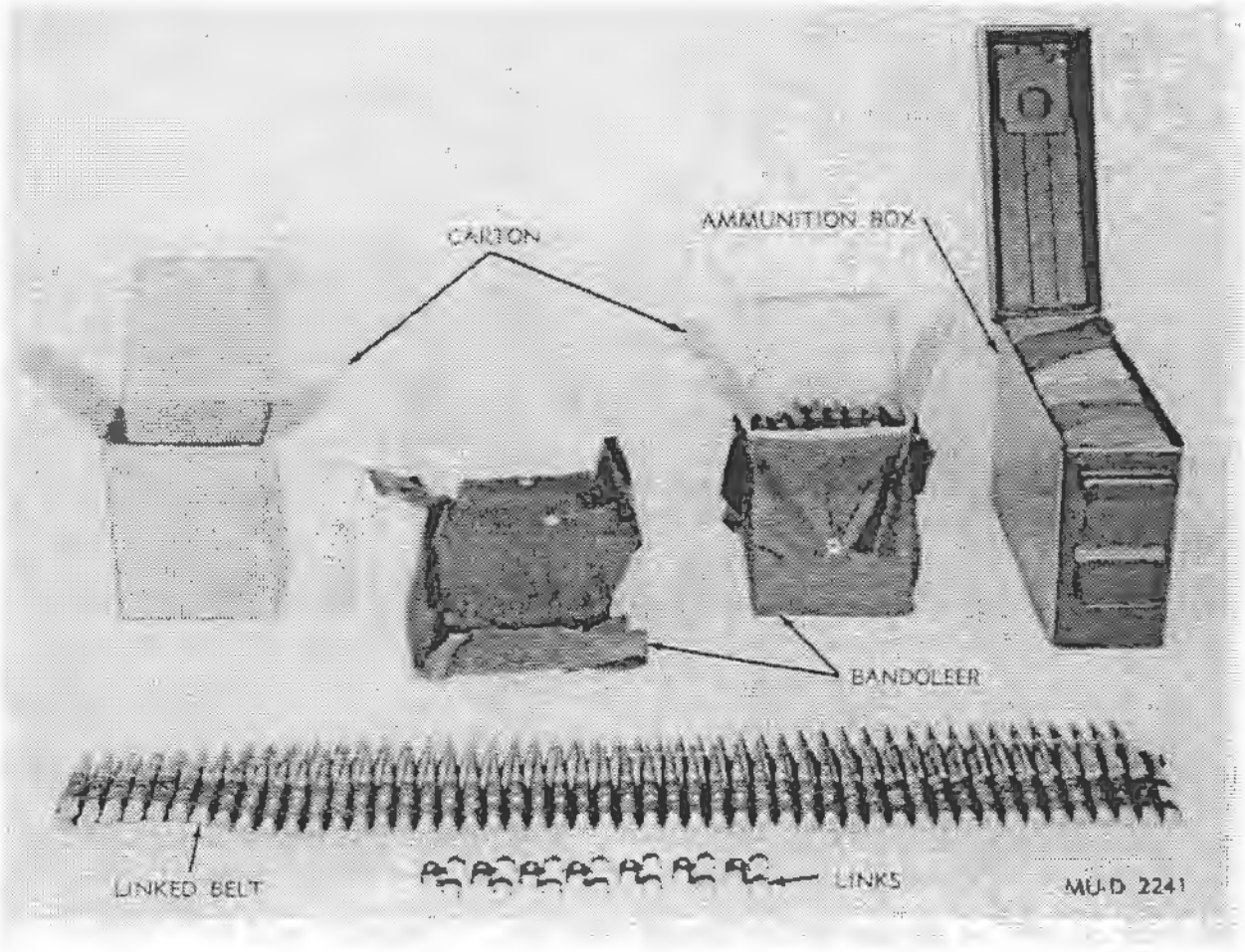


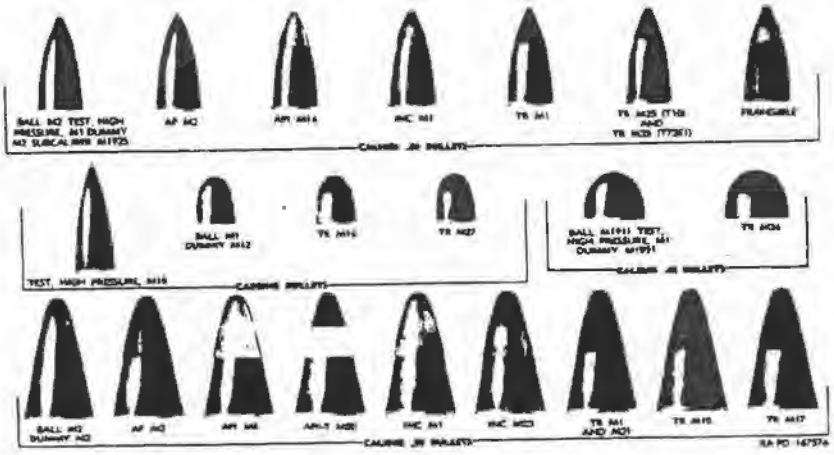
Figure 18. Cartridges, link belt, cartons, bandoleers and ammunition box.

21. 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*

SMALL ARMS, GENERAL



Identification of bullets of small arm cartridges

Use: Cal, .50 machine guns, Cal, .30, carbines, rifles, semiautomatic rifles, automatic rifles, and machine guns, Cal, .22 pistols, rifles, and machine guns (for gallery practice), Shotguns, 12-gage, Cal, .45 automatic pistols, revolvers, and submachine guns. Subcaliber tubes and adapters for artillery weapons which use ammunition of similar size and type.

Description: A complete round of small-arms ammunition is known as a cartridge, and is made up of the following components:

Bullet: The bullet in general is cylindrical. The nose may be round, as in the cal, .50 bullet, or ogival as in all service rifles and machine gun bullets. The base may be square or boat- tailed. Types are identified by the color of the tip and include the following:

- Armor-piercing bullets contain a core of hardened steel.
- Ball usually contain a slug of antimony hardened lead except in the case of the cal, .50, wherein the outer core is of soft steel.
- Tracer contains a lead slug, and a chemical composition in the rear.
- Incendiary bullets contain an incendiary composition.

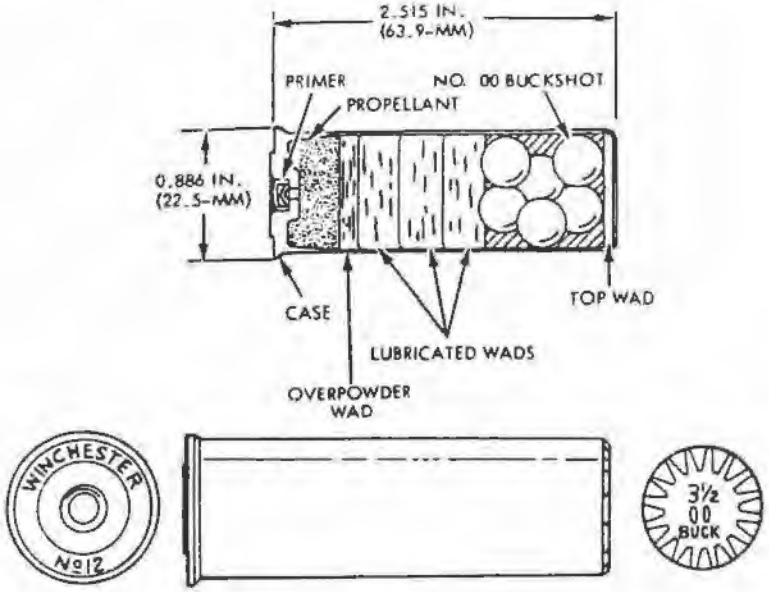
Cartridge case: The cartridge case is the means whereby the other components are assembled into the unit. It also provides a waterproof container for the propelling charge.

Primer: Percussion

Propelling charge: The propelling charge consists of a quantity of smokeless powder. The weight of the charge is not constant. It is adjusted for each powder lot to give the required velocity with pressure within the limits prescribed for the weapon in which it is fired.

Reference: TM 9-1904, Ammunition Inspection Guide, dated 2 March 1944
TM 9-1900, Ammunition General, dated June 1956

SHELL, SHOTGUN, 12 GAGE



General. Shotgun shells are procured by the Ordnance Department from several manufacturers for use in 12-gage sporting and riot-type shotguns. They are intended for guard or combat use and for hunting or trap shooting.

Visual identification Shells for guard and combat use have a brass head extending at least 1-inch along the case. Shells for sporting use have a head extending only 1/2 inch along the case

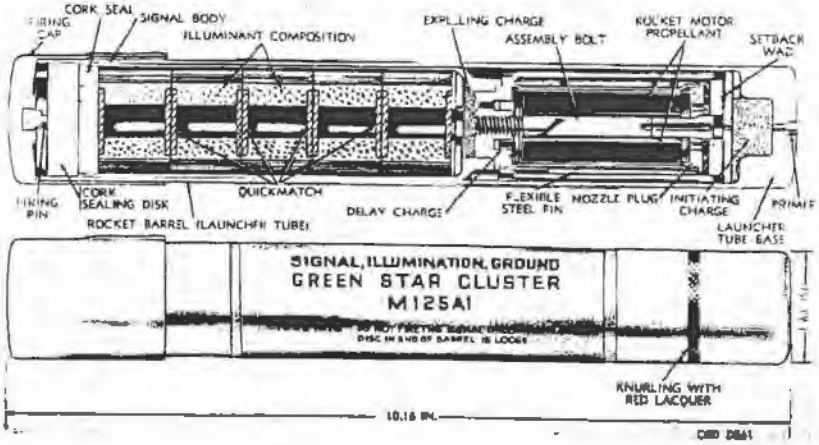
Components. The consists of a case, a primer, several wads, a propelling charge, and a load of lead shot. The case consists of a brass head and a paper or plastic (more recent issue) case or shell body. In guard or combat shells, the head extends a distance of 1 inch along the case. (In some shells, the entire case is of brass.) In sporting shells, the head extends 1/2 inch or less. Tbe head is reinforced by a base of compressed paper in which the primer pocket is formed. Some paper shells have steel reinforcement, called the lining, under the brass head. The shell body is made of paper and waterproofed. The head is attached to the shell body by crimping. The primer is a commercial type suitable for ignition of the smokeless powder used. The size of the leadshot for each type is as follows:

Guard or combat.....	No. 00 buckshot
	No. 4 chilled shot
Sporting	No. 71/2 chilled shot
	No. 9 chilled shot

Length: .....2.515 inch
Weight: .....930 grains
Propellant: .....Smokeless Powder (26 grains)
Primer: .....Percussion

Reference: TM9-1904, Ammunition Inspection Guide, March 1944

SIGNALS, ILLUMINATION, GROUND, STAR CLUSTERS, GREEN, M125A1; RED, M158; WHITE, M159



Use: Hand held rocket launching mechanism. For day or night signalling.

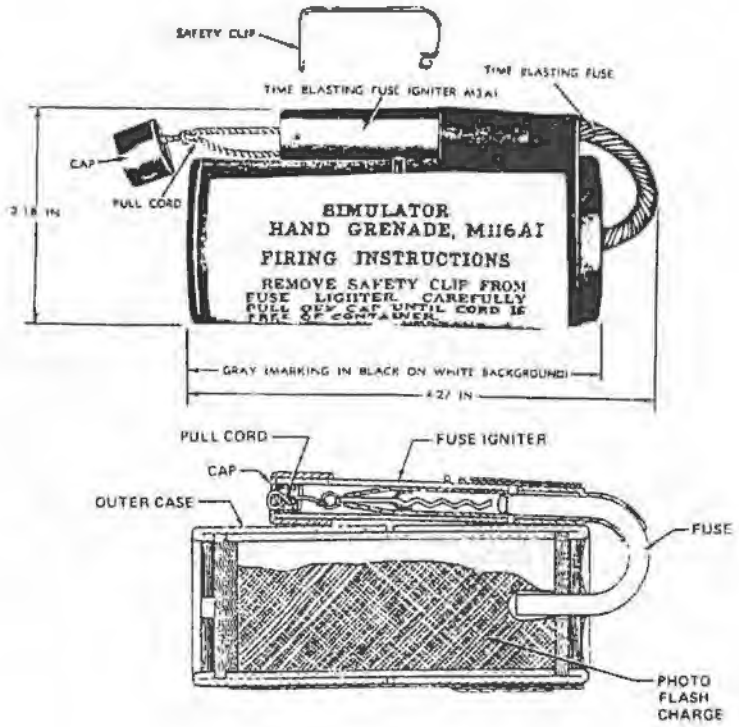
Description: Star cluster signals consist of five-star illumination assemblies and a rocket motor propulsion assembly contained in a hand-held aluminum launching tube. The base of the launching tube contains a primer and an initiating charge. As shipped, the firing pin cap is assembled to the forward end and must be reversed for firing. Stabilizing fins on the tail assembly of rocket are folded parallel to the axis of the signal. A bolt, which also transfers the initiating charge flash to the propellant, extends into the center of the solid propellant which fills the propulsion assembly. The illumination assembly is mounted on top of the propulsion with a delay assembly and an expelling charge between. A label specifying firing procedures is secured to the body of the signal.

Functioning: Striking the primer with the firing pin fires the initiating charge to ignite the rocket propellant. As the rocket emerges from the launching tube, the fins extend for flight stability. Before rocket motor burnout the black powder expelling charge is ignited performing the two fold function of expelling and igniting the 5-star illuminant assemblies.

Length	10.16 inches
Diameter (body)	1.67 inches
Weight	1.3 pounds
Pyrotechnic charge	Illuminant composition 2.5 to 3.75 oz
Initiating charge	Black powder, 0.725 grams
Expelling charge	Black powder, 0.75 grams
Propelling charge	91% Black powder, 9% calcium carbonate, 39.0 grams
Color	White label with black markings Each signal has a cork seal the color of the signal

Reference TM 43-0001-37, Army Ammunition Data Sheets Military Pyrotechnics, April 1977

SIMULATOR, HAND GRENADE, M116A1



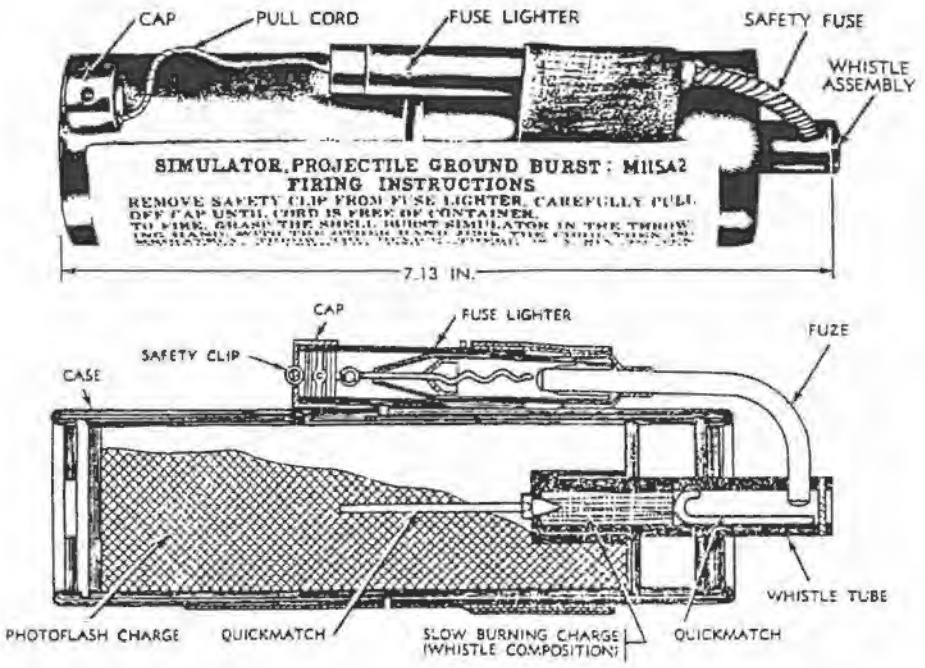
General: This simulator is used to provide battle noises and effects during troop maneuvers. This simulator is ignited by the action of a time blasting fuse igniter (fuse lighter) M3A1 and is thrown like a hand grenade. The time blasting fuse (safety fuse) burns for 5 to 10 seconds after ignition, followed by a flash and accompanying loud report.

Description: The body of the hand grenade simulator consists of a cylindrical paper tube (closed at both ends), containing one and one quarter ounces of photoflash powder. The simulator body is 1.6 inches in diameter (2.18 inches across time blasting fuse igniter) and 3.75 inches long (4.27 inches with time blasting fuse). A length of time blasting fuse extends from the center of one end of the body and, after a 180° bend, is inserted into time blasting fuse igniter M3A1 taped to the side of the simulator. The time blasting fuse igniter contains a double pull coed, a ripple wire coated with a phosphorous friction composition, a small metal cup filled with ignition composition. There is a cellulose nitrate coating on the phosphorous coating and on the ignition composition. The sealing cap is held in place during shipment and handling by a spring type wire safety clip.

M116 Simulator: This simulator is similar to the M116A1, except that the time blasting fuse igniter M3, which has a single pull cord and no cellulose nitrate coating on the phosphorous coated friction wire and ignition composition, is used in place of the time blasting fuse igniter M3A1.

Reference: TM 43-0001-37, Military Pyrotechnics, February 1977
TM 91370-200, Military Pyrotechnics, September 1966

SIMULATOR, PROJECTILE, GROUND BURST, M115A2

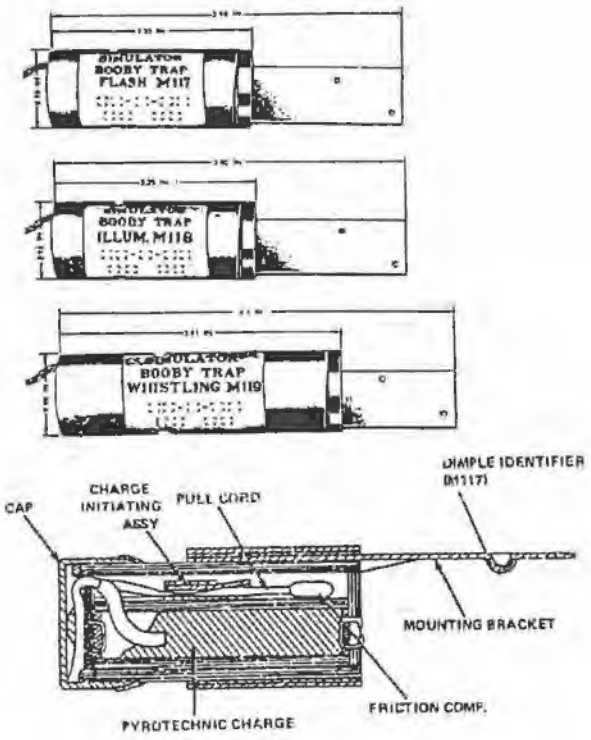


General: This simulator is a pyrotechnic device used to provide battle noises and effects during troop maneuvers. The simulator is ignited by the action of time blasting fuse igniter M3A1. Following a delay of 6 to 10 seconds after ignition, the simulator produces a high pitch whistle which lasts two to four seconds. After a fraction of a second, the simulator explodes, producing a flash and loud report.

Description: The body of the simulator consists of a cylindrical paper tube (closed at both ends) containing approximately 2 ounces of photoflash powder and whistle assembly which extends from one end of the tube. The simulator is 2.38 inches in diameter (including fuse lighter) and 7.13 inches long. The whistle assembly is a paper tube containing a pressed, slow burning powder charge, (2.0 grams). Extending from the side of this assembly is a length of safety fuse which, after a 90° bend, is inserted in a fuse lighter M3A1 taped to the side of the simulator. The fuse lighter contains a double pull cord and a cellulose nitrate coating on the phosphorous-coated friction wire and ignition composition.

Reference: TM 43-0001-37, Military Pyrotechnics, February 1977
TM 9-1370-200, Military Pyrotechnics, September 1966

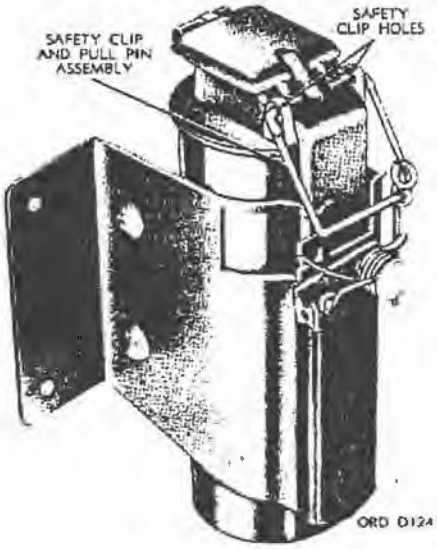
SIMULATOR, BOOBYTRAP, FLASH, M117; ILLUMINATING, M118; WHISTLING, M119

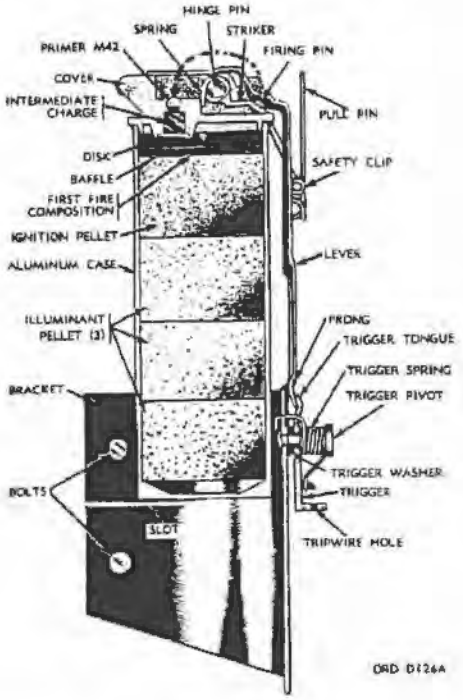


Description: The flash simulator M117 consists of a cylindrical outer tube (kraft paper) and a flat, metal nailing bracket which extends from one end of the tube. The body is 0.98 inch in diameter and, without nailing bracket, 2.25 inches long. The nailing bracket increases the length to 3.90 inches. Located within the outer tube is a charge initiating assembly and an inner tube containing a pyrotechnic charge. The assembly used for initiating the charge is located in the space between the inner and outer tubes. This assembly consists of a strip of paper coated with a friction-sensitive composition and folded into a pad so that the coated surfaces are face to face. The pad is attached to the inner tube. Over the top of the pad is a strip of felt held in place, under light pressure, by adhesive tape wrapped around the inner tube. A length of pull cord runs between the coated surfaces of the pad. One end of the pull cord is covered with friction composition; the other end is coiled and placed in the end of the body opposite the nailing bracket. A paper cap, held on by a strip of tape, covers this end of the simulator.

M117	Flash composition, (0.09 ounces)
M118	Illumination composition, (0.18 ounces)
M119	Whistle composition, (0.12 ounces)
Reference:	TM 43-0001-37, Military Pyrotechnics, February 1977
	TM 9-1370-200, Military Pyrotechnics, September 1966

SURFACE TRIP FLARE, M49A1





Use: To give warning of infiltrating troops by illuminating the field of the advancing enemy.

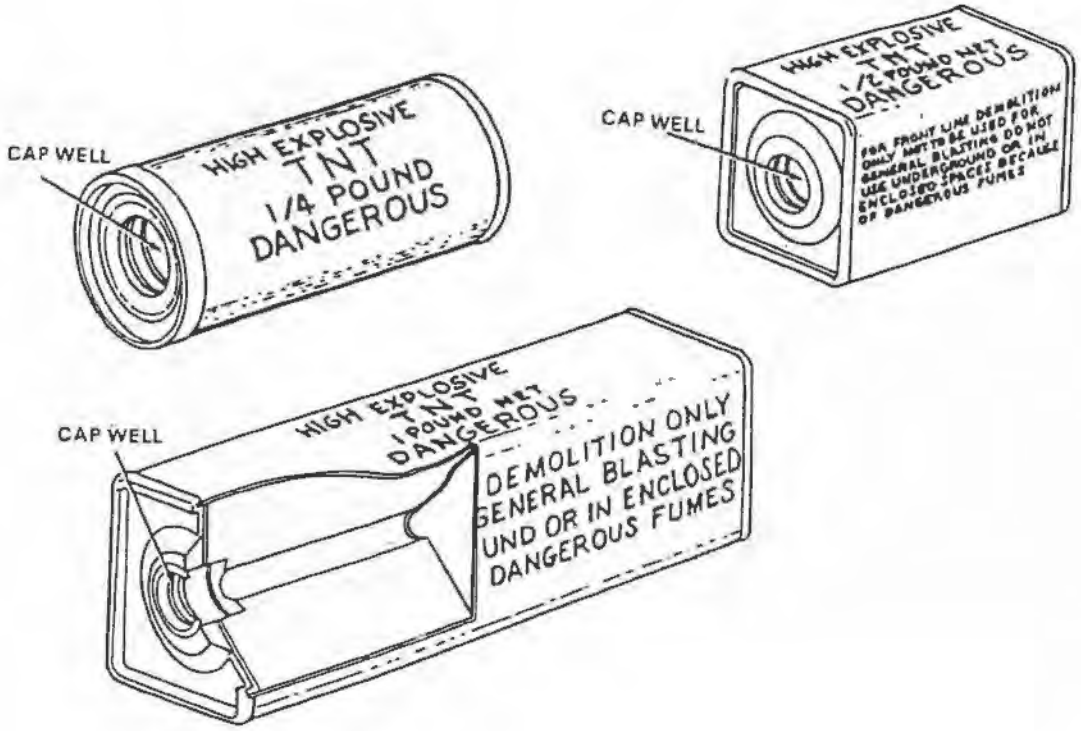
Description: The trip flare consists of an illuminant assembly, cover loading assembly, and mounting bracket assembly. The illuminating assembly is an aluminum case containing an ignition increment and three illuminant increments. The waterproof cover loading assembly contains a percussion primer, intermediate charge and a springloaded 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. The flare is armed by attaching a trip wire to either the trigger or pull pin.

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

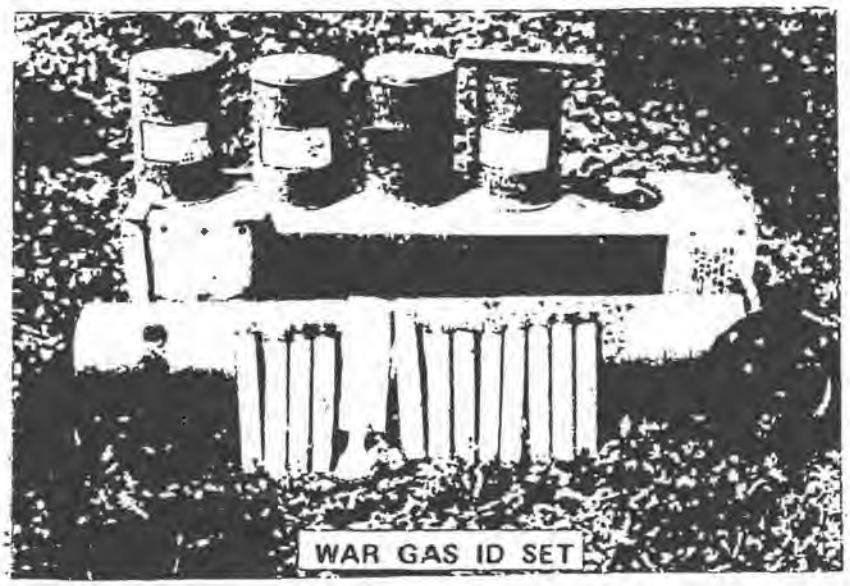
TNT, (TRINITROTOLUENE)



Description: TNT (trinitrotoluene) block demolition charges are standard demolition charges used for all types of demolition work. However, the ¼-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 by 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 ¼-pound block is issued in a cylindrical waterproof olive-drab cardboard container. The ½-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.

Reference: FM 5-25, Explosives and Demolitions, January 1942
FM 5-25, Explosives and Demolitions, May 1967
FM 5-25, Explosives and Demolitions, March 1986

CHEMICAL AGENT IDENTIFICATION SET (CAIS) SET GAS IDENTIFICATION, DETONATION M1



Use: Designed to be used outdoors. The gas tubes would be detonated, creating an agent cloud. Soldiers would then try to identify the agent based on its odor and other characteristics.

Description: The K951/952 CAIS contained 48 Pyrex, flame sealed ampules, 12 each containing 1.4 ounce solution of Mustard (H, 5% in chloroform) Lewisite (L, 5% in chloroform), Chloropicrin (PS, 50% in chloroform), and Phosgene (CG) for a total of 26 fluid ounces of agent, less the chloroform, per set. Each ampoule is 1 inch in diameter and 7½ inches long. Each ampoule is packed in a cardboard screw cap container with agent type indicated by letters on the cardboard container. Twelve cardboard containers each are packaged into 4 press fit metal cans which are 9¼ inches high. The cans are packed into a steel cylinder 6-inches in diameter, approximately 38 inches long and 0.145 inches thick. The open end of the cylinder is closed by a flanged end cover which is secured by eight bolts. The only difference between the K951 and K952 is that the K951 was issued with blasting caps that were packed and shipped in a separate container.

Old Stock Number:..... FSN 1365-025-3273 (K951)
FSN 1365-025-3783 (K952)

Reference: Chemical Agent Identification Set Information Package, date unknown, U.S.A. Chemical Material Destruction Agency, Aberdeen Proving Ground, Md.

Capsule, Riot Control Agent: CS

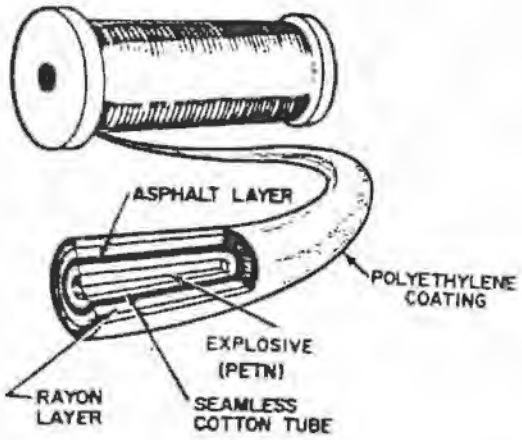
Use: These capsules are used to demonstrate the protection afforded by properly fitted chemical-biological masks, and to demonstrate to unmasked trainees the effects of CS riot control agent.

Description: The capsule consists of a size 00 gelatin capsule filled with ground CS riot control agent (ortho-chlorobenzylidene malon-nitrile). The filled capsule weighs about .82 grams. Fifty CS capsules are packed in a resealable metal can. The CS is aerosolized by placing the capsule on an upened empty tin can that is placed over a burning candle. The CS particles sting and irritate the skin, eyes, nose and throat and have a powerful lachrymatory effect on exposed personnel.

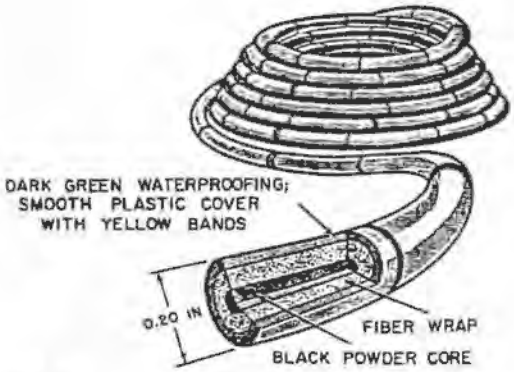
Filler in capsules ..... .82 grams of CS (ortho-chlorobenzylidene malono-nitrile).

References: TM43-0001-26-2, *Chemical Weapons and Munitions*, 29 April, 1982

Cord, Detonating and Fuse, Blasting: Time M700



Detonating cord



Time blasting fuse

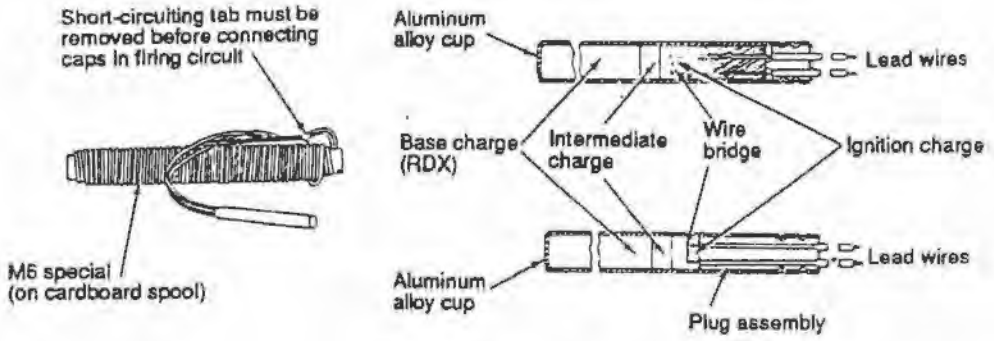
Use: Detonating cord is used to prime and detonate other explosive charges. Time blasting fuse is used to ignite nonelectric blasting caps.

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 fuse contains black powder. The important difference is that detonating cord explodes at a velocity of 5,000 feet per second, while time blasting fuse 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. Time blasting fuse is initiated by either a fuse igniter or match and can itself initiate nonelectric blasting caps.

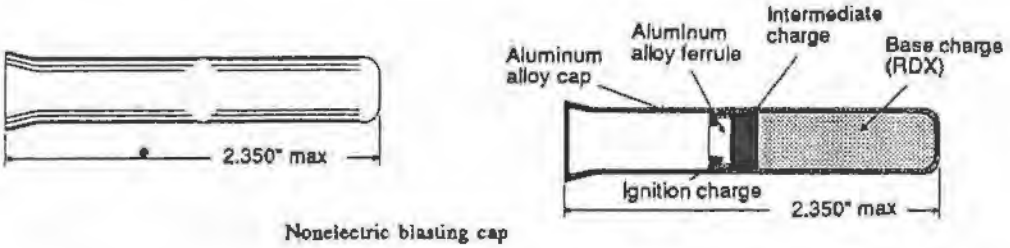
Overall length ..... Detonating cord can be cut to any length from 500-foot or 1,000-foot spools; Time blasting fuse can be cut to any length from 50-foot spools
Diameter ..... approx. 0.20 - 0.23"
Filler ..... Detonating cord: PETN; Time blasting fuse: black powder

References: TM 43-0001-38, Army Ammunition Data Sheets for Demolition Materials, June 1981; FM 5-250, Explosives and Demolitions, 15 June 1992

Cap, Blasting: Electric, M6 and Nonelectric, M7



Electric blasting cap



Nonelectric blasting cap

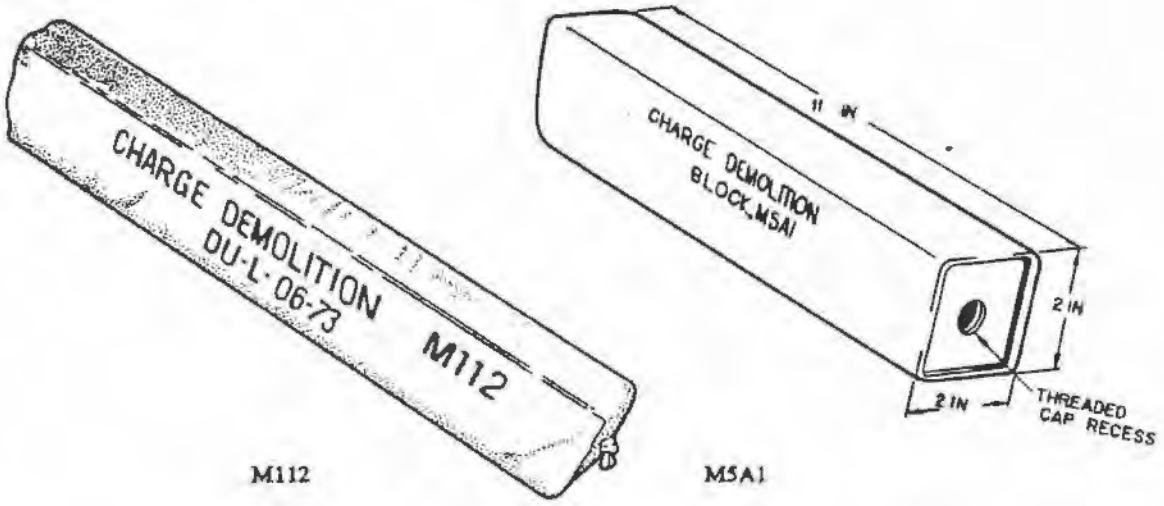
Use: Blasting caps are used to initiate high explosive demolition charges. Electric caps utilize a blasting machine or other source of electric power, while nonelectric caps are used in conjunction with time blasting fuse or a firing device base coupling.

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 fuse or the base coupling of a firing device. Initiation of these blasting caps will detonate all military explosives.

Overall length ..... 2.35"
Diameter ..... approx. 0.24 - 0.26"
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

Charge, Demolition: Block M112 and Block M5A1 (Composition C4)



M112 M5A1

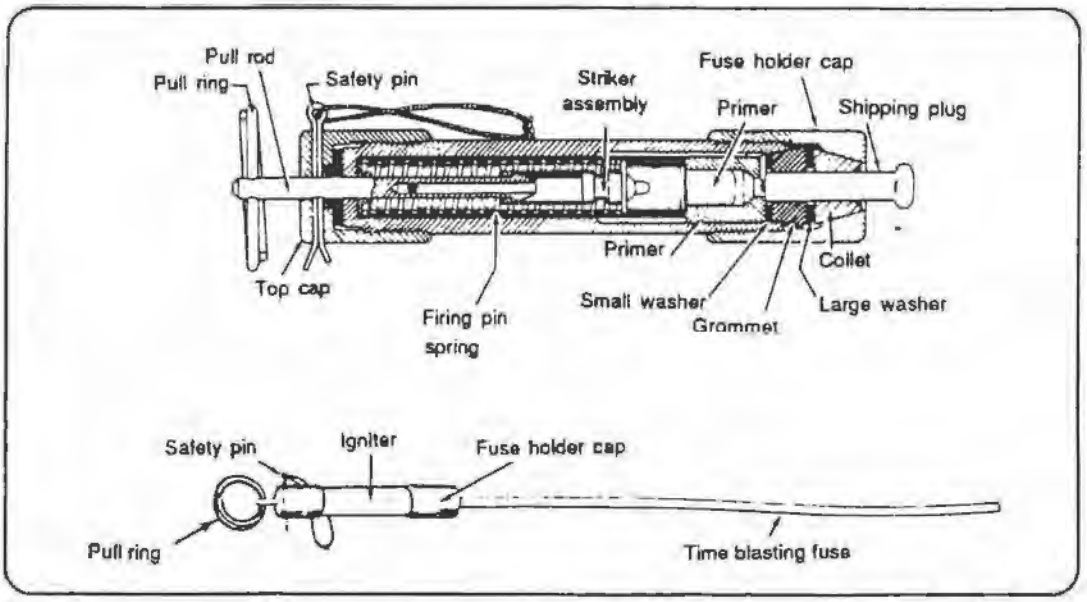
Use: These demolition charges are plastic explosives and are used in all types of demolition work, particularly cutting and breaching.

Description: Both of these demolition charges are made of Composition C4, which is a plastic explosive containing RDX and oily plasticizers. Composition C4 of recent manufacture is white, but older lots may be gray or off-white in color. Charge M112 consists of 1¼ pounds of explosive in a mylar film bag backed with pressure sensitive adhesive tape for adhering to flat, dry surfaces. Charge M5A1 consists of 2½ pounds of explosive in a clear plastic container that has a threaded cap well in each end. These charges can be initiated with electric or nonelectric blasting caps, and when detonated, release large amounts of compressed gas which exerts force in the form of a shock wave. The velocity of detonation for C4 is approximately 26,400 feet per second (8,040 meters per second). Composition C4 is rated as being 1.34 times as effective as TNT, which is the standard by which other explosives are measured.

Dimensions ..... M112 - 11.25" x 2.06" x 1.06"; M5A1 - 12" x 2" x 2"
Filler ..... 91% RDX and 9% non-explosive plasticizers

References: TM 43-0001-38, Army Ammunition Data Sheets for Demolition Materials, June 1981; FM 5-250, Explosives and Demolitions, 15 June 1992; TM 9-1300-214, Military Explosives, 20 September 1984

Igniter, Time Blasting Fuse: M60, Weatherproof



Use: To initiate time blasting fuse in all weather conditions and under water.

Description: This device is a pull-type assembly consisting of three major subassemblies: a firing mechanism, a fuse holder and a primer base. These subassemblies are contained within an olive drab nylon tube. Once a length of time blasting fuse is inserted into the fuse holder cap, the safety cotter pin is removed. A 10 to 30 pound pull on the pull ring brings the spring-loaded firing pin back to the release washer, which spreads the firing pin's jaws. This releases the firing pin from the knobbed end of the pull rod. Once released, the firing pin is driven by the compressed spring into the primer, which fires and ignites the end of the time blasting fuse.

Length . . . . . 4.75"
Diameter . . . . . .75"
Filler . . . . . primer mixture (in primer)

Reference . . . . . TM 43-0001-38, Army Ammunition Data Sheets for Demolition Materials, June 1981; FM 5-250, Explosives and Demolitions, 15 June 1992

APPENDIX B

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
CAC	Combat Assault Course
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
CESO	Civil Engineering Support Office
CFR	Code of Federal Regulations
COE	Chief of Engineers
ctg	Cartridge
CWM	Chemical Warfare Material
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
EB	Elliott's Beach
EM	Engineer Manual
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ERR	Eastern Recruiting Region
ETL	Engineering Technical Letter
FGDC	Federal Geographic Data Committee
FM	Field Manual
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
GIS	Geographic Information System
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)
HTA	Heavier Than Air
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
MB	Marine Barracks
MCAS	Marine Corps Air Station
MCAAF	Marine Corps Auxiliary Air Field
MCAAP	McAlester Army Ammunition Plant
MCRD	Marine Corps Recruit Depot
MCX	Mandatory Center of Expertise
MIDAS	Munitions Items Disposition Action System
MT	Mechanical Time
MTSQ	Mechanical Time Super Quick
NARA	National Archives and Records Administration
NAVSEA	Naval Sea Systems Command
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	Observation Point or 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)
PI	Parris Island
PIBD	Point Initiating, Base Detonating
PM	Project Manager
PPE	Personal Protective Equipment
QASAS	Quality Assurance Specialist, Ammunition Surveillance
QM	Quartermaster
QRE	Qualitative Risk Evaluation
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
SCAR	Sub-Caliber Aerial Rocket
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
SWMU	Solid Waste Management Unit
TCRA	Time Critical Removal Action
TEU	United States Army Technical Escort Unit
TM	Technical Manual

TNT	Trinitrotoluene
TP	Target Practice
TPDC*	Training and Performance Data Center of DOD
USACE	U.S. Army Corps of Engineers
USADACS	U.S. Army Defense Ammunition Center and School
USAFHRA	U.S. Air Force Historical Research Agency
USATCES	U.S. Army Technical Center for Explosive Safety
USATHMA	U.S. Army Toxic and Hazardous Materials Agency
USC	United States Code
USCG	Untied States Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
VB	Viven-Bessieres, in reference to rifle grenades
WAA*	War Assets Administration
W&FTB	Weapons and Field Training Battalion
WGS	World Geodetic System
WNRC	Washington National Records Center

* designates an historic acronym

APPENDIX C

REPORT DISTRIBUTION LIST

REPORT DISTRIBUTION LIST

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Commanding General, Marine Corps Recruit Depot Eastern Recruiting Region Natural Resources and Envrionmental Affairs (NREA) Office ATTN: Tim Harrington P. O. Box 19003 Parris Island, SC 29905-9003	8

PLATES

REPORT PLATES

1 **MCRD ERR Parris Island** – Vicinity Map
2 **MCRD ERR Parris Island** – Ranges 1937 Field Artillery
3 **MCRD ERR Parris Island** – Ranges Weapons and Field Training Battalion Area
4 **MCRD ERR Parris Island** - Ranges Page Field Training Area
5 **MCRD ERR Parris Island** - Ranges Miscellaneous Areas, Ordnance Storage & Historic Fortifications
6 **MCRD ERR Parris Island** – Formerly Used Defense Sites (FUDS)
7 **MCRD ERR Parris Island** - Aerial Photograph-1945

Thematic Computer-Aided Design and Drafting (CADD) map files completed in association with this Archives Search Report are based on historic cartographic, aerial and site visit data collected during this investigation. The thematic maps were created using Intergraph's Microstation.

The thematic maps were created by scanning and warping selected historic data to reference points collected from non-stable selected base maps such as U.S. Geological Survey (USGS) 7.5 minute, quadrangle sheets or National Imaging and Mapping Agency (NIMA) maps. The horizontal scale and horizontal datum of the base maps is generally known. In this case the datum used was World Geodetic System (WGS) 1984. Attempts have been made to rectify the data to the referenced base maps. However, distortions in scale and contortions of the features are present. These distortions are a result of inaccuracies in the source data, as well as the processes of scanning and rectifying the data. Much of the data on the maps lack sufficient information to support a determination of accuracy.

Many of the historic maps used were hand-drawn or built on locations that were inaccurate by modern standards. In general, historic map inaccuracies are unknown and not quantifiable. The unknown inaccuracies may then be magnified by the georeferencing process. Therefore, thematic maps generated from historic maps and drawings will have accuracy no greater than the least accurate source.

The historical aerial photography has been semi-rectified (georeferenced) to the base map; however, the photos have not been corrected for photogrammetric displacements such as those due to topography or the altitude of the aircraft at the time of imaging. They are not orthorectified images. Locations of features noted on aerial photography are not exact due to the rectifying of both the image and the base map.

The horizontal and vertical locations of selected features noted in the ASR and located on the thematic maps have been established utilizing Global Positioning System (GPS) technology. These coordinates were acquired using the Federal Version PLGR96+ GPS receiver. Features located utilizing GPS techniques are so noted in the ASR. The PLGR+96 uses the Precise Positioning Service (16 m SEP) and Wide Area GPS Enhancement (WAGE) 4 m CEP.

Copies of the thematic maps are included on the companion CD diskette to this report. The

lineage and source of the historic data used to generate the thematic maps is unknown. The majority of Federal Geographic Data Committee (FGDC) Metadata fields are therefore unknown. A metadata file that gives all available pertinent information has been provided with this product. The statements above are inclusive of all available information regarding the historic data sources and the thematic maps generated. The thematic maps are not original digital mapping data; are scanned and warped data with selected unique feature annotation. The intended purpose of the mapping data is for photo-interpretation and not design. The vector data and associated symbology is unique to the intended purpose. The majority of the digitized features are not part of the current Tri-Service CADD Standards list of features and associated line types and symbology (ie. range fans, pits, disturbed land). The mapping data produced does comply with applicable Tri-Service Standards.

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VICINITY MAP

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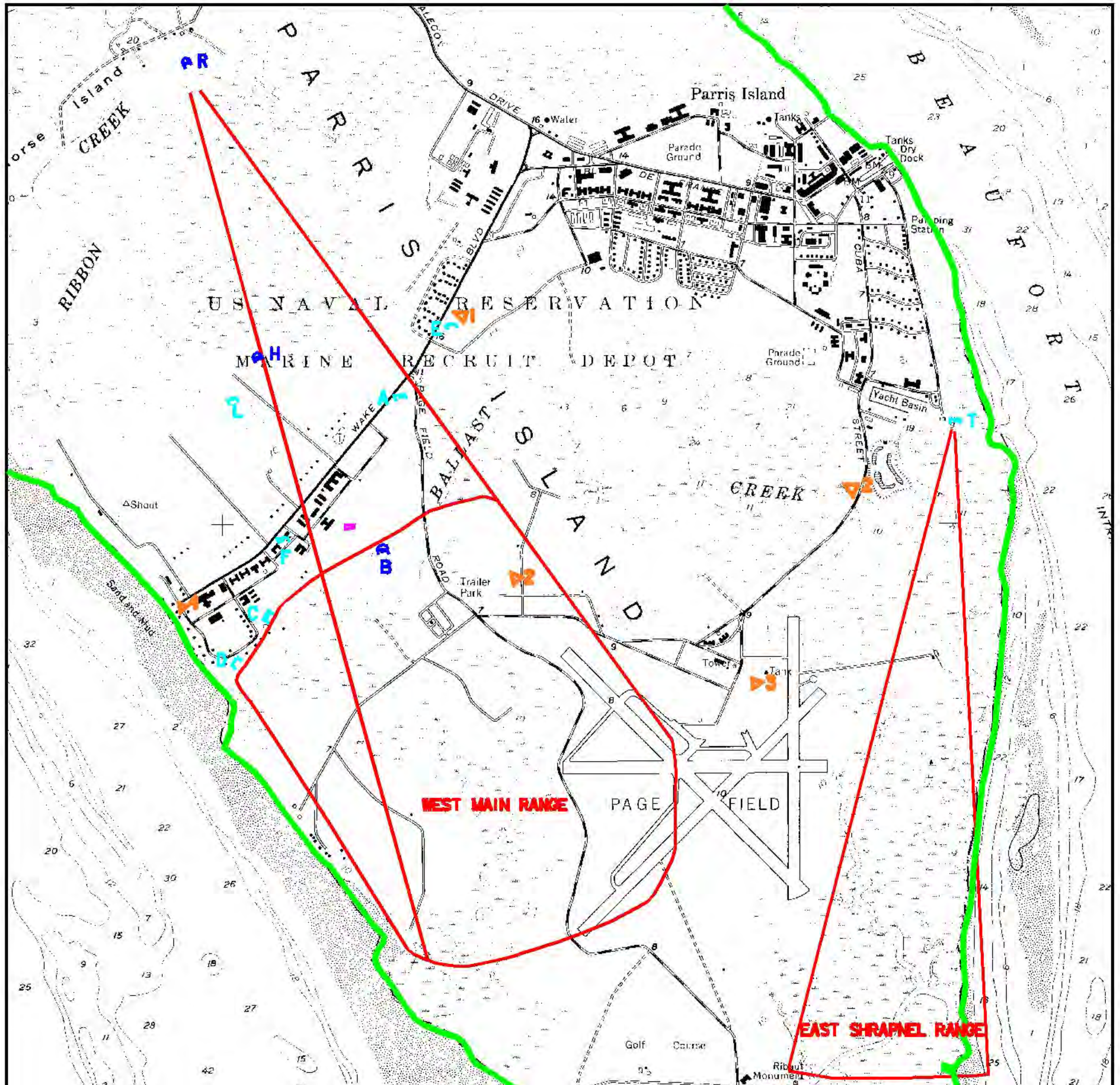

LEGEND

- PROJECT BOUNDARY
- RANGES
- OBSERVATION POINT
- NON-PERMANENT FIRING POSITION
- CONCRETE FIRING POSITION
- CONCRETE OBSERVATION POST

0 2000 4000

APPROXIMATE SCALE IN FEET

N

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ST. LOUIS DISTRICT

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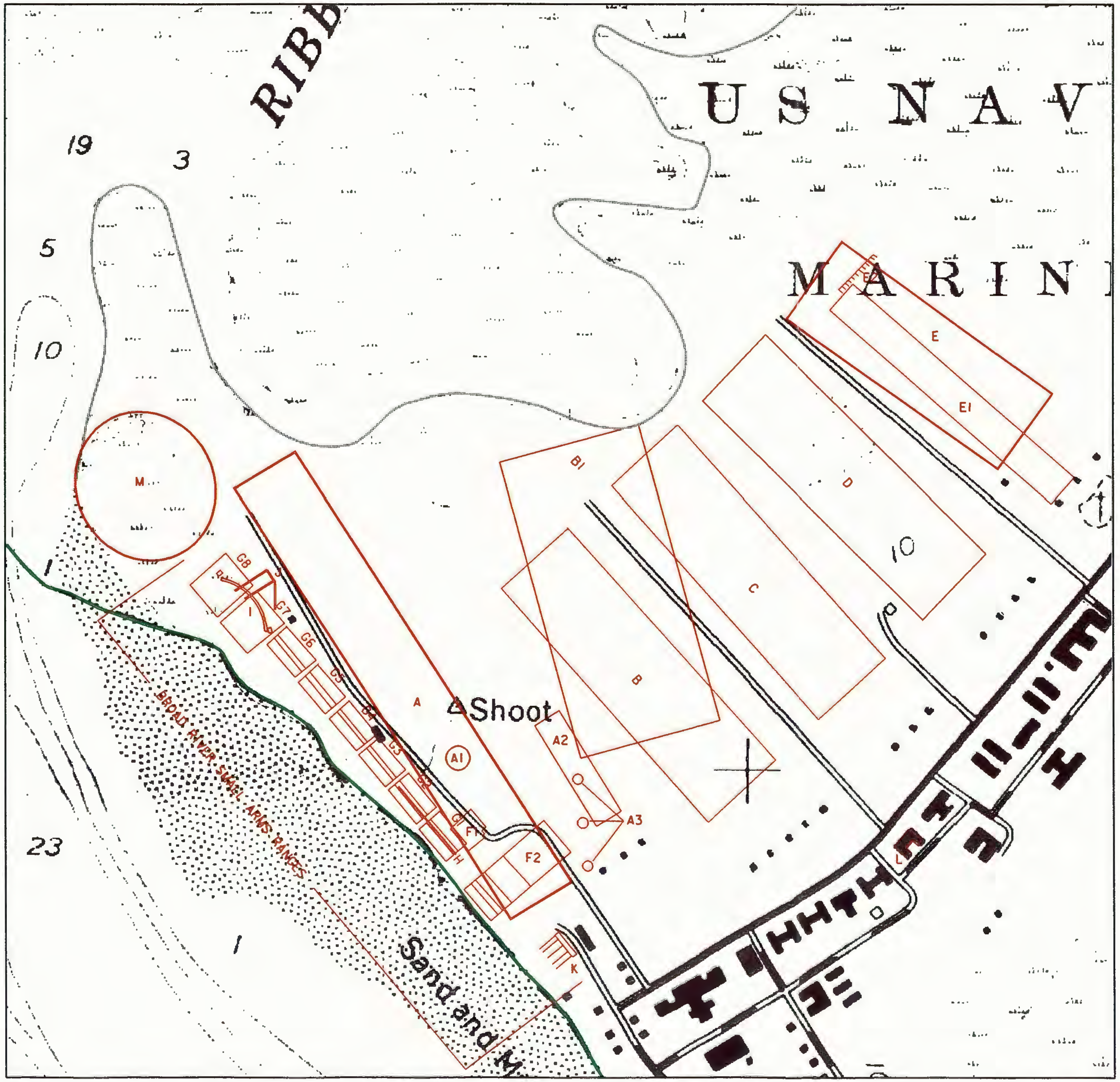
RANGES 1937 FIELD ARTILLERY

PROJ. DATE APRIL, 1999	DATE OF PHOTO: 1937	PLATE NO. 2
07-JUN-1999		



KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
A	KHE SANH; RANGE "A" (1941-1999) ; 1,000 YARD RANGE (1929-1940) ; NEW RIFLE RANGE (1918)
A1	GRENADE COURTS (1944)
A2	DAY MOVEMENT COURSE (1998)
A3	RIFLE GRENADE (1941)
B	HUE CITY; RANGE "B" (1941-1999); 600 YARD RANGE (1932-1941)
B1	600 YARD RANGE (1929-1932); NEW RIFLE RANGE (1918)
C	CHOSIN; RANGE "C" (1944-1999)
D	STARLIGHT; RANGE "D" (1944-1999)
E	INCHON; RANGE "E" (1970-1999)
E1	HAND GRENADE PRACTICE AREA (1944-1968)
E2	GRENADE PIT (1953-1970)
F1	NAK TONG
F2	PISTOL BUTTS (1929)
G1	SMALL BORE RANGE NO. 1 (1944-1970)
G2	SMALL BORE RANGE NO. 2 (1944-1970)
G3	SMALL BORE RANGE NO. 3 (1944-1970)
G4	SMALL BORE RANGE NO. 4 (1944-1970)
G5	SMALL BORE RANGE NO. 5 (1944-1954)
G6	SMALL BORE RANGE NO. 6 (1944-1954)
G7	SMALL BORE RANGE NO. 7 (1944)
G8	SMALL BORE RANGE NO. 8 (1944)
H	22 RANGE (1941)
I	SKEET RANGE (1946-1953)
J	900' RANGE (1973)
K	ELECTRIC PISTOL RANGE, BUILDING 788 (1952); PUSAN (1999)
L	SMALL BORE RANGE IN BUILDING 765 (1952)
M	ROCKET AND MORTAR IMPACT AREA

BROAD RIVER SMALL ARMS RANGES

LEGEND

PROJECT BOUNDARY

RANGES

0 650 1300

APPROXIMATE SCALE IN FEET

N

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ST. LOUIS DISTRICT

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EASTERN RECRUITING REGION
PARRIS ISLAND, SC
BEAUFORT COUNTY

RANGES WEAPONS AND FIELD TRAINING BATALLION AREA

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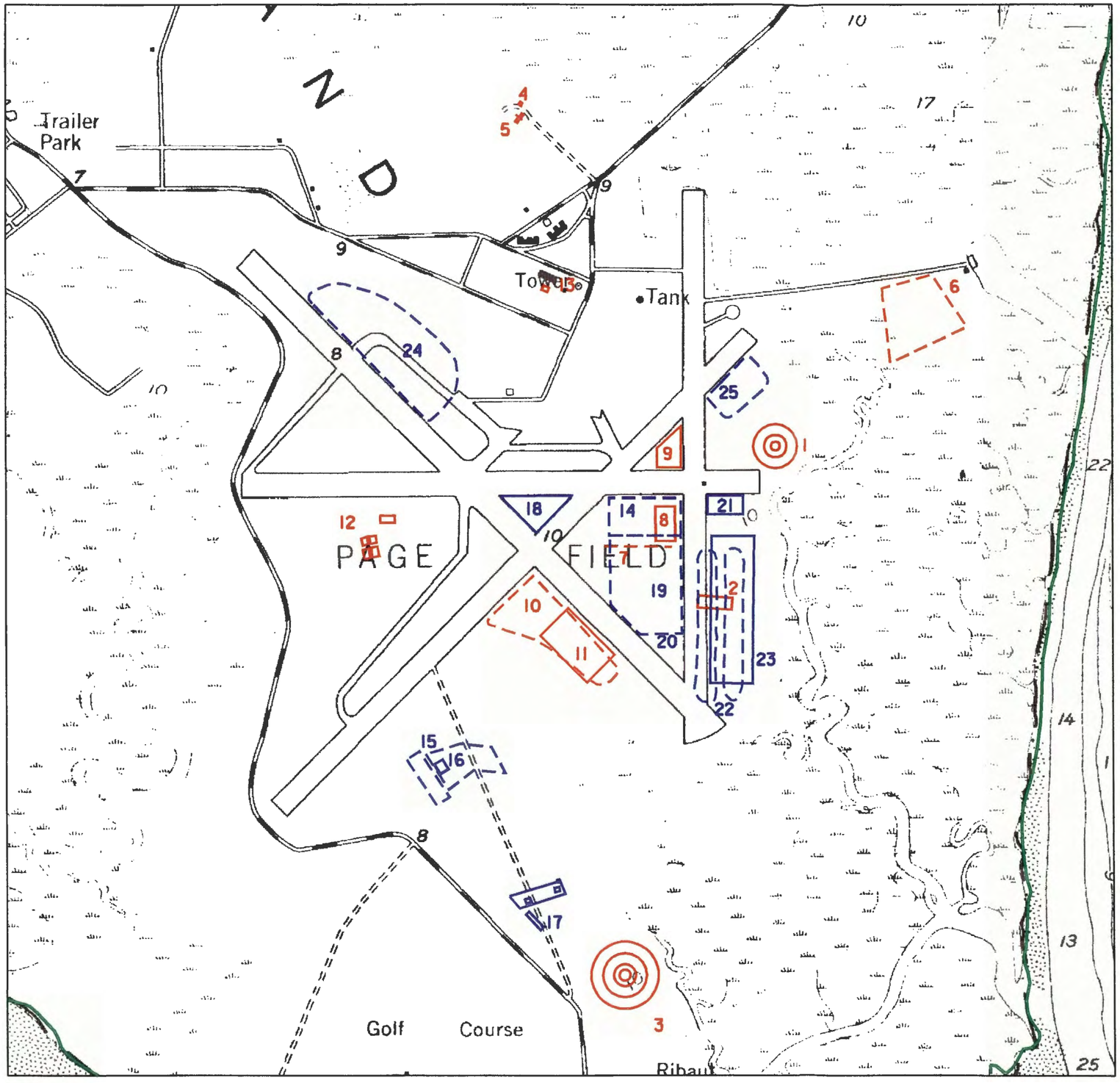


KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1	AERIAL BOMBING TARGET AT PAGE FIELD 1937)
2	STRAFING RANGE AT PAGE FIELD (1937-1940) (EST. LOCATION)
3	AERIAL BOMBING TARGET AT GOLF COURSE (1946)
4	SKEET RANGE, BUILDING AS48 AT PAGE FIELD (1946-53)
5	TRAP RANGE, BUILDING AS47 AT PAGE FIELD (1946-53)
6	GUADALCANAL HAND GRENADE RANGE (1983-99)
7	MINE/BOOBY TRAP (1994)
8	BLDG. 4119, PRACTICE GRENADE AND MINE FIELD (1983)
9	PRACTICE GRENADE RANGE (1987)
10	CAC (COMBAT ASSAULT COURSE) (1994)
11	INFILTRATION COURSE (1987)
12	COMBAT TOWN (1994)
13	GAS CHAMBER, 793 (1998))
14	NBC MOVEMENT COURSE (1987)
15	FIELD FORTIFICATION COURSE II (1994)
16	INFILTRATION COURSE, SOUTH OF PAGE FIELD (1983) BUILDING 4024
17	NIGHT MOVEMENT COURSE SOUTH OF PAGE FIELD (1983) BUILDING 4022
18	WIRE ENTANGLEMENT DISPLAY (1987)
19	DAY MOVEMENT STATIONS (1984)
20	SQUAD OFFENSE COURSE (1987)
21	NIGHT MOVEMENT COURSE (1987)
22	DAY MOVEMENT 1 AND DAY MOVEMENT 2 (1994)
23	FIRE TEAM/NBC MOVEMENT COURSE (1987)
24	NBC FIELD COURSE (1994)
25	BOOBY TRAP COURSE (1994)

LEGEND

- PROJECT BOUNDARY
- RANGES
- MISC. TRAINING STATIONS AND COURSES

0 1000 2000

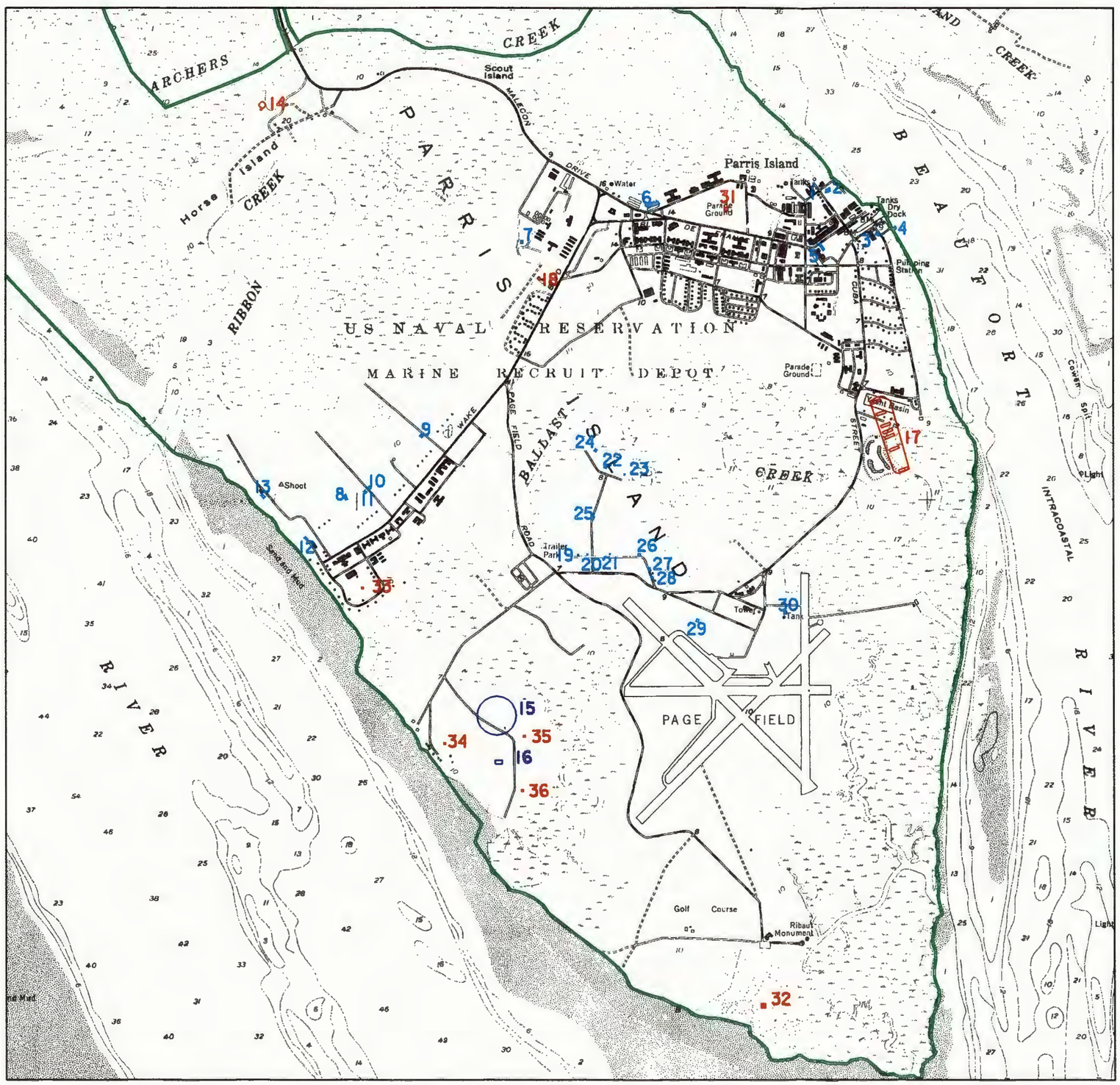
APPROXIMATE SCALE IN FEET

N

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

MARINE CORPS RECRUIT DEPOT
EASTERN RECRUITING REGION
PARRIS ISLAND, SC
BEAUFORT COUNTY
RANGES
PAGE FIELD TRAINING AREA

PROJ. DATE: APRIL, 1999	DATE OF MAP: 1943	PLATE NO. 4
20-MAY-1999 05:22	n:\oew\oew99a\scarol\parris\map\t443pfta.dgn	



KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1	BLDG. 45, MAGAZINE (1934-1940s), PAINT LOCKER (1946-1960s), BLDG. 16 MAGAZINE (1899-1919)
2	FORT HAINES
3	FORT MACKAY
	TEMPORARY MAGAZINE XXI (1905) - not specifically located
4	BLDG. 48, AMMUNITION (1919) - probable location - not specifically located
5	BLDG. 85 AMMUNITION SALVAGE STORAGE (1919)
6	GUN SHED GA (1941)
7	BLDG. 875, GAS MASK STORAGE BLDG. (1953-73)
8	BLDG. 20 AMMUNITION STORAGE (1929)
9	BLDG. 721, READY AMMUNITION STORAGE (1946-1970s)
10	BLDG. 723, READY AMMUNITION STORAGE (1946-1970s)
11	BLDG. 724, READY AMMUNITION STORAGE (1946-1970s)
12	BLDG. 784, READY AMMUNITION STORAGE (1946-1970s)
13	BLDG. 786, AMMUNITION STORAGE (1946-1970's)
14	RECREATIONAL FIRING RANGE AT HORSE ISLAND
15	TACTICAL BIVOUAC AREA
16	BLDG. 4026, FIELD FORTIFICATION DISPLAY
17	RIFLE RANGE AT BALLAST CREEK (1910)
18	BLDG. 673, GAS CHAMBER
19	BLDG. A1, SMALL ARMS MAGAZINE (1946-)
20	BLDG. A2, SMALL ARMS MAGAZINE (1946-)
21	BLDG. A3, SMALL ARMS MAGAZINE (1946-)
22	BLDG. A4, HIGH EXPLOSIVES MAGAZINE (1946-)
23	BLDG. A5, HIGH EXPLOSIVES MAGAZINE (1946-)
24	BLDG. A6, HIGH EXPLOSIVES MAGAZINE (1946-)
25	BLDG. A7, FUZE MAGAZINE (1946-)
26	BLDG. A8, SMOKE DRUM MAGAZINE (1946-)
27	BLDG. A9, INERT MAGAZINE (1946-)
28	BLDG. A10, READY MAGAZINE (1946-)
29	BLDG. A11, READY MAGAZINE (1946)
30	BLDG. 4002 (1973-1999)
31	AERIAL BOMB TARGET AT PARADE DECK (1937-1940) - approximate locationon interviews
32	AERIAL BOMB TARGET AT SOUTHERN TIDLE FLATS (32°18'7.4", 80°40'44.17" as located by GPS)
33	POSSIBLE GRENADE RANGE NEAR OLD SWIMMING POOL WEAPONS BATTALION TRAINING AREA
34	GAS CHAMBER AT ELLIOTT'S BEACH
35	POSSIBLE FUSE RANGE AT ELLIOTT'S BEACH
36	POSSIBLE HAND GRENADE RANGE AT ELLIOTT'S BEACH

LEGEND

- PROJECT BOUNDARY
- RANGES
- ORDNANCE STORAGE AND HISTORICAL FORTIFICATIONS
- MISCELLANEOUS TRAINING STATIONS, COURSES AND MANEUVER AREAS

0 2500 5000

APPROXIMATE SCALE IN FEET

N

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

MARINE CORPS RECRUIT DEPOT
EASTERN RECRUITING REGION
PARRIS ISLAND, SC
BEAUFORT COUNTY
RANGES MISCELLANEOUS AREAS, ORDNANCE STORAGE & HISTORIC FORTIFICATION

PROJ. DATE: APRIL, 1999	DATE OF MAP: 1979	PLATE NO. 5
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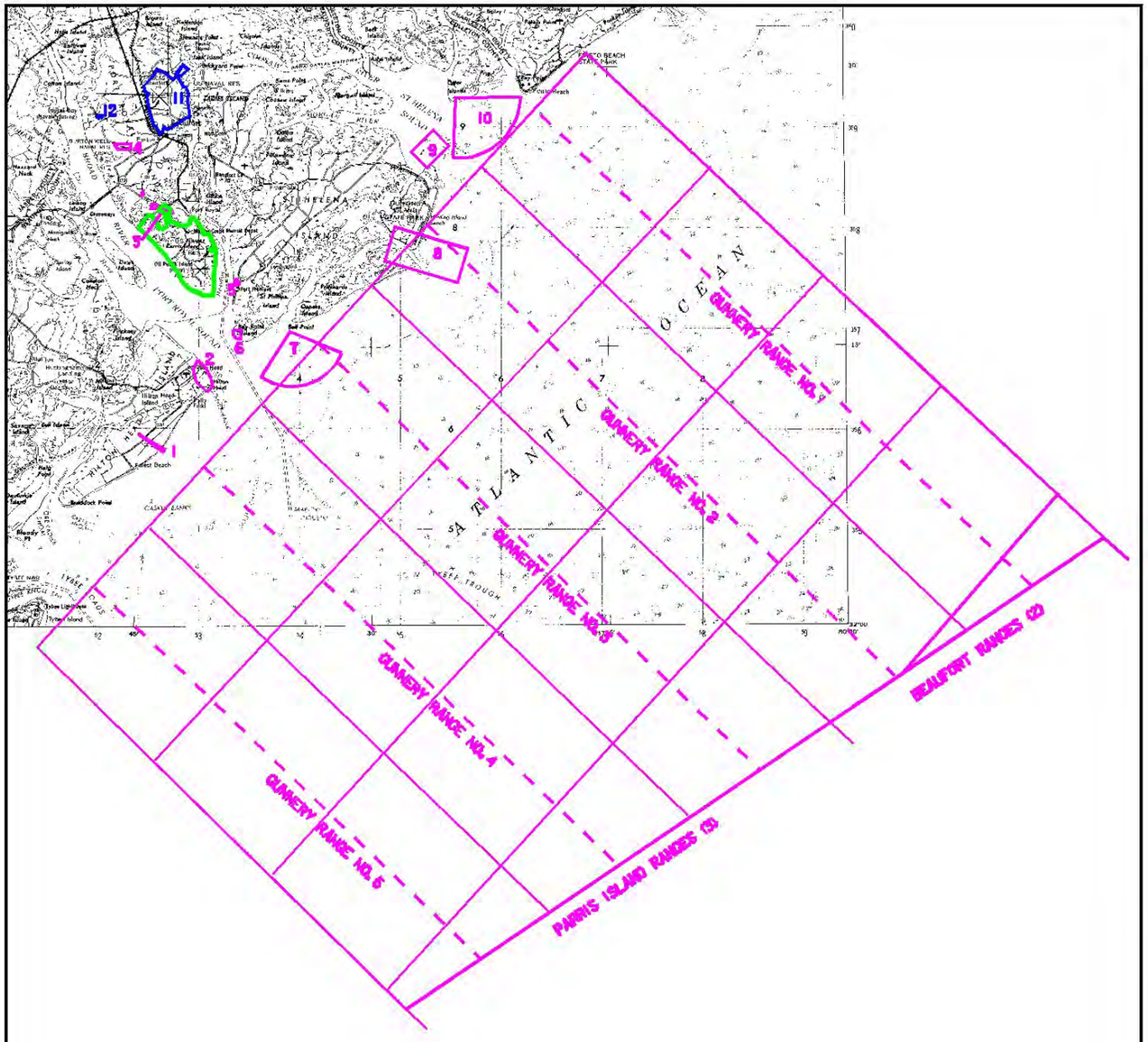

KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1	HILTON HEAD LIGHTHOUSE RESERVATION, CAMP MCDOUGAL OR MARINE CORPS FIRING RANGE
2	HILTON HEAD MILITARY RESERVATION, CIVIL WAR ERA: FORT WALKER, FORT WELLES, FORT SHERMAN, FORT HOWELL AND FORT MITCHELL
3	JERICHO WELL AND MAIN GATE
4	BURTON WELL FIELD
5	FORT FREMONT
6	BAY POINT MILITARY RESERVATION ON ST. PHILLIPS ISLAND; CIVIL WAR ERA: FORT BEAUREGARD
7	BULL POINT BOMBING AND STRAFING TARGET ON CAPER'S OR PRITCHARD'S ISLAND
8	HUNTING ISLAND/FRIPP ISLAND BOMB TARGET/ROCKET RANGE
9	EGG ISLAND DIVE BOMBING TARGET
10	EDISTO ISLAND'S BAY POINT STRAFING TARGET
11	MCAS BEAUFORT
12	LAUREL BAY NAVAL HOUSING

LEGEND

- PROJECT BOUNDARY
- FORMERLY USED DEFENSE SITES (FUDS)
- OTHER ACTIVE MILITARY INSTALLATIONS

0 37000 74000

APPROXIMATE SCALE IN FEET

N

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

MARINE CORPS RECRUIT DEPOT
EASTERN RECRUITING REGION
PARRIS ISLAND, SC
BEAUFORT COUNTY

FORMERLY USED DEFENSE SITES (FUDS)

PROJ. DATE: APRIL, 1999	DATE OF MAP: 1978	PLATE NO. 6
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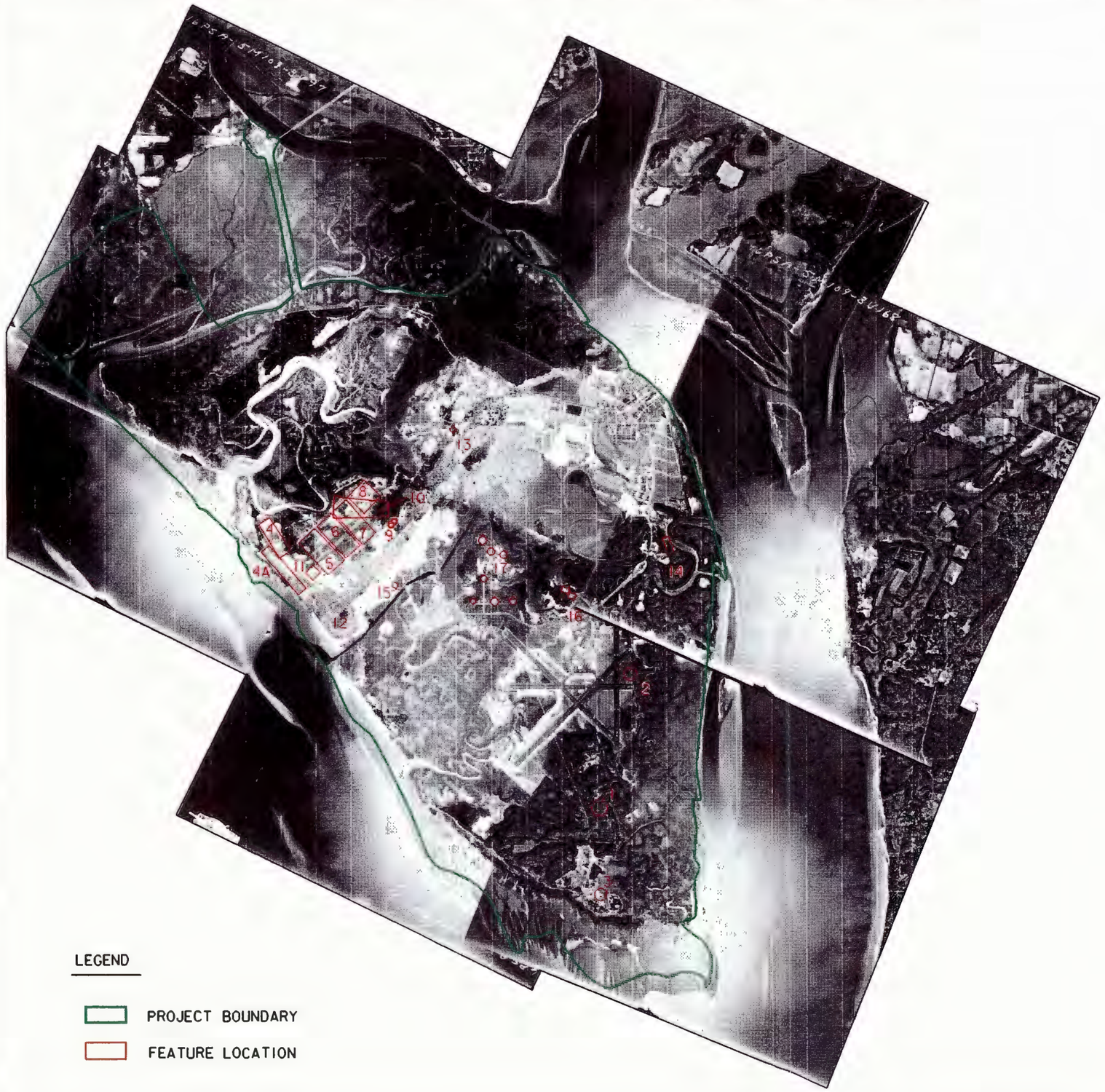

KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1.	AERIAL BOMBING TARGET, AT GOLF COURSE
2.	AERIAL BOMBING TARGET AT PAGE FIELD
3.	AERIAL BOMBING TARGET AT SOUTHERN TITLE FLATS
4.	RANGE A
4A.	SMALL BORE RANGES 1-8
5.	RANGE B
6.	RANGE C
7.	RANGE D
8.	350 YARD WIDE TARGET BERM AND FIRING LINES AT APPROXIMATELY 100, 200, AND 300 YARDS VISIBLE ON THE HAND GRENADE PRACTICE AREA WHICH BECOMES RANGE E
9.	TWO CIRCULAR FEATURES APPROXIMATELY 150 FEET IN DIAMETER, WHICH RESEMBLES SNAP IN OR DRY FIRE RANGES
10	POSSIBLE EARLIER RANGE WITH A WESTERN DIRECTION OF FIRE, WHICH CUTS ACROSS BOTH RANGES E AND D; 300 YARDS WIDE AND POSSIBLY 600 YARDS LONG
11.	GROUND SCARRING EVIDENT AT THE LOCATION OF THE 1942 RIFLE GRENADE CIRCLES
12.	NO EVIDENCE ON THE REPORTED GRENADE COURT SOUTH OF THE SWIMMING POOL
13.	TREES OBSCURE GAS CHAMBER, BIULDING 673
14.	BUILDING DEVELOPMENT ON NORTHERN PORTION OF THE RIFLE RANGE AT BALLAST CREEK
15.	FIELD ARTILLERY CONCRETE OBSERVATION POST
16.	TRAP AND SKEET RANGES AT PAGE FIELD
17.	ORDNANCE STORAGE STRUCTURES

0 4000 8000

APPROXIMATE SCALE IN FEET

N

U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

MARINE CORPS RECRUIT DEPOT
EASTERN RECRUITING REGION
PARRIS ISLAND, SC
BEAUFORT COUNTY
1945 AERIAL PHOTOGRAPHY

PROJ. DATE: APRIL, 1999	DATE OF PHOTO: 1945	PLATE NO. 7
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