

Site OE-24B

Practice Hand Grenade Range

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SITE OE-24B (PRACTICE HAND GRENADE RANGE)

3.24B Site OE-24B (Practice Hand Grenade Range)

This report consists of two parts. The first part, contained in Sections 3.24B.1 through 3.24B.5, includes a presentation and assessment of archival data. Specific elements include a review of site history and development, evaluation of potential ordnance at the site, a summary of previous ordnance and explosives (OE) investigations, and a conceptual site model. The above-mentioned information was used to support the second part of this report, which is the Site Evaluation (Section 3.24B.6). The Site Evaluation was conducted in accordance with the procedures described in the *Final Plan for Evaluation of Previous Work (Harding Lawson Associates [HLA], 2000)* and may restate some information presented previously. The Site Evaluation discusses the evaluation of the literature review process (Section 3.24B.6.1) and evaluation of sampling process(es) (Section 3.24B.6.2). These discussions are based on information from standardized literature review and sampling review checklists (Attachment 24B-A1). Section 3.24B.7 provides conclusions and recommendations for the site. References are provided in Section 3.24B.8.

3.24B.1 Site Description

Site OE-24B is 14.2 acres in size and is located in the west-central portion of former Fort Ord (Plate 24B-1) to the south of the Main Garrison and just north of the Multi-Range Area (MRA). Site OE-24B was identified through a review of a 1946 Fort Ord historical map as part of the Supplement to the Fort Ord Archive Search Report (ASR; *U.S. Army Engineer Division, Huntsville [USAEDH], 1994*).

3.24B.2 Site History and Development

The following presents a summary of the site history and development that is based on archival research and review of historical training maps and aerial photographs. Plates have been prepared that present pertinent features digitized from historical training maps and scanned aerial photographs reviewed by MACTEC. It should be noted that minor discrepancies between source maps, combined with the natural degradation of older source maps and photographs, has resulted in misalignment of some map features. In addition, camera angle and lens distortion introduced into older aerial photographs combined with changes in vegetation and site features over time may contribute to misalignment of some map features with respect to aerial photographs.

Pre-1940s Era

This site lies within a tract of land purchased from private landowners by the government in 1917 (*Arthur D. Little, Inc. [ADL], 1994*). Documentation for use of this area by the U.S. Army (Army) for training prior to 1940 is limited to topographic maps. Topographic maps of the area from 1918 (*Department of the Interior [DOI], 1918*) and 1933 (*Army, 1933*) were reviewed. No identifiable features or text were associated with this area. Eucalyptus Road is shown on the 1933 topographic map and is close to its present location.

1940s Era

Review of 1940s era documentation including historical maps and aerial photographs indicates that a practice hand grenade range was present in this area in the 1940s.

- A practice hand grenade training area is shown on the Fort Ord training maps from 1945 and 1946 (*Army, 1945, 1946*). A live grenade range training area (Site OE-24C) is identified southwest of the practice hand grenade range. Practice Rifle Grenade (Sites OE-24A and OE-24E) and Booby Trap Training Area (OE-24D) are also shown on the map in the vicinity of the Practice Hand Grenade (Site OE-24B).
- Aerial photographs from 1949 and 1951 show a disturbed/cleared area in the same location as the Practice Hand Grenade area (Plate 24B-2).

1950s Era

Review of 1950s era documentation including training maps, aerial photographs, and grading plans indicated that practice hand grenade (Site OE-24B) training ended sometime prior to 1954 and that the area was developed as base housing by 1959. The following identifies the results of historical maps and aerial photographs' review.

- Site OE-24B is not shown on the circa 1954 map or on maps after that date (*Army, 1954*).
- A Field Battalion Training Area (FBTA) is shown northeast of the Practice Hand Grenade area on the 1956 Fort Ord training maps (*Army, 1956*).
- The 1957 Fort Ord training map shows a “BM reserve” on the Practice Hand Grenade area (Site OE-24B) and bleachers just east (*Army, 1957*).
- East Officers Area Section 4 grading plans dated 1957 are available for the site area (*U.S. Army Corps of Engineers [USACE], 1959*). The grading plans are as-built revisions dated 1959 and show the planned housing development for this area. The available plans are digital versions of the original plans. The quality of the images is not sufficient to identify the changes in ground surface elevation related to grading.
- An aerial photograph from 1959 (*USACE, 1960*) shows the completed housing and is identified as East Officers Housing Area. It appears the areas cleared of vegetation in the 1951 aerial photograph were covered with housing or fill material in 1959.

1960s to Present

Military housing was completed in 1959 and 1961 and was occupied from the 1960s to present. From the 1960s until present, the closest training areas used are south of the Practice Hand Grenade area (Site OE-24B) inside the MRA.

- No training sites are present in this area on training maps from 1964 through 1988.
- Aerial photographs from 1966 (Plate 24B-3) and 1999 (Plate 24B-4) show continued housing over the former site area. The housing is identified as Rogers Fitch Park on a 1967 map (*Army, 1967*).
- A rifle smoke grenade and 100 M1 Rounds (both Ball and Tracer small arms ammunition) were discovered northeast of the site in February 1993. Two practice 40mm projectiles were discovered northwest of the site in August 1997. The 40mm practice projectiles were not available for use in the 1940s.

Proposed Future Land Use

The proposed reuse of this area is continued military housing.

3.24B.3 Potential Ordnance Based on Historical Use of the Area

This section describes the types of training devices that could have been used at a practice grenade range in the 1940s. Information on hand grenades used during World War II (WWII) was obtained from *The American Arsenal, the World War II Official Standard Ordnance Catalog of Small Arms, Tanks, Armored Cars, Artillery, Antiaircraft Guns, Ammunition, Grenades, Mines, etcetera* (Hogg, 2001)

Five types of grenades were identified for use in WWII. These include fragmentation, offensive, chemical, practice, and training grenades. A brief description of the practice and training grenades is provided below:

- An MK II – standard practice grenade was available that was equipped with a M10A3 igniting fuze, and is loaded with a small black powder charge.
- A training grenade, MK IA1 was also available. This was an inert grenade and contained no charge.

It is also possible that pyrotechnic items could have been used in conjunction with this training. It is expected that all OE items would be found at or near the surface.

3.24B.4 History of OE Investigations

The following describes the OE investigations performed at this site.

1994 Archives Search Report, Supplement 1

The purpose of the archives search conducted at Fort Ord was to gather and review historical information to determine the types of munitions used at the site, identify possible disposal areas, identify unknown training areas, and recommend follow-up actions. The archives search was conducted in accordance with a scope of work provided by USAEDH to the USACE St. Louis District and U.S. Army Corps of Engineers guidance published in June 1994. The archives search included interviews with individuals familiar with the sites, site visits to previously established sites, site reconnaissance on newly identified training areas, and the review of data collected during sampling or removal actions.

Site OE-24 was identified as a new site as part of the November 1994 Archives Search Report Supplement (USAEDH, 1994). The site is described as containing several rifle and hand grenade ranges, both practice and live sites, based on review of a 1946 map. A site visit was conducted and a piece of a warhead was found just north of Eucalyptus Road (OE-24A). The warhead was believed to be part of a high explosive grenade. Sampling of a 10-acre area surrounding the find was proposed in the ASR. Requirements for preparation of an ASR are described in Section 2.0 of this report.

1994 UXB International Investigation

UXB International, Inc. (UXB) completed land surveying of the site and may have performed some brush cutting within the site boundaries as part of their investigation (USA Environmental Inc. [USA], 2000).

No sampling or intrusive activities were completed. The surveyed site boundaries are presented on Plate 24B-4.

1997 CMS (USA) Investigation

CMS Environmental (CMS) completed sampling at Site OE-24B in 1997 (*USA, 2000*). As part of this sampling 2 standard grids of 100 by 200 foot and 1 grid of non standard dimensions were sampled (1.29 acres, 56,000 square feet) using SiteStats/GridStats (SS/GS) method (Table 24B-1). Each one of the grids was established partially outside of the Site OE-24B boundary due to terrain and structures within the site (*USA, 2000*). None of the sample grids fall within the digitized 1945 site boundary; however Grid B-2 does fall within a cleared area evident on the 1951 aerial photograph. It should also be noted that the grids were placed in open spaces and that most of the area within the 1945 digitized boundaries are covered with housing with only small open areas. According to the CMS work plan the sample grids were surveyed using a maximum 5 foot search lane with a Schonstedt Model GA-52/Cx magnetometer. Following the survey that located 1600 anomalies, 225 anomalies were selected for sampling by the SS/GS sampling program. Based on the program 14 percent of the identified anomalies were excavated and sampled. The remaining anomalies were not excavated. OE-related items identified during sampling included one expended grenade fuze (Model not reported) (Table 24B-2). No live items were identified during sampling and no further OE response was recommended in the after action report.

3.24B.5 Conceptual Site Model

Conceptual site models (CSMs) are generally developed during the preliminary site characterization phase of work to provide a basis for the sampling design and identification of potential release (functioning of the OE item; e.g., detonation) and exposure routes. CSMs usually incorporate information regarding the physical features and limits of the area of concern (the site), nature and source of the contamination (in this case OE), and exposure routes (potential scenarios that may result in contact with OE).

The CSM for Site OE-24B is based on currently available site-specific and general information including literature reviews, sampling results, aerial photographs, maps, technical manuals, and field observations, and the information shown on Plate 24B-5. The CMS was developed to help evaluate the adequacy of the investigation completed to date and to identify potential release and exposure pathways.

3.24B.5.1 Training Practices

Site OE-24B is categorized as a practice hand grenade training area. Review of the 1949 and 1951 aerial photographs shows an approximately 100- by 200-foot area cleared of vegetation. The danger area for live hand grenades is 150 meters (over 450 feet). It is believed, on the basis of the small size of the cleared area, much less than 450 feet by 450 feet and on the description provided with the training map, that Site OE-24B was only used for practice hand grenade training.

Hand grenade training areas usually consist of throwing bays or trenches and targets. According to current training manual FM3-23.30 the targets should include soldiers in the open at 20 meters, a fortified mortar pit at 20 meters, a fighting position at 30 meters, and a trench target at 40 meters. Practice training would include practice in the proper way to hold the grenade and throw the grenade (*Army, 2000*). According to FM3-23.30, all soldiers must go through a mock-bay training before going through to the live bay. It is anticipated that the 1940s training area would have been similar to the training areas used today and that the area identified for practice training may have been the mock area.

3.24B.5.2 Site Features

Site OE-24B was identified on historical training maps (1945) as a Practice Hand Grenade training area. A disturbed vegetation area is present on both the 1949 and 1951 aerial photographs. Although maps showing the configuration of hand grenade ranges at Fort Ord in the 1940s are not available, the aerial photograph review indicates that the area was used as training area in the 1940s. Due to the small size of the area, it is not likely that the area would have been used for live grenade training. Review of training maps from the 1950s does not indicate that this area was used for practice grenade training after the 1940s. Housing was constructed in this area between 1957 and 1959. Extensive grading was completed prior to construction of the housing.

3.24B.5.3 Potential Sources and Location of OE

Site OE-24B was used for practice grenade training in the 1940s. Based on the use of this area as a practice grenade training area, the types of OE that would be expected include the MK II-standard practice grenade equipped with a M10A3 igniting fuze, which is loaded with a small black powder charge, and the MK IA1 training grenade. The MK IA1 was an inert grenade that contained no charge. It is also possible that pyrotechnic items associated with training at the practice grenade range could be present. These items would normally be found at the surface of the site; however, it is possible that OE could be below the surface in areas of the site that were graded prior to housing construction.

No OE was discovered at this site during sampling; however, one OE scrap item, an expended grenade fuze was discovered. This item indicates that the area may have been used for practice hand grenade training prior to construction of the housing. Review of historical records indicates a live M23A1 rifle grenade was found northeast and outside of the site. No 1940s OE items have been found within the housing area during the 40 plus years that the housing area has been occupied.

3.24B.5.4 Potential Exposure Routes

Access to the site is currently unrestricted and has been open to the public for over 40 years. Because no OE items were discovered during sampling or reported previously, it is unlikely that OE exists at the surface in this area. Therefore, it is unlikely that a receptor would come in contact with an OE item on the surface. Because the site was graded prior to construction of the housing, it is possible that OE (grenade fuzes, or practice grenades) could be present below the ground surface. Future construction workers could come in contact with OE during excavation activities.

For each of the OE items potentially remaining at the site, the following discussions provide information on: (1) how the item was designed to function, (2) the likelihood the item would function if found onsite and handled, and (3) the type of injury the item could cause if it functions. Additional information on these items is provided in Attachment 24B-A2.

MK II Practice Hand Grenade. The MK II practice hand grenade used the M205 or the M10A3 fuze on earlier models, and was designed to train personnel to arm and throw hand grenades. It was identical to the MK II fragmentation hand grenade, except for a filling hole in the base and a cork stopper to close the hole after the black powder strips had been inserted. The black powder strips provided noise and smoke without fragments upon functioning. It was functioned when a soldier removed the safety pin from the safety lever and threw the grenade allowing the safety lever to fly free, releasing the spring-loaded striker to strike the primer. The primer ignited the delay element in the fuze, which burned for a period of 4.0 and 5.0 seconds before firing the detonator, which in-turn fired the black powder strips forcing the cork out of the hole in the base and causing a loud report (*Navy, 1947*). These could be caused to function by

incidental contact by movement, i.e., stepping on, picking up, or kicking the grenade. The safety lever is made of very thin metal and if exposed to the elements for long periods of time, will deteriorate to eventually allow the safety pin to break free. This will allow the functioning sequence mentioned above to take place. If caused to function, the type of injury that could be sustained would be burns from the black powder strips, or possibly, exposure to metal fragments from the detonator. The detonator is part of the fuze and is contained within the grenade housing. The functioning fuze is not designed to have sufficient force to fragment the grenade itself.

Summary: It is possible that a person could cause a practice grenade to function if one were found at the site and be burned or exposed to metal fragments from the exploding detonator housed within the grenade; the practice grenade itself would not fragment. However, the grenade would have to contain a live fuze and functioning detonator, and these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

M10A3 Hand Grenade Fuze. The M10A3 grenade fuze functions much the same as the M205 grenade fuze discussed above, but differs in that the safety lever fits over rather than under the lip of the fuze body (*Navy, 1947*). An unfired grenade fuze of the types listed above should be considered very sensitive and more likely to function when exposed to incidental contact like being stepped on, crushed, or heated. These fuzes contain a very small amount of very sensitive primary explosive, which, if caused to detonate will shatter the lower portion of the aluminum fuze body. Injuries that could be expected include shrapnel wounds to unprotected areas of the body.

Summary: It is possible that a person could cause a fuze to function if one were found at the site and be burned or exposed to metal fragments, but the fuze would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that could cause it to function.

3.24B.6 Site Evaluation

The available data (e.g., archival and reconnaissance data) regarding Site OE-24B were reviewed and evaluated according to procedures described in the *Final Plan for Evaluation of Previous Work (HLA, 2000)*. The evaluation process is documented through the completion of a series of checklists. Copies of the checklist are provided as Attachment 24B-A1. This section presents a summary of the results of the checklist evaluation. It is divided into two sections, an assessment of the literature review and an assessment of the sampling performed at the site.

3.24B.6.1 Literature Review

Type of Training and OE Expected

According to training maps, Site OE-24B was used as a practice hand grenade training area in the 1940s. The literature indicates that this would not be an impact area for fired projectiles, but that practice hand grenades may have been used for training at this site. It is also possible that pyrotechnic items could have been used during training.

Subsequent Use of the Area

Subsequent use of this area was for residential housing. Review of grading plans indicates that this area was graded prior to housing construction. Grading plans indicate that cut and fill activities occurred in this area. As stated in Section 3.24B.2 the quality of the grading plan images is not sufficient to identify

the changes in ground surface elevation that resulted from the grading. It is anticipated that any OE found during housing construction would have been removed prior to occupation of the housing; however, this is not documented. After housing construction, the closest training areas were located within the MRA.

Establishment of Site Boundaries

Review of historical aerial photographs and training maps indicates that the practice hand grenade training area is in the vicinity of the site boundaries as established in the 1997 ASR. The initial site boundary was established by UXB in 1994 based on information provided in the 1994 ASR. No additional information on establishment of site boundaries is provided in the USA after action report, other than a reference to boundaries provided in the 1997 ASR.

The practice hand grenade range may include a small area to the north of the ASR boundaries based on the map and aerial photograph review. The site as digitized from the 1945 training map appears to be west of the ASR boundaries; however, review of the aerial photographs suggests that the boundaries are further to the east as shown in the ASR. All of the sampling grids extend outside of the ASR boundaries. Grid B-2 appears to have been placed in the area that was disturbed on the 1951 aerial photograph. This disturbed area also may extend to the north of the current ASR site boundaries.

Summary of Literature Review Analysis

Based on review of site literature, there was sufficient historical evidence to warrant sampling of this site. The historical information indicated that this area was used as a practice hand grenade range in the 1940s. In addition, there is evidence that the training area may have extended to the north.

3.24B.6.2 Sampling Review

This section describes the items that were found during sampling and the types of fillers that would be used in the items. The review includes a comparison of sampling locations relative to site boundaries, a review of the equipment used during sampling, a discussion on the sampling methods used and the quality control measures used during the investigation.

Sampling Results (Items Found)

Sampling was conducted at Site OE-24B in 1997. SS/GS sampling was conducted on three sample grids. SS/GS is a computer program used to statistically estimate the ordnance density of a site or grid during field investigations. Guided by the program, 225 of 1600 magnetic anomalies identified were sampled. One grenade fuze was uncovered at a depth of 0.5 feet below ground surface (bgs) in Grid 01B. Wire, nails, and other types of small metal debris were found in the upper two feet bgs at the remaining anomaly locations. The presence of a grenade fuze supports the use of the site as a practice grenade training area. No evidence of other types of training or use as an impact area was identified as a result of sampling.

Site Boundaries Review

A review of the sampling results indicates that a grenade fuze was found in the southern most grid (01B). No OE scrap or OE items were found in the other two grids. Based on the results of the sampling the training area may have extended south into the area sampled by Grid 01B.

Equipment Review

USA used the Schonstedt Model GA-52/Cx magnetometer to survey Site OE-24B. A maximum search lane of 5 feet was used during sampling. The Schonstedt instruments are passive dual flux-gate magnetometers – highly sensitive magnetic locators that detect ferrous (iron) metal objects; however, they cannot detect non-ferrous metal objects (e.g., lead, brass, copper, aluminum). Magnetometers make passive measurements of the earth's natural magnetic field; ferrous metal objects (and rocks) are detected because they produce localized distortions (anomalies) in the magnetic field. The Schonstedt magnetometers actually detect slight differences in the magnetic field (the “gradient”) by means of two sensors mounted a fixed distance apart within the instruments' staff. Because the magnetic response falls off (changes) greatly even over a short distance, a gradient magnetometer like the Schonstedt Model GA-52/Cx is especially sensitive to smaller, near-surface ferro-metal objects (*Breiner, 1973*).

The performance of the GA-52/Cx was evaluated as part of the Ordnance Detection and Discrimination Study (ODDS; *Parsons Infrastructure & Technology Group Inc. [Parsons], 2001*). As part of the ODDS, studies were performed to evaluate:

- Signatures of inert OE items suspended in air at varying orientations and distances from the geophysical sensor (static tests).
- The ability of various geophysical instruments to detect and discriminate between different OE items buried at various depths (seeded tests).
- Geophysical instrument performance at actual OE sites (field trial testing)

The Schonstedt tools were not evaluated during the static test; therefore, only the seeded test results and field trial tests are discussed herein. It is recognized that the ODDS study areas may not represent the same field conditions as Site OE-24B; therefore, differences in field conditions, if applicable, should be considered when using information from the ODDS.

During the seeded test, the Schonstedt Model GA-52/Cx detected between 67 and 78 percent of Type 1 items (MK II hand grenades and illumination signals) buried at depths ranging from just below the surface to 1 foot. The detection rate percentages presented in the ODDS vary according to the search radius used (either 1.6 or 3.3 feet) for the analysis, and assume a 5-foot wide search lane. Results for the 3-foot search lane, also evaluated as part of the ODDS, are not included in the detection percentages presented above, because the 3-foot wide search lanes were not used during the investigation. A standard search radius for investigating anomalies was not specified in the CMS work plans or after action report; therefore, the detection “range” based on the two search radii is presented above. These detection rates are considered conservative because an additional 1 foot was added to the items' calculated penetration depth to allow for soil deposition over time. Because the field conditions at the seeded test site and orientations of buried items may not be comparable to the Site OE-24B conditions, the results should only be used as an indication that the equipment is capable of detecting the same types of items between 0 and 1-foot bgs.

Results of the ODDS field test trials were also reviewed for potential use in evaluating instrument performance at Site OE-24B. Detection ranges for the Schonstedt Model GA-52/Cx were calculated for 4 of the 6 test sites; the remaining sites did not have enough OE detected to allow calculation of site statistics. A standard search radius for investigating anomalies was not specified in the CMS work plan or after action reports; therefore, the detection “range” based on the two search radii (1.6 and 3.3 feet) is presented above. The calculated detection rates for the combined sites ranged from 97 to 100 percent

depending on the search radius used for the calculation. It should be noted that the ODDS field trial sites were selected to represent areas with high ordnance density. In comparison, Track 1 sites are expected to have very low ordnance densities. Therefore, the field trial results may not be applicable to Track 1 sites.

Results of the ODDS field trails for field test site FTS-3, which has an OE item density most like Site OE-24B, were also reviewed. Five OE-related items were located at FTS-3, and no additional OE items were found after sifting 10 percent of each grid. This result indicates that it is unlikely that OE items would remain at FTS-3. Similar results could be expected at other sites (such as OE-24B) after survey and clearance using a Schonstedt Model GA-52/Cx.

Although not directly comparable to Site OE-24B, the results of the ODDS indicate that the Schonstedt model used at this site is capable of detecting the ferrous surface and subsurface OE expected at this site. Blank ammunition is non-ferrous and cannot be detected with a magnetometer.

Sampling Methods Discussion

SS/GS sampling methodologies were used at this site. As stated previously, SS/GS is a computer program used to statistically estimate the ordnance density of a site or grid during field investigations. It estimates the number of ordnance items at a given site or grid and can be used to assess whether a site has been characterized adequately. This program was designed so there were equal chances of finding OE and non-OE related items. Excavation of anomalies identified with a magnetometer is performed in accordance with direction of the program; generally 32 to 40 percent of the flagged anomalies are investigated using this technique (CMS, 1995). The SS/GS methodology was reviewed by the EPAs Federal Facilities Restoration and Reuse Office. The Technical Support Center, EPA National Exposure Research Laboratory (NERL) in Las Vegas, Nevada also provided statistical assistance in reviewing the SS/GS methodology. Several problems were identified as a result of the review. The primary conclusions were that 1) the statistical procedures are vague and not well documented, 2) that conclusions about homogeneity are not consistent, and 3) that the stopping rules are faulty and 4) not able to identify UXO clusters at a site. Although these problems were identified, the information obtained during sampling is useful in identifying the presence of and type of OE present at the site.

As part of this sampling effort two standard grids of 100 feet by 200 feet and one grid of non standard dimensions were sampled (1.29 acres). One thousand six hundred anomalies were identified within these grids, and 225 anomalies (14 percent) were sampled. As noted above, an expended grenade fuze was identified. Because no UXO items were encountered during sampling of the 225 anomalies, the expected number of UXO items calculated by the SS/GS program is zero.

Quality Assurance/Quality Control

Field Sampling

Throughout the operations at Site OE-24B, the contractor performed daily operational checks and Quality Control (QC) inspections of the SS/GS work done on this site (USA, 2000). Quality Assurance (QA)/QC performed throughout the field sampling is documented in the AAR (USA, 2000). Because of the nature of the SS/GS sampling, QA/QC was limited to inspections of operational activities and documentation. No deficiency reports were written during inspections. In accordance with the USA/CMS work plan, all instruments requiring maintenance and/or calibration were to be checked prior to the start of each workday. Batteries were to be replaced as needed and the instruments were to be checked against a known source. The QC specialist was responsible for ensuring that personnel perform operational checks

and maintain appropriate log entries. The QC specialist also was to perform random unscheduled checks of the various sites to ensure that personnel perform the work as specified in the work plan.

Data Management

Parsons, the current OE contractor, performed a 100 percent Quality Control review of the data associated with this site. This review followed the guidelines presented in the Standard Operating Procedures provided as Appendix A. This review included review of the SS/GS records, review of the field grid records, and review of the database created by the OE contractor. The USACE followed the QC review with a 10 percent QA review of the Parsons' data review. The requirements of the QA review are described in the Standard Operating Procedure (SOP) provided as Appendix B to the Track 1 Remedial Investigation/Feasibility Study (RI/FS). The purpose of the data review was to complete a 100 percent check of all available grid and SS/GS records to identify discrepancies between the after action reports and the grid records. Discrepancies were then researched and corrections made, if appropriate, prior to loading the data into the project database. Information from the SS/GS indicated that a grenade fuze was found during sampling. This information was not identified in the associated grid record, but was added to the database based on the identification in the SS/GS records.

For this site, the following conclusions can be mad regarding the quality of the data:

- The grenade fuze can be located to the grid. Information on location within the grid is not available.
- The data collected are useful in providing information concerning the type of OE items present at the site.
- Because some anomalies were not excavated using the SS/GS investigative approach, some OE scrap items may still be present within the sampling grids.
- Because only one OE scrap item was found, and no OE items were found through the investigation of 225 randomly selected anomalies out of 1600 total, it is reasonable to assume that a small percentage of the remaining anomalies could contain OE scrap. OE would not be expected based on the sampling results.
- Problems have been identified with the statistical methods used in the SS/GS sampling as noted above; however, the sampling results are still useful in identifying OE potentially present at the site.

3.24B.7 Conclusions and Recommendations

The following section presents conclusions and recommendations for this site based on the review and analysis of the data associated with historical information and sampling activities.

3.24B.7.1 Conclusions

Site Use and Development

- The site appears to have been used as a practice hand grenade range in the 1940s. Both historical data and sampling data support this conclusion.

- The training appears to extend to the northwest to encompass the entire disturbed area shown on the 1951 aerial photograph; however, the current boundaries and grid locations encompass most of the disturbed area. No changes to the site boundaries are recommended.
- Subsequent use of this area as military housing would suggest that live items associated with the use in the 1940s would have been removed during the construction of the housing, if encountered.
- Review of grading plans for the housing development and aerial photographs following development of military housing indicates that the site was filled/cut prior to completion of the housing.
- No incidental OE finds of practice 1940s-era hand grenades are documented in this area. A burial pit containing a M23A1 rifle grenade smoke and 100 M1 rounds, both ball and tracer, was found northeast of the site. These items would not be expected to have been used at a practice hand grenade training area.

Sampling Adequacy and Data Quality

- Based on review of the site data, no sampling was completed within the digitized 1945 site boundary; however, it does appear that sampling was completed within the vicinity of a cleared area present on the 1951 aerial photograph. The finding of a grenade fuze during sampling also suggests that sampling was completed in the area of the 1945 practice grenade range.
- The Schonstedt Model GA-52/Cx was used for all geophysical investigations. This instrument was evaluated as part of the ODDS and is capable of detecting the type of items expected at this site. A numerical value of detection of items cannot be calculated for an individual site because of the differences in site conditions between the ODDS sites and Site OE-24B.
- The sampling methodology used for this site was SS/GS. Problems with the statistical methods used in the program have been identified; however, the data collected are useful in evaluating the past use and potential distribution of OE at the site.
- The following OE items, if present at the site, are considered to pose an acceptable risk if encountered for the following reasons:

MK II Practice Hand Grenade. It is possible that a person could cause a practice grenade to function if one were found at the site and be burned or exposed to metal fragments from the exploding detonator housed within the grenade; the practice grenade itself would not fragment. However, the grenade would have to contain a live fuze and functioning detonator, and these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

M10A3 Hand Grenade Fuze. It is possible that a person could cause a fuze to function if one were found at the site and be burned or exposed to metal fragments, but the fuze would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function.

- Although the previous OE sampling efforts performed at Site OE-24B are not consistent with requirements in place today, the quantity and quality of the available information is sufficient to make an informed decision regarding the site. The entire site was not sampled; however, further efforts to refine the site boundaries or conduct 100 percent sampling of the site would not add significantly to the understanding of the site or change the conclusions of this report.

3.24B.7.2 Recommendations

Based on review of existing data:

- It is not anticipated that OE would remain at this site. However, there is potential for OE to be present at this site because OE was used throughout the history of Fort Ord.
- This site qualifies as a Track 1, Category 3 site because it was used for training. OE items that potentially remain pose an acceptable risk based on site-specific evaluations conducted in the RI/FS.
- No further OE-related investigation is recommended.

These conclusions and recommendations are based on the following:

- The literature review and sampling provide no evidence that HE was used at the site or that the site was used as an impact area
- No live OE was found during the OE sampling program. OE-related items were used for training purposes only and were inert.
- The site has been occupied by residences for over 40 years and no OE incident reports have been found indicating that practice grenade training items were discovered at the site.

The U.S. Army Corps of Engineers completed ordnance investigations at Site OE-24B. The Army, with regulatory oversight from the U.S. Environmental Protection Agency (USEPA) and the California Department of Toxic Substance Control (DTSC), conducted a systematic investigation and no explosive material was found. The investigation was specifically designed to assess the nature of the past military training activities at the site. Even though no actionable risk was identified through the remedial investigation process, in the interest of safety the Army recommends reasonable and prudent precautions be taken when conducting intrusive operations at the site. Construction personnel involved in intrusive operations at the site should attend the Army's "ordnance recognition and safety training" to increase their awareness of and ability to identify OE items. Trained construction personnel will contact an appropriate local law enforcement agency if a potential OE item is encountered. The local law enforcement agency will arrange a response by the Army. To accomplish that objective, the Army will request notice from the landowner of planned intrusive activities, and in turn will provide ordnance recognition and safety training to workers prior to the start of intrusive work. Additionally, while these intrusive activities are ongoing, the Army will conduct weekly site visits and provide refresher education as appropriate.

Upon approval of the proposed remedy for Site OE-24B (no further OE-related investigation), Site OE-24B will be incorporated into the basewide OE RI/FS 5-year review schedule. The purpose of the 5-year review is to determine whether the remedy at Site OE-24B continues to be protective of human health and the environment. The 5-year review will also document any newly identified site-related issues identified during the review and will identify recommendations to address them as appropriate. At the time of the next 5-year review, the Army will assess whether the education program should continue. If experience indicates that no explosive items have been found in the course of development or redevelopment of the site, it is anticipated that the education program may, in consultation with the regulatory agencies, be discontinued, subject to reinstatement if an explosive item is encountered in the future.

3.24B.8 References

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TABLES

Table 24B-1. Sampling Operations, Site OE-24B
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site	Grid ID	Operation Type	Contractor	Geophysical Instrument Used	Grid Completion Date
OE-24B-Practice Hand Grenade Range	OE-24B_(01 B)	SS/GS	USA	SCHONSTEDT GA-52CX	5/6/1997
OE-24B-Practice Hand Grenade Range	OE-24B_(02 B)	SS/GS	USA	SCHONSTEDT GA-52CX	5/7/1997
OE-24B-Practice Hand Grenade Range	OE-24B_(03 B)	SS/GS	USA	SCHONSTEDT GA-52CX	5/7/1997

Grid ID = Only the portion of the grid ID within parenthesis is posted on Plate 24B-4.

SS/GS = Sitestats/Gridstats sampling performed, selected anomalies were excavated.

USA = USA Environmental

Grid Completion Date = Work may have been conducted within a particular grid on more than one date.

**Table 24B-2. OE Scrap Found During Sampling, Site OE-24B
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California**

Site	Grid ID	OE Items	Status	Depth (in)	Quantity
OE-24B -- Practice Hand Grenade Range	OE-24B_(01 B)	Fuze, grenade	Inert	6	1

Site = OE Site Number.

Grid ID = Grid where item was found. Only the portion of the grid ID within parenthesis is posted on Plate 24B-4.

Status = Condition of item, either live or inert. Inert indicates no OE hazard (i.e., OE Scrap).

Depth = Inches below ground surface that the item was found.

Quantity = Number of like items found.

ATTACHMENT

24B - A1

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

Yes No Inconclusive

TYPE OF TRAINING AND OE EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired OE such as mortars, projectiles, rifle grenades or other launched ordnance)?

	No	
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Sources reviewed and comments

No evidence to support an impact area. This OE site was identified as "Practice Hand Grenade" on 1945 and 1946 Training Facilities maps. The site is one of four hand and rifle grenade training locations in this area, identified on the 1945 and 1946 maps. The four training areas are not identified on available training maps after 1946 (e.g., Circa 1954 map, 1945 map, 1946 Master Plan).

2. Is there historical evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?

Yes		
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Sources reviewed and comments

The practice grenade fuze contains a small black powder charge (Greenhill, 2001).

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g., simulators, flares, smoke grenades) but not explosives?

		Inconclusive
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Sources reviewed and comments

Its possible based on the historical use of the site that smoke grenades may have been used. No evidence of pyrotechnics have been found however (USAEDH, 1997; USA, 2000).

DEVELOPMENT AND USE OF THE SURROUNDING AREA

4. Does subsequent development or use of the area indicate that OE would have been used at the site?

	No	
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Sources reviewed and comments

Housing was constructed in this area in the late 1950s. References: USACE, 1959 (Grading Plans) and USACE, 1960 (Photomap).

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

Yes No Inconclusive

5. Does use of area surrounding the site indicate that OE would have been used at the site?

		Inconclusive
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Sources reviewed and comments

Area is bordered by the multi-range area to the south, training areas to the east and west (later a golf course to the west) and training areas/development to the north. Training area to the west does not have any OE sites within. Nothing found in the two OE sites to the north. References: 1945 training map, 1946 map.

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish

Yes		
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Sources reviewed and comments

Small disturbed area visible in the northwest corner of the ASR site boundary (1951 aerial photograph).

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

Yes		
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Sources reviewed and comments

Boundary defined on the 1945 Training Facilities Map (Army, 1945).

8. Should current boundaries be revised?

		Inconclusive
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Sources reviewed and comments

The boundary could be shifted to the north and west to encompass the disturbed area shown in the 1951 photo. Sampling grids were completed in the area to the north; therefore the area to the north has been investigated.

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

Yes No Inconclusive

RESULTS OF LITERATURE EVALUATION

Does the literature review provide sufficient evidence to warrant further investigation?

Yes		
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Comments

Results of the literature review indicate that the site was used for practice hand grenade training in the 1940s. The results of the boundary review indicate that the boundaries could be extended toward the north. A sample grid was placed in the approximate location of the disturbed area from the 1951 aerial photo.

References

USAEDH, 1997. Revised Archives Search Report, Former Fort Ord, California, Monterey County, California. Prepared by US Army Corps of Engineers St. Louis District.
 Training Facilities Map, Revised August 1945
 Master Plan - Fort Ord, April 5, 1946
 Training Areas That Cannot Be Used at the Same Time, Circa 1954
 Field training Areas and range Map, April 27, 1964.
 Hogg, Ian V., 2001. The American Arsenal. Greenhill Books. London.
 1951 Aerial photograph

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Yes No Inconclusive

1. Is there evidence that the site was used as an impact area (i.e., fired OE such as mortars, projectiles, rifle grenades and other launched ordnance)?

	No	
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Sources reviewed and comments

No evidence to suggest that the area was an impact area. One OE-related scrap expended grenade fuze was found during sampling (USA, 2000).

2. Is there evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?

Yes		
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Sources reviewed and comments

One expended grenade fuze was found during sampling (ASR, USA, 2000).

3. Is there evidence that training involved use of pyrotechnic and/or smoke producing items (e.g., simulators, flares, smoke grenades) but not explosives?

	No	
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Sources reviewed and comments

No evidence to suggest that pyrotechnics were used (USAEDH 1997); Review of Fort Ord facilities and training maps; After Action Report - USA, 2000).

4. Was sampling and/or reconnaissance performed within the appropriate area?

Yes		
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Sources reviewed and comments

The three sample grids were all partially outside of the boundary of the site due to the terrain and the presence of houses and streets (USA, 2000). However, Grid B-2 appears to be within an area where previous training occurred. The grenade fuze was found in Grid B-1.

5. Does sampling indicate OE and/or ordnance-related scrap are present at the site?

Yes		
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Sources reviewed and comments

OE-related scrap (expended grenade fuze) was found during sampling (USA, 2000).

ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

Yes No Inconclusive

6. Were the type(s) of items found consistent with the type of training identified for the site?

Yes		
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Sources reviewed and comments

The grenade fuze is consistent (USA, 2000).

7. Were the type(s) of items found consistent with the era(s) in which training was identified?

		Inconclusive
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Sources reviewed and comments

The model of expended grenade fuze was not identified; therefore the era of the fuze is unknown (USA, 2000).

8. Was HE fragmentation found?

	No	
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Sources reviewed and comments

No HE fragmentation identified (USAEDH 1997; USA, 2000).

9. Was HE found?

	No	
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Sources reviewed and comments

Expended grenade fuze and fragmentation only (USAEDH 1997; USA, 2000).

10. Were LE found?

	No	
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Sources reviewed and comments

Expended grenade fuze and fragmentation only (USAEDH 1997; USA, 2000).

11. Were pyrotechnics found?

	No	
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Sources reviewed and comments

Revised Archives Search Report (ASR), USAEDH 1997; After Action Report - USA, 2000.

12. Were smoke producing items found?

	No	
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Sources reviewed and comments

Revised Archives Search Report (ASR), USAEDH 1997; After Action Report - USA, 2000.

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Yes No Inconclusive

13. Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?

	No	
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Sources reviewed and comments

Expended grenade fuze (USAEDH 1997; USA, 2000).

14. Do items found in the area indicate training would have included use of training items with energetic components?

Yes		
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Sources reviewed and comments

USAEDH 1997; After Action Report - USA, 2000. The grenade fuzes used during the era contained a black powder charge.

15. Were items found in a localized area (possibly the remnants of a cleanup action)?

	No	
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Sources reviewed and comments

Only a single item was found, After Action Report - USA, 2000.

16. Has the site been divided into sectors to focus on areas of common usage, similar topography and vegetation, and/other unique site features?

	No	
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Sources reviewed and comments

Site was not divided into sectors. The boundaries were established based on historical documentation and site visits (USA, 2000 and USAEDH,1997).

17. Should current site boundaries be revised?

		Inconclusive
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Sources reviewed and comments

Cleared area shown on 1951 aerial photo is mostly captured by the site boundary. One of the grids was placed within the cleared 1951 cleared area. Site boundary could be extended to include the grid.

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Yes No Inconclusive

18. Was equipment used capable of detecting items suspected at the site at the maximum expected depth?

		Inconclusive
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Sources reviewed and comments

Hand grenades would be expected on the surface. The expended grenade fuze was found at a depth of 6 inches. It is unknown if items could be buried deeper than 6 inches at this site, because of the construction activities. Based on finding the expended grenade fuze and other non-OE scrap items to a depth of 2 feet, it is expected that the instrument would detect items within the top 2 feet.

19. Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?

Yes		
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Sources reviewed and comments

Schonstedt GA-52/Cx (USA, 2000). Non ferrous items were not expected at this site.

20. Do the results of the ODDS indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?

		Inconclusive
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Sources reviewed and comments

Hand grenade (practice) was listed as Type I item in the ODDS (USA, 2000). Instrument listed in the after action report is the Schonstedt GA-52/Cx. Depending on model, line spacing and search radius, based on the seeded tests, probability ranges from 67% to 78% for the Type I item. Results of the field trials indicate that 97 to 100 percent of OE items could be found using a 5-foot line spacing. A 5-foot line spacing was used for sampling. The results of the ODDS indicate that the Schonstedt GA-52/Cx is capable of detecting the ferrous OE items expected at this site. A site specific numerical detection rate cannot be calculated for an individual site based on the results of the ODDS.

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

	Yes	No	Inconclusive
21. Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?			Inconclusive

Sources reviewed and comments

Yes. The items used at the site are non-penetrating items. However, if items were buried, then the confidence level would decrease.

22. Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturer's specifications?	Yes		
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Sources reviewed and comments

Throughout operations at Site OE-24B CMS performed daily operational checks and Quality Control (QC) inspections of its work (USA, 2000)

23. Based on the anticipated target density (UXO items per acre) has the minimal amount of sampling acreage been completed in accordance with the scope of work or contractor work plan?			Inconclusive
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Sources reviewed and comments

SiteStats/GridStats was used to design and implement sampling at this site. Subsequent to this work, the use of this program has been questioned. It appears that the data are of good quality; however, it is not possible to statistically evaluate the adequacy of the sampling of this site.

24. Based on sampling procedure (e.g., grids, transects, and/or random walks) was a percentage of the site completed to provide 95% confidence in a UXO density estimate, and if so provide total area investigated and the UXO density estimate.			Inconclusive
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Sources reviewed and comments

56,000 square feet (approximately 1.29 acres) sampled by CMS based on 2 100x200-foot grids and 1 grid of non-standard dimensions. Each of the three grids were established partially outside of the Site OE-24B boundary due to terrain and structures within the site (USA, 2000). It is not possible to estimate OE density because no OE was found.

Total Area: 56,000 sq.	
UXO Density:	Not Calculated

**ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION**

Yes No Inconclusive

25. What percentage of the anomalies were intrusively investigated?

Sources reviewed and comments

1600 anomalies identified and 225 sampled or 14% (USA, 2000).

Total % of anomalies investigated:	14%
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26. Was the appropriate data processing scheme used for the site, how was the data processed?

Sources reviewed and comments

Not applicable, no digital geophysical data were collected.

		Not Applicable
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27. Has the field data been collected and managed in accordance with quality control standards established for the project?

Sources reviewed and comments

The grids which were sampled in Sites OE-24B were not subject to formal Quality Control (QC) inspections because of the nature of the SiteStats/GridStats procedures. Throughout operations at Site OE-24B, CMS performed daily operational checks and QC inspections of its work. No deficiency reports were written during inspections of the SiteStats/GridStats sampling work done on this site (USA, 2000).

Yes		
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Result of Sampling Evaluation

Does the sampling evaluation provide sufficient evidence to warrant further investigation?

	No	
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Comments

Based on the review of existing site data, it is not anticipated that OE would remain at this site, however, because the site was used for practice hand grenade training, the possibility for practice grenade fuzes to remain at the site cannot be ruled out.

References

USA Environmental, Inc., (USA) 2000. After Action Report SiteStats/GridStats OE Sampling, Inland Range Contract, Former Fort Ord, California, Site 24B-E And OE-39. December 30.

ATTACHMENT 24B-A
EVALUATION OF PREVIOUS WORK: SITE OE-24B
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
USAEDH, 1997. Revised Archives Search Report, Former Fort Ord, California, Monterey County, California. Prepared by US Army Corps of Engineers St. Louis District.			
Parsons, 2000. Ordnance Detection And Discrimination Study, Seeded Test Technical Memorandum, Former Fort Ord, California, Presidio of Monterey, California.			
USAESCH, 1997. Penetration of Projectiles Into Earth, An Analysis of UXO Clearance Depths at Ft. Ord. September 10. Appendix F of the Phase 2 EE/CA.			

ATTACHMENT 24B-A2

POTENTIAL ORDNANCE USED AT OE-24B

1 ATTACHMENT 24B-A2

2
3 POTENTIAL ORDNANCE USED AT OE-24B

4 MK II Practice Hand Grenade - The MK II practice hand grenade was used in training to simulate the MK
5 II fragmentation hand grenade (*Hogg, 2001*). The MK II practice hand grenade used the M205 or M10A3
6 fuze on earlier models, and was designed to train personnel to arm and throw hand grenades. It was
7 identical to the MK II fragmentation hand grenade, except for a filling hole in the base and a cork stopper
8 to close the hole after the black powder strips had been inserted. The black powder strips provided noise
9 and smoke without fragments upon functioning. It was functioned when a soldier removed the safety pin
10 from the safety lever and threw the grenade allowing the safety lever to fly free, releasing the spring-
11 loaded striker to strike the primer. The primer ignited the delay element in the fuze which burned for a
12 period of 4.0 and 5.0 seconds before firing the detonator, which in-turn fired the black powder strips
13 forcing the cork out of the hole in the base and causing the smoke and noise (OP, 1664).

PLATES

Disclaimer

The following plates have been prepared to present pertinent features digitized from historical training maps and scanned aerial photographs. It should be noted that minor discrepancies between source maps, combined with the natural degradation of older source maps and photographs, has resulted in misalignment of some map features. In addition, camera angle and lens distortion introduced into older aerial photographs, combined with changes in vegetation and site features over time may contribute to misalignments of some map features with respect to the aerial photographs.