SITE OE-20

RECOILLESS RIFLE TRAINING RANGE

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3.20 Site OE-20 (Recoilless Rifle Training Range)

A summary report for Site OE-20 is provided below. This report consists of two parts. The first part, contained in Sections 3.20.1 through 3.20.5, 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 3.20.6). 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 3.20.6.1), and evaluation of the sampling process(es) (Section 3.20.6.2). These discussions are based upon information from standardized literature review and reconnaissance review checklists (Attachment 20-A). Section 3.20.7 provides conclusions and recommendations for the site. References are provided in Section 3.20.8.

3.20.1 Site Description

Site OE-20 is approximately 7 acres in size and located in the southwestern portion of the Main Garrison of the former Fort Ord north of Gigling Road and east of Highway 1 (Plate 20-1). Site OE-20 was identified as a potential Recoilless Rifle Training Range through a review of Fort Ord historic records completed as part of the Fort Ord Archives Search (*U.S. Army Engineer Division, Huntsville [USAEDH], 1993*).

3.20.2 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 Harding ESE. 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 the misalignment of some map features with respect to the aerial photographs.

1940s Era

Site OE-20 lies within a land tract purchased from private landowners by the government after July 1940 (*Arthur D. Little, Inc.* [*ADL], 1994*). Review of 1940s training maps, aerial photographs, and Fort Ord historical maps indicate that the nearby training sites were used beginning sometime in the late 1940s.

- The 1941 and 1949 aerial photographs show no distinguishable disturbed or cleared area in the vicinity of the Recoilless Rifle Training Range (OE-20). A 1949 aerial photograph shows a round cleared area northeast of the site whose location is coincident with an area identified as a rifle instruction circle (RIC) on 1950s training maps.

- Site OE-20 is within an area identified as a "Well Area No Artillery Firing Or Demolitions" on the 1945 and 1946 training maps (*U.S. Army [Army], 1945; U. S. Army Corps of Engineers [USACE], 1946*). The Well Area refers to the general area containing the Fort Ord water supply wells.

1950s Era

Review of 1950s training maps, aerial photographs, and Fort Ord historical maps indicates that the site vicinity was used for training in the 1950s. Housing was constructed just south of Site OE-20 in 1953 (Plate 20-2). The site area is identified as Recoilless Rifle Training Area (RRTA) on the circa 1954, 1956, and 1957 training maps. The results of the review of 1950s era documentation are as follows:

- A 1951 aerial photograph shows a cleared square area in the same area that Machine Gun Square 1 is depicted on the 1954 training map. A disturbed area is visible just east of the site. Highway 1 is present to the west of the RRTA as identified on the circa 1954 training map.

- Housing (North Bayview Park) was constructed on the south side of Gigling Road in 1953 (*ATC Environmental Inc.* [*ATC], 1994*). The 1967 map identifies the housing area (North Bayview Park) as Joseph W. Stilwell Park (*Army, 1967*).

- An area in labeled RRTA on circa 1954, 1956, and 1957 training maps is in the vicinity of Site OE-20.

- As seen on circa 1954 and 1956 maps, approximately 400 feet east of the RRTA is a training area labeled "R 57 & 75." The letter "R" is not defined on the training maps; however, it is assumed that this was a training area for 57mm and 75mm recoilless rifles. About 600 feet northeast of Site OE-20 Machine Gun Squares 1 and 2 are present. Approximately 400 feet west is an area labeled "South Inspec (believed to be Inspection) Area (SIA)" on the 1954 map and 1956 maps (*Army, 1954 and 1956*).

- A 1956 aerial photograph shows cleared or disturbed areas for Machine Gun Squares 1 and 2 and for the RRTA (Plate 20-2). Housing is evident south of the site. No distinct site boundary can be delineated based on the 1956 aerial photograph.

- The site is identified as "RRTA" on the 1957 training map (*Army, 1957*), but is not identified on the 1958 training map or any other maps thereafter.

- Ranges used for the firing of antitank weapons, including recoilless rifles, were present within the Multi-Range Area (MRA; Plate 20-1) and are shown on the 1946, circa 1954, 1956, 1957, 1958, 1961, and 1964 training maps.

1960s to Present

Review of 1960s Fort Ord training maps and aerial photographs indicate no evidence of training activities in the site vicinity.

- The 1964, 1967, and 1972 training facilities maps show training area "F" approximately 100 feet east of the site. The training area is indicated as "G-3" on the map legend (*Army, 1964 and 1967; USACE, 1972*). G-3 included operations and plans (*Army, 1985*).

- A 1999 aerial photograph shows Highway 1 to the west and housing to the south of the site (Plate 20-3).

Future Land Use

This site is within land to be transferred to the City of Seaside. Future use of this area is designated as open space (*USACE, 1997*).

3.20.3 Potential Ordnance based on Historical Use of the Area

No evidence has been found to suggest that this site was used for anything other than a troop training area for recoilless rifle familiarization. Information gathered during site investigation activities indicates no evidence of OE use. Information on recoilless rifles used in the 1950s was obtained from Field Manual (FM) 23-11 (*Army, 1965*), from Army Regulation (AR) 385-63 (*Army, 1983*) and interviews (*Stoner, 2002*). If recoilless rifle projectiles were fired at this site, the projectiles would have been fired roughly parallel to ground surface and would be expected to be located at or near the surface.

3.20.3.1 Recoilless Rifles

Recoilless rifles are portable antitank weapons that were either shoulder or ground fired and in some cases could be fired by either method. The recoilless rifle was developed during WW II and saw limited action by war's end. The weapon was used extensively during the Korean War. Recoilless rifles in use by the Army in the mid 1950s include the M18 57mm, the M20 75mm, the M40 106mm, and the truck-mounted M27 105mm (*Stoner, 2002*). Explosive ammunition used in the models of recoilless rifles listed above included high explosive antitank (HEAT), white phosphorous (WP) smoke, and canister (antipersonnel) in the M18 and M20; HEAT and high explosive plastic (HEP) in the M27; and HEAT, HEP, and APERS (flechette antipersonnel) in the M40. Additionally, target practice (TP) or drill rounds were also used in all models of recoilless rifles.

3.20.4 History of OE Investigations

The following describes the OE investigations that have been conducted at Site OE-20.

1993 Archives Search Report

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. Guidance for conducting archives searches did not exist prior to 1995. The 1993 ASR was completed based on the Scope of Work provided to the St. Louis Corps of Engineers by the Huntsville Corps of Engineers and on archive search reports completed at other military installations. The Archives Search included a Preliminary Assessment/Site Investigation (PA/SI) consisting of interviews with individuals familiar with the sites, visits to previously established sites, reconnaissance of newly identified training areas, and reviewing data collected during sampling or removal actions.

Site OE-20 was identified as a site in the 1993 Archives Search Report (ASR; *USAEDH, 1993*). This site was identified based on review of a 1957 training map. A site visit was conducted and no evidence was observed indicating Recoilless Rifle Training. The recommendation in the ASR was that random spot sweeps should be considered. Requirements for preparation of an ASR are described in Section 2.0 of this report.

Human Factors Applications, Inc. (HFA) Investigation

In 1994, Human Factors Applications Inc. (HFA) completed a subsurface investigation of Site OE-20. The HFA sampling methodology is discussed in Section 3.20.6.2. Twelve 100- by 100-foot grids were 100 percent sampled (all anomalies detected were investigated) using either the Schonstedt Model GA-52/C or the Schonstedt Model GA-72/Cv magnetometer with a maximum search lane width of 5 feet. None of the sample grids were located within the boundary of the site (Plate 20-3). The grids were instead located in an area "down range from Site 20" in the assumed target area (*USAEDH, 1997*). No OE or OE scrap items were found during grid sampling. Based on the sampling results, HFA recommended no further action for this site (*HFA, 1994*). A summary of the sampling operations conducted at Site OE-20 is provided in Table 20-1. A site visit was conducted by Harding ESE personnel in June 2002, to locate the grid stakes used by HFA to mark the grid locations. Stakes were identified to the east of the Site OE-20 ASR boundary. The metal grid stakes used to mark the southeast corner of each grid were located in close proximity to the digitized grid locations (Plate 20-3).

The scope of work for HFA indicated that a detailed accounting of all OE items/components/scrap encountered would be performed. However, grid records providing this information are no longer available. Existing information regarding items found is summarized in the text of the HFA OE Sampling and OE Removal Report (*HFA, 1994*). The report itemized inert OE scrap found and removed. Some non-OE scrap was also removed and turned in at the end of the project. Contract requirements for the scope of work performed by HFA are described in more detail in Section 2.0 of this report.

1997 Revised Archives Search Report

The revised ASR included a review of the sampling investigation conducted in 1994 by HFA. Based on the sampling results (no OE items found), the 1997 revised ASR recommended no further OE-related investigation at Site OE-20 (*USAEDH, 1997*).

3.20.5 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-20 is based on available site-specific and general information including literature reviews, sampling results, aerial photographs, maps, technical manuals, field observations, and the information shown on Plate 20-2. It is provided to help evaluate the adequacy of the investigation completed to date and to identify potential release and exposure pathways. The model presented for this site is for a recoilless rifle training area (Plate 20-4). A description of the training area is described below. Additionally, a description of a recoilless weapons range from AR 385-63 (*Army, 1983*) is provided.

3.20.5.1 Type of Training

Training practices are discussed below to provide information on the types of OE that may have been used at the site and the possible location of OE potentially remaining at the site.

Recoilless Rifle Training Area

Based on the location of the site in relation to existing housing, Highway 1, and other developed areas at the time at Fort Ord, Site OE-20 would not have been used for training activities that involved the use of OE. Training at this site probably involved weapon familiarization including the proper handling, deployment, and care of the gun (Plate 20-4).

Recoilless Weapons Range

Safety design requirements for a recoilless weapons range are presented in the *Policies and Procedures For Firing Ammunition for Training, Target Practice, and Combat* (*Army, 1983*). The surface danger zone for a recoilless weapons range is composed of an impact area (primary danger area), a ricochet area (provided to contain ricochet projectiles), a secondary danger area paralleling the impact area laterally (to contain fragments on the right or left edge of the impact area), a secondary danger area on the downrange side of the impact area (to contain fragments from items exploding on the far edge of the impact area), and a rear danger zone impacted by the effects of the weapon being fired. Depending on the model of the recoilless weapon used, range safety requirements include a minimum distance to impact of approximately 250 to 300 meters, and a maximum range of approximately 2,200 to 8,600 meters. The minimum distance to impact may be reduced by 75 percent if firing non-explosive projectiles from unprotected positions (*Army, 1983*).

3.20.5.2 Site Features

Site OE-20 is located within the Fort Ord Main Garrison. At the time of use (about 1954 through 1957) the area consisted of an open field that was relatively flat. The southern end of the site was bounded by Gigling Road and the North Bayview Park Housing area. Immediately to the west and running in a north south direction is Highway 1. The recoilless rifle training area is identified on training maps as a rectangular area extending from Gigling Road approximately 250 feet north or as a rectangular area located about 250 feet north of Gigling Road, extending east-west (Plate 20-2). Other training areas in the vicinity included Machine Gun Squares, the South Inspection Area, R 57 & 75, and the South Parade Ground approximately 2,200 feet to the northeast.

Site OE-20 falls within an area delineated as a "Well Area No Artillery Firing Or Demolitions" on the 1945 and 1946 training maps (*Army, 1945; USACE, 1946*).

3.20.5.3 Potential Sources and Location of OE

Available information indicates that Site OE-20 was used as a recoilless rifle training area in the 1950s. However, it is believed that training at this site did not involve the use of OE.

3.20.5.4 Potential Exposure Routes

This site is within land currently owned by the Army and is immediately adjacent to military housing. Because no OE items were found during sampling and because the use of OE was not likely in this area, it is unlikely that a receptor would come in contact with an OE item at Site OE-20.

3.20.6 Site Evaluation

The available data (e.g., archival and reconnaissance data) regarding Site OE-20 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 20-A. 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.

3.20.6.1 Literature Review

Type of Training and OE Expected

As discussed in section 3.20.2, the 1950s facilities and training maps identify Site OE-20 as a RRTA. The site vicinity also included R 57 & 75 and Machine Gun Squares 1 and 2. Due to the proximity of the site to developed areas (e.g., North Bayview Park housing, Highway 1, and the Main Garrison) it is unlikely that OE was used at this site. The machine gun squares were used for the practice of setting up and aiming weapons or dry fire training (*USAEDH, 1993*). The exact use of the Site Inspect Area is unknown. The area designated as "R 57 & 75" was most likely used for recoilless rifle training using 57mm and 75mm weapons. No evidence exists that would indicate the use of pyrotechnic and/or smoke-producing items in this area. There is no evidence that training would have involved using high or low explosive items or that the area was an impact area.

Subsequent Use of the Area

With the exception of the base Commissary to the east, this area has remained undeveloped. Highway 1 (west of Site OE-20) was present prior to the use of the area as a training area. Construction of the North Bayview Park housing area (south of the site) began in 1953.

Establishment of Site Boundaries

Site OE-20 was identified from the review of Fort Ord Training facilities maps conducted by the USACE as part of the Archives Search. Other adjacent training sites were also identified. Historical aerial photographs show a cleared area in the approximate location of the RRTA. The digitized RRTA boundaries from the 1950s training maps are roughly coincident with a cleared area identified on the 1956 aerial photograph. Footprints of the RRTA taken from 1950s training maps fall partially within the current Site OE-20 boundary. A site walk was conducted and no evidence of recoilless rifle training was observed. Following the site walk and initial OE sampling of the site, USACE personnel, including the UXO Safety Specialist, evaluated the area boundary using the sampling results, site walk information, Fort Ord training maps, and aerial photographs. Based on the follow-up evaluation, the Site OE-20 boundary was established. No additional information was found as a result of the literature review to warrant changes to the current boundary of Site OE-20.

Summary of Literature Review Analysis

The site area was used for recoilless rifle and machine gun training. Other features noted on training maps include the South Inspect Area and R 57 & 75. The specific use of the South Inspect Area is not known. Based on the ASR, sampling was warranted for this site. Because of the proximity of Site OE-20 to military housing, Highway 1 and the South Parade Ground, it is unlikely that training at the RRTA would have included the use of OE. Based on the minimum range safety distances for a recoilless weapons ranges provided in AR 385-63 (*Army, 1983*), which includes all models of recoilless rifles discussed previously, it is not feasible that the Site OE-20 area could have supported a live fire range.

3.20.6.2 Sampling Review

This section describes the items that were found at the site and how these items support historical information concerning past use of the site. Site boundaries are assessed in terms of the items found. There is also a discussion regarding sampling equipment, methods, and quality control measures used during prior OE sampling programs.

Sampling Results (Items Found)

As described in Section 3.20.4, HFA completed an initial site investigation east of Site OE-20 in 1994 (*HFA, 1994*). Twelve 100- by 100-foot grids were 100 percent sampled in an area "down range from Site 20" in the assumed target area. No OE or OE scrap items were found during grid sampling and no evidence was found to suggest that Site OE-20 was used for firing of recoilless rifles or any other weapons. There was also no evidence found to suggest that any high or low explosive items, pyrotechnics, or smoke-producing items were used as part of training in the area.

Site Boundaries Review

The boundaries for Site OE-20 were established using information provided by the USACE. All sample grids were located downrange from the site in the area assumed to be the target area for the Recoilless Rifle Training Area. No OE or evidence of OE-related training was found during the Site OE-20 sampling, and no modification of the existing Site OE-20 boundaries is necessary.

Equipment Review

HFA used the Schonstedt Models GA-52/C or the GA-72/Cv magnetometers to conduct the geophysical investigation of the grids adjacent to Site OE-20. These magnetometers are hand held and swung from side to side, generating a maximum search lane width of 5 feet. 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, gradient magnetometers like the Schonstedt GA-52/C or the GA-72/Cv are especially sensitive to smaller, near-surface ferro-metal objects *(Breiner, 1973).*

The performance of both the Schonstedt GA-52/C and GA-72/Cv magnetometers were evaluated as part of the Ordnance Detection and Discrimination Study (ODDS; *Parsons Infrastructure & Technology Group Inc.* [*Parsons], 2001*). As part of 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 site testing).

The Schonstedt tools were not evaluated during the static tests; therefore, only the seeded test results and the field trial tests are discussed herein. It is recognized that the ODDS study areas may not represent the same field conditions as Site OE-20; 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/C detected between 34 and 53 percent of the Type V (75mm projectile) items, and the Schonstedt Model GA-72/Cv detected between 38 and 44 percent of the Type V items, buried at depths approaching the items maximum calculated depth of penetration (up to 4 feet for the 75mm projectile). The detection rate percentages presented in the ODDS vary according to the search radius used for the analysis (either 1.6 or 3.3 feet) and assume a 5-foot wide search lane. A search lane width of 5 feet was used by HFA during sampling at Site OE-20. Results for the 3-foot wide search lane, also evaluated as part of the ODDS, were not included in the detection percentages presented above, because 3-foot wide search lanes were not used during the geophysical investigation of Site OE-20. A standard search radius for investigating anomalies was not specified in the OE contractor work plan or the after action reports; therefore, detection ranges for the different search radii are presented above. The detection rates discussed above are considered conservative because an additional one foot was added to the items' calculated penetration depth to allow for soil deposition over time. Projectiles that may have been fired by recoilless rifles at this site (e.g., 57mm and 75mm) would have been fired roughly parallel to the ground surface. Penetration of these projectiles to depths equaling their maximum calculated penetration depths is unlikely. Because the field conditions at the seeded test site and orientations of buried items may not be comparable to the Site OE-20 conditions, the results should be used to indicate that in general, the equipment is capable of detecting the same types of items at depths exceeding the items maximum calculated depth of penetration.

Results of the ODDS Field Trial Sites (FTS) were also reviewed for potential use in evaluating instrument performance at Site OE-20. Detection rates for the Schonstedt GA-52/C and GA-72/Cv were calculated for 4 of the 6 test sites; the remaining sites did not have enough OE detected to allow calculation of site statistics. The calculated detection rates for the combined sites ranged from 52 to 98 percent depending on the search radius used for the calculation. A standard search radius for investigating anomalies was not specified in the OE contractor work plan or the after action report; therefore detection ranges for the different search radii (1.6 and 3.3 feet) are presented above. 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 densities of OE scrap. Therefore, the field trial results may not be applicable to Track 1 sites.

Results of the ODDS field test trials for the field test site closest in OE item density (FTS-3) to Site OE-20 were also reviewed. Five OE items were located during the investigation. No additional OE items were found during sifting of 10 percent of each grid (final Quality Control [QC] sampling). This indicates that it is unlikely that OE items would remain at FTS-3. Similar results could be expected at other sites, such as OE-20, after survey and clearance using the Schonstedt magnetometers.

Although not directly comparable to Site OE-20, the results of the ODDS indicate that all models of the Schonstedts used at this site are capable of detecting the ferrous surface and subsurface OE expected at this site. Small arms ammunition is non-ferrous and cannot be detected with a magnetometer.

Sampling Methods Discussion

One hundred percent grid sampling was conducted at Site OE-20. According to the HFA work plan, grids were generally to be 100- by 100-feet and separated by at least 200 feet (HFA, 1993). Twelve 100- by 100-foot grids were set up to the east of Site OE-20 as part of the 1994 HFA sampling program. A maximum search lane width of 5 feet was used during sampling. These grids were 100 percent sampled,

which requires that 100 percent of the anomalies detected in the sampling grids be excavated. The number of anomalies found was not documented and no field-generated grid records were available for review. According to the HFA work plan, each grid was given a 100 percent visual surface survey. A 100 percent subsurface survey, using a Schonstedt magnetometer was performed simultaneously. If surface items were found, their locations were plotted on a map and the items removed. Subsurface contacts and anomalies were flagged for excavation and identification. Subsurface contacts were uncovered using hand tools (*HFA, 1993*). The general approach to the investigation of anomalies was to dig down to the anomaly, remove it, and check the excavation with the Schonstedt. If the anomaly was no longer detected, no further digging was performed. If the Schonstedt continued to detect an anomaly, the area was excavated to at least 4 feet below ground surface (bgs). No information was gathered on the types of non-OE scrap discovered during sampling, or the depths at which items were found. Because no OE items were identified at Site OE-20, OE densities were not calculated.

Quality Assurance/Quality Control

The Quality Assurance/Quality Control (QA/QC) procedures are described below.

Field Sampling

Little specific information concerning operational procedures was documented in the HFA after action report (*HFA, 1994*). The following describes field procedures specified in the work plan and the after action report when documented. According to the HFA work plan, equipment was inspected by the Senior UXO Supervisor (SUXOS) and Quality Control/Site Safety Officer (QC/SS) prior to placing it in service (*HFA, 1993*). Magnetometers were inspected and tested daily on a buried piece of inert ordnance to ensure that the magnetometers were operating within specification. The test source, a solid steel 81mm mortar (inert ordnance item), was buried at a depth of 4 feet. The magnetometers were tested before starting sampling operations in the morning and when operations resumed after lunch (*HFA, 1994*). Magnetometers that failed the inspection and test were determined to be in need of repair, and were to be removed immediately from service. Random checks were to be performed by the QC/SS and/or the SUXOS during daily operations. The QC/SS was to inspect all records bi-weekly to ensure that they were kept and maintained (*HFA, 1993*).

After surface and subsurface clearance of each site and prior to removal of grid markers, the QC/SS performed the standard minimum 10 percent QC check of each grid (*HFA, 1994*). If OE was detected during the QC check, the grid was to be searched again to ensure that there were no other anomalies present. Following the QC checks, the Army Corps of Engineers Huntsville Division (CEHND) Safety Specialist was to perform a 10 percent QA check of the site (sampled grids) prior to acceptance of the sample data. According to the After Action Report, the project was completed without QC discrepancy. It was not possible to perform a check of the reported results and the field-generated grid sampling documentation, because they were not available.

Data Management

Parsons, the current OE contractor, performed a 100 percent QC review of the data associated with the site. This review followed guidelines presented in the Standard Operating Procedures (SOP) provided as Appendix A. This evaluation included a review of copies of the Quality Control Logs and Daily Operations Journal and the database created by the OE contractor. Additional information was entered into the OE database including the grid ID, sampling method, and geophysical instruments used. The USACE followed the QC review with a 10 percent QA of the Parsons' data review. The requirements of the QA review are described in the USACE SOP provided as Appendix B in this report. The purpose of the QC/QA review was to complete a 100 percent check of all contractor data to identify discrepancies.

Discrepancies were then researched and corrections made, if appropriate, prior to loading the data into the project database. No discrepancies between the after action report and the contractor data were identified for this site.

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

- The data collected by HFA were useful in identifying areas where OE is not likely present based on sampling.
- Because no OE items were found, the absence of location and depth information does not impact data quality.
- There appears to be poor survey control for the grid locations.
- No QA records for this sampling effort are available.

3.20.7 Conclusions and Recommendations

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

3.20.7.1 Conclusions

Site Use

- According to Fort Ord training facilities maps, this area was used for various training activities including recoilless rifle training and machine gun training. Other training activities were conducted in this area, but exact type of training is unknown.
- On the basis of training maps Site OE-20 was used as a recoilless rifle training area in the 1950s. However, because of the proximity of the site to military housing and other publicly used areas, it is unlikely that OE would have been used at this site. Additionally, no evidence of OE items was found during sampling of the area to the east of the Site OE-20 boundary.
- Based on the minimum range safety distances for recoilless weapons ranges provided in AR 385-63, it is not feasible that the Site OE-20 area could have supported a live fire range.

Sampling Adequacy and Data Quality

- The Schonstedt Model GA-52/C or Model GA-72/Cv were used for the geophysical survey at Site OE-20. These instruments were evaluated as part of the ODDS and, with the exception of small arms ammunition, are capable of detecting the type of items expected at this site. A numerical value for detection of items cannot be calculated for an individual site. Although not considered surface items in the ODDS, the projectiles fired from a recoilless rifle are fired parallel to the ground resulting in minimal penetration. If ordnance was fired, it would be found at or near the surface significantly increasing the probability of detection.
- Because it is unlikely that OE was used at this site, or in this area, and because no OE items were found during the sampling of Site OE-20, additional sampling of the area R 57 & R 75 is not warranted.

- The data collected by HFA are useful because no OE or OE scrap items were found in the 12 grids that were sampled, supporting the assertion that OE were not used at Site OE-20. Since no OE items were found, the absence of depth, location, and accurate grid location information for this site is not considered a data gap that significantly affects the interpretation of this site.

- The magnetometers used by HFA were inspected daily. Random checks of the geophysical instruments were conducted by the QC/SS. A standard QC check (minimum 10%) of each grid sampled was performed by the QC/SS. Following QC the USACE Safety Specialist performed a 10 percent QA check of the sampled grids.

- Sampling and evaluation of previous work followed published work plans and SOPs.

Although the previous OE sampling efforts performed at Site OE-20 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, the sampling methods were sufficient to confirm the assumption that OE was not used at the site. Additionally, because OE was not used at Site OE-20, further effort 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.

3.20.7.2 Recommendations

Based on the review of existing data:

- It is not anticipated that OE will be found at Site OE-20 and no further OE-related investigation is recommended. However, because OE were used throughout the history of Fort Ord, the potential for OE to be present at Site OE-20 cannot be ruled out.

- Site OE-20 meets Track 1 Category 1 conditions because no evidence was found to indicate that OE was used here.

Upon approval of the proposed remedy (no further OE-related investigation), Site OE-20 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-20 continues to be protective of human health and the environment. The 5-year review will also document any newly identified site-related data or issues identified during the review, and will identify recommendations to address them as appropriate.

3.20.8 References

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TABLE

Table 20-1. Sampling Operations, Site OE-20
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-20 -- Recoilless Rifle Training Range	C2I1A9-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H1I7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H1I9-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H1G0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2I2A1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2I1A0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2I1A7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H2I1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H1I0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H1G7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H1G9-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-20 -- Recoilless Rifle Training Range	C2H2G1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available

Sampling = 100 percent of anomalies detected were excavated to a minimum depth of 4 feet. Deeper anomalies were investigated if directed by the USACE.
HFA = Human Factors Applications Inc.

Note: A field with the annotation "not available" is a null field in the OE database.

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.

ATTACHMENT

20-A

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
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	

Sources reviewed and comments
No OE-related evidence of any kind found. Area identified as a "Recoilless Rifle Training Area" or "RRTA" on 1) Training Areas That Cannot Be Used At The Same Time," Circa 1954; 2) Fort Ord Training Areas & Facilities, Revised December 20, 1956; 3) Map of Fort Ord Training Areas & Facilities, Revised July 15, 1957.

2. ***Is there historical evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?***		No	

Sources reviewed and comments
Revised Archives Search Report (ASR), USAEDH 1997; Site visit; Review of Fort Ord facilities and training maps. It is unlikely that OE would have been used at this site because of the proximity of the site to the "North Bay View Park" housing area.

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?***		No	

Sources reviewed and comments
Revised Archives Search Report (ASR), USAEDH 1997; Site visit; Review of Fort Ord facilities and training maps.

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
LITERATURE REVIEW

DEVELOPMENT AND USE OF THE SURROUNDING AREA

	Yes	No	Inconclusive
4. ***Does subsequent development or use of the area indicate that OE would have been used at the site?***		No	

Sources reviewed and comments
No OE-related features on maps or photos after 1957.

	Yes	No	Inconclusive
5. ***Does use of area surrounding the site indicate that OE would have been used at the site?***		No	

Sources reviewed and comments
Housing was constructed immediately adjacent to the Recoilless Rifle Training Area (RRTA) in 1953. The RRTA was identified in this area on training maps in the mid-50s. Highway 1 was located approximately 800 feet west of the current site boundary.
Aerial photos 7/25/41, 8/17/49, 7/3/51, 5/14/56, 5/2/66.
Training maps

ESTABLISHMENT OF SITE BOUNDARIES

	Yes	No	Inconclusive
6. ***Is there evidence of training areas on aerial photographs that could be used to establish boundaries?***	Yes		

Sources reviewed and comments
1956 aerial photo shows ground disturbance in the approximate area. Evidence that other training in the nearby general area (South Inspec Area, R 57 & 75, and machine gun squares) (7/25/41, 8/17/49, 7/3/51, 5/14/56, 5/2/66)

	Yes	No	Inconclusive
7. ***Is there evidence of training on historical training maps that could be used to establish boundaries?***	Yes		

Sources reviewed and comments
Yes. The 1954, 1956 and 1957 training maps delineate an area identified as RRTA.

	Yes	No	Inconclusive
8. ***Should current boundaries be revised?***		No	

Sources reviewed and comments
No indication that the boundary should be revised on the basis of the literature review.

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
LITERATURE REVIEW

	Yes	No	Inconclusive
Does the literature review provide sufficient evidence to warrant further investigation?		No	

RESULTS OF LITERATURE EVALUATION

Comments

Although sampling was completed outside of the site boundary, OE is not expected to have been used at this site because of the proximity to the "North Bayview Park" housing area. No further OE-related investigation is warranted.

References

USAEDH, 1997. Revised Archives Search Report, Former Fort Ord, California, Monterey County, California. Prepared by US Army Corps of Engineers St. Louis District.
Circa 1954, Training Areas That Cannot Be Used at the Same Time.
1956, Fort Ord Training Areas & Facilities. Revised December 20.
1957, Map of Fort Ord Training Areas and Facilities. July 15.

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
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	

Sources reviewed and comments
No evidence to suggest that the area was an impact area (HFA, 1994). It is unlikely that OE was used at this site because of the proximity to housing.

2. ***Is there evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?***		No	

Sources reviewed and comments
No evidence to suggest that the area was an impact area (HFA, 1994). It is unlikely that OE was used at this site because of the proximity to housing.

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	

Sources reviewed and comments
No evidence to suggest that the area was an impact area (HFA, 1994). It is unlikely that OE was used at this site because of the proximity to housing.

4. ***Was sampling and/or reconnaissance performed within the appropriate area?***		No	

Sources reviewed and comments
Sampling was completed outside of the current site boundary. The rationale was that the area sampled would most likely have been a downrange target area. However, based on the proximity of this site to the adjacent "North Bayview Park" (Stilwell Park) housing area, it is not likely that OE would have been used at this site.

5. ***Does sampling indicate OE and/or ordnance-related scrap are present at the site?***		No	

Sources reviewed and comments
No UXO or OE scrap were found (HFA, 1994).

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
SAMPLING EVALUATION

	Yes	No	Inconclusive
6. ***Were the type(s) of items found consistent with the type of training identified for the site?***			Not applicable

Sources reviewed and comments
No OE items found.

7. ***Were the type(s) of items found consistent with the era(s) in which training was identified?***			Not applicable

Sources reviewed and comments
No OE items found.

8. ***Was HE fragmentation found?***		No	

Sources reviewed and comments
HFA, 1994

9. ***Was HE found?***		No	

Sources reviewed and comments
HFA, 1994

10. ***Were LE found?***		No	

Sources reviewed and comments
HFA, 1994

11. ***Were pyrotechnics found?***		No	

Sources reviewed and comments
HFA, 1994

12. ***Were smoke producing items found?***		No	

Sources reviewed and comments
HFA, 1994

13. ***Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?***		No	

Sources reviewed and comments
HFA, 1994

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
SAMPLING EVALUATION

	Yes	No	Inconclusive
14. ***Do items found in the area indicate training would have included use of training items with energetic components?***			Not applicable

Sources reviewed and comments
Nothing found during sampling of the area down-range of Site OE-20 (HFA, 1994).

15. ***Were items found in a localized area (possibly the remnants of a cleanup action)?***			Not applicable

Sources reviewed and comments
No OE items found.

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

Sources reviewed and comments
Site was not divided. Sampling occurred in what was thought to be a downrange (target area) location and outside of the boundary of the site (HFA, 1994).

17. ***Should current site boundaries be revised?***		No	

Sources reviewed and comments
No indication that the site boundaries need revision based on the sampling results.

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

Sources reviewed and comments
Schonstedt GA-52/C or GA-72/Cv magnetometers were used by HFA. Because the recoilless rifle is a direct fire weapon and fired roughly parallel to the ground minimal penetration depths are expected. Projectiles fired from these weapons most likely would have been detectable with the magnetometers used (Parsons, 2001).

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
SAMPLING EVALUATION

	Yes	No	Inconclusive
19. ***Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?***	Yes		

Sources reviewed and comments
The equipment is capable of detecting the types of items expected at the site. Non-ferrous items are not expected at this site. Any OE associated with the site would be most likely be present at or near the surface.

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?***	Yes		

Sources reviewed and comments
Although not directly comparable to Site OE-20, the results of the ODDS indicate that all models of the Schonstedts used at this site are capable of detecting the items expected at this site (Parsons, 2001).

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?***	Yes		

Sources reviewed and comments
Schonstedt GA-52/C or GA-72/Cv magnetometers were used by HFA at this site. Items should be at or near surface based on use of the weapon. Instruments used would detect items suspected at this site (Parsons, 2001).

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

Sources reviewed and comments
"Each magnetometer was tested each morning and field tested after lunch to determine that it was operating correctly." (HFA, 1994)

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
SAMPLING EVALUATION

	Yes	No	Inconclusive
23. ***Based on the appropriate 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?***			Not applicable

Sources reviewed and comments
Not applicable. No OE was detected, therefore UXO density cannot be calculated.

	Yes	No	Inconclusive
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

Sources reviewed and comments
120,000 square feet (approximately 2.75 acres) sampled by HFA based on 100x100-foot grids (HFA, 1994). Sampling was outside of the site boundary.

Total Area: 120,000 sq ft
UXO Density: Not calculated

25. ***What percentage of the anomalies were intrusively investigated?***

Sources reviewed and comments
HFA sampling consisted of 100% sampling. The number of anomalies identified is unknown (HFA, 1994).

Total % of anomalies investigated	HFA: 100%

	Yes	No	Not applicable
26. ***Was the appropriate data processing scheme used for the site, how was the data processed?***			Not applicable

Sources reviewed and comments
Not applicable. No digital geophysical data were collected.

ATTACHMENT 20-A
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE 20, RECOILLESS RIFLE TRAINING RANGE
SAMPLING EVALUATION

	Yes	No	Inconclusive
27. *Has the field data been collected and managed in accordance with quality control standards established for the project?*			Inconclusive

Sources reviewed and comments
"The project was completed without QC discrepancy, " (After Action Report - HFA, 1994). HFA field data are not available for review. It is not possible to perform a 10% check of reported results and field/grid records.

Result of Sampling Evaluation

	Yes	No	Inconclusive
Does the sampling evaluation provide sufficient evidence to warrant further investigation?		No	

Comments
No sampling has occurred within the boundary of Site OE-20. The sampling that did occur was completed to the east of the site (assumed target area) and no OE was found. On the basis of the sample results (no OE or OE fragmentation found) and based on the proximity of the site to the North Bayview Park Housing area and other facilities (e.g., Highway 1) and the general size of Site OE-20, it is unlikely that OE would have been used at this site. No further OE-related investigation is warranted.

References
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UXB 1995