This appendix discusses the procedures that will be performed by UXO-qualified personnel during geophysical support, subsurface MEC removal operations, and MEC disposal. This section includes procedures for excavating anomalies, identifying MEC, transportation and detonation of MEC, and required engineering controls. Alternative/modified procedures may be approved in site specific RAWP to accommodate changes in technology and/or government safety standards.

**H.1 Overall Safety Precautions.** The general work practices defined by CEHNC will be followed. This includes limiting the work periods for field UXO personnel to 10 hours per day and 40 hours per week. Exceptions to this requirement will only be made in the event that public safety is at imminent risk and with the concurrence of the USACE OE Safety Specialist and Contracting Officer.

**H.1.2 Reacquire Anomalies.** Following data processing during both the initial DGM and QC DGM, the geophysical crew will reacquire identified anomalies. Anomaly maps will be produced and dig sheets assigned to the UXO crew. Anomalies will be investigated under the direction of the SUXOS. Qualified UXO technicians will provide support during the geophysical field work.

**H.1.3 Remove Anomalies.** The UXO teams will excavate all anomalies identified by digital geophysical surveys within the designated subsurface removal areas. The UXO teams will remove all MEC items and any other metallic object greater than 2” in any dimension. The size and composition of field crews will be specified in site specific RAWPs. MEC items will be identified using a current munitions database. The estimated dimensions of any MEC-like, but otherwise unidentifiable, metallic item recovered will be recorded (length, width, thickness, and metal type). These data will be downloaded daily to the database.

Small hand tools such as shovels, spades, trowels, and pry bars will be used to uncover potential MEC. Hand tools will be used for the majority of items, which are generally found near the surface. Anomaly excavation will be performed to depth. If the UXO team has dug to a depth of 4’ and not recovered the anomaly, they will request direction from the USACE OE Safety Specialist. An evaluation of whether to continue excavation will be made based on site-specific conditions and the nature of the anomaly. If the decision is made to discontinue excavation, the UXO team will backfill the hole, record the location and document in a field variance that no anomaly was detected to the depth excavated.

It is the Army’s intent to resolve all anomalies in the areas where subsurface clearance is performed. The location and properties of any unresolved anomalies will be documented in the Site Specific After-Action report.

Excavation within Habitat Reserve can be destructive. All work must be accomplished in accordance with the Environmental Protection Plan (EPP), Section 10.0. The techniques for backhoe excavation described below may change depending on the EPP requirements.

The following basic technique will generally be used for anomaly excavation:

1. The anomaly will be located with an EM61. A magnetometer may also be used to assist in anomaly location.
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2. Until the anomaly is otherwise identified, it will be assumed that the anomaly is MEC. Excavation will be initiated adjacent to the anomaly. The excavation will continue down until the excavated area has reached a depth below the top of the anomaly as determined by frequent inspection with a magnetometer.

3. Using progressively smaller and more delicate tools to carefully remove the soil, the excavation team will expand the sidewall to expose the metallic item in the wall of the excavation for inspection and identification without moving or disturbing the item.

4. Once the item is exposed for inspection, the excavation team will determine if it is MEC. If the item is not MEC, it will be removed and the area will be rechecked to ensure that a hazardous item is not hidden beneath it. The excavation team will then annotate the results of the excavation on the Anomaly Tracking Sheet forms and move on to the next marked subsurface anomaly.

A commercial backhoe may be used if required by the UXO team to carefully excavate anomalies if believed to be at a greater depth than can be efficiently excavated by hand. The size of backhoe excavations will be consistent with the HMP. If utilized, the backhoe will be used no closer than 1’ lateral from anomalies located during excavation. A team consisting of at least a UXO Technician II and an equipment operator will perform the anomaly excavation. The UXO Technician III may assign additional workers to assist with the excavation if deemed necessary. The excavation will be conducted similarly to hand excavation.

1. Upon arrival at the anomaly site, the excavation team will reacquire the anomaly, and the equipment operator will begin the excavation under the direction of the UXO Technician II. The equipment operator will excavate near the location, but not directly on top of the anomaly.

2. To prevent contacting the anomaly with the backhoe, the UXO Technician II will frequently monitor the excavation to ensure that the equipment operator does not dig directly over the anomaly. The objective of the direction by the UXO Technician II is to remove the soil from a selected area adjacent to the anomaly, while ensuring that the backhoe bucket does not disturb the anomaly.

3. The UXO Technician II will direct the equipment operator to stop excavation when the soil has been removed to within 1’ of the anomaly as estimated by the response from the metal detector or the post-processed geophysical data. The backhoe will then be shut down, the backhoe operator will move away from the anomaly location, and the excavation will be completed using hand tools as previously described for hand excavation.

H.1.4 MEC Discovery, Notification, and Reporting. It is essential that the discovery of all MEC is immediately reported to the appropriate on-site personnel, accurately documented and communicated to USACE.
H.1.5 **Exclusion Zone (EZ).** The EZ is designed to protect the public during munitions removal activities. The Munitions with the Greatest Fragmentation Distance (MGFD) will be identified in each site specific RAWP and computed in accordance with DDESB TP No. 16, Rev 2, October 2005. The Minimum Separation Distance (MSD) for non-essential personnel shall also be specified in the site specific RAWP. Engineering controls can be used to reduce the MSD when the EZ around the work site(s) does not permit establishment of the needed 360 degree EZ. Use of engineering controls can serve as an alternative to evacuation to the full MSD, but may decrease work production rates, require additional equipment and materials, and site approval for use. Reducing the EZ with engineering controls shall be based on tests that follow the guidelines described in the CEHNC Memorandum (2004).

HNC-ED-CS-S-98-8, 1998 provides guidelines for use of the Miniature Open Front Barricade (MOFB, commonly referred to as the “Bud-Lite”) during intrusive operations such as MEC investigation and anomaly excavations. This equipment authorized for use by DDESB TP No. 15, Ver 2.0, June 2004 mitigates fragmentation range in 3 directions (sides and front) in the event of unintentional detonations, but offers no blast mitigation capability.

HNC-ED-CS-S-98-7, 1998 provides guidelines for use of sandbags to mitigate blast and fragmentation effects during intentional detonations. DDESB TP No. 15, Ver 2.0, June 2004 authorizes use of this equipment during removal actions when appropriately used in accordance with established guidelines.

HNC-ED-CS-S-96-8, 1997 provides guidelines for use of soil, water tamping or other forms of barricading during detonation operations to reduce fragmentation and/or blast range. DDESB TP No. 15, Ver 2.0, June 2004 authorizes use of these forms of barricading when appropriately used in accordance with established guidelines.

Areas such as Del Rey Oaks, York School, and Monterey Airport property require special consideration when in close proximity to removal activities. Sensitive areas shall be described in site specific RAWPs and work will be scheduled to reduce the inconvenience to the extent practicable.

Only personnel essential to the project and authorized visitors will be permitted access into the EZ when MR operations are being conducted. Essential personnel are limited to SUXOS, UXOSO, UXOQCS, UXO Technician III, UXO Technician II, and UXO Technician I personnel. Sweep personnel may be employed to conduct surface sweep activities, working under the direct supervision of UXO Technician II or III personnel. All non-essential personnel (authorized visitors) who require entry into the EZ will require a UXO escort in accordance with EP 385-1-95a (USACE, 2004).

If MEC with a fragmentation distance greater than the specified MGFD is discovered, or if warranted by the quantity of MEC discovered, all work will be halted and a new EZ will be designated based on the item found. If detonation operations are to be performed, the SUXOS will compute a safety zone based on the type of MEC involved and the quantity of explosives required to destroy that type of MEC. The USACE OE Safety Specialist will approve this computation before detonation activities can be performed.
The EZ will be established as follows:

**Unintentional Detonation** – The unintentional detonation exclusion zone for non-essential personnel is the greatest distance of:

1. the blast overpressure, as computed by using the formula: 
   \[
   D = 40W^{1/3} \quad [D=15.87Q^{1/3}]
   \]
   or
2. the calculated hazardous fragment distance (HFD) as provided in DDESB TP No. 16, Rev 2, October 2005.

Minimum Separation Distance (MSD) is based on blast overpressure, as computed by the formula: 
\[
D = 40W^{1/3} \quad [D=15.87Q^{1/3}]
\]

Where:  
- \( D \) = distance in feet [meters],  
- \( W \) = net explosive weight in pounds, and  
- \( Q \) = net explosive weight in kilograms

**Intentional Detonation** – The intentional detonation exclusion zone for non-essential personnel is the greatest distance of:

1. the blast overpressure, as computed by using the formula: 
   \[
   D = 328W^{1/3} \quad [D=130.16Q^{1/3}]
   \]
   or
2. the calculated maximum fragment distance (MFD) as provided in DDESB TP No. 16, Rev 2, October 2005.

Where  
- \( D \) = distance in feet [meters],  
- \( W \) = net explosive weight in pounds, and  
- \( Q \) = net explosive weight in kilograms

For both Unintentional and Intentional Detonations, the exclusion zone may be reduced employing the engineering controls listed in DDESB TP No. 15, Ver 2.0, June 2004 or other DDESB-approved engineering controls.

**H.1.6 MEC Identification.** UXO Technicians will make every effort to identify MEC through visual examination of the item for markings and other identifying features such as shape, size, and external fittings. Items will not be moved during the inspection/identification until the fuze condition can be ascertained. If the condition is questionable, the UXO Technicians will consider the fuze to be armed. The fuze is considered the most hazardous component of MEC, regardless of type or condition. The SUXOS and the USACE OE Safety Specialist will agree on the positive identification of the item and the disposition of the item prior to implementing any disposal operations. The following general ordnance safety guidelines will be followed:

- In general, a projectile containing a base-detonating fuze is to be considered armed if the projectile has been fired.
- Arming wires and pop out pins on unarmed fuzes will be secured by taping in place prior to movement.
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- Do not rely on the color-coding of MEC for positive identification of contents. Munitions having incomplete or improper color-coding have been encountered. (This is especially true with regard to the 40-mm family of ordnance).

- Avoid the area forward of the nose of a munition until it can be ascertained the item does not contain a shaped charge. The explosive jet can be fatal at great distances forward of the longitudinal axis of the item. Assume any shaped charge munitions to contain a piezoelectric (PZ) fuzing system until the fuzing system is positively identified. A PZ fuze is extremely sensitive, can function at the slightest physical change, and may remain hazardous for an indefinite period of time.

- Examine a projectile for the presence or absence of an unfired tracer. Also examine the item for the presence or absence of a rotating band and its condition.

- Assume a practice MEC contains a live charge until it can be determined otherwise. Expended pyrotechnic/practice devices may contain red/WP residue. Due to incomplete combustion, phosphorus may be present and re-ignite spontaneously if subjected to friction or the crust is broken and the contents exposed to air.

- Do not approach smoking WP MEC. Burning WP may detonate the burster or dispersal explosive charge at any time.

- Procedures in Chapter 13, Technical Manual 9-1300-214, Military Explosives, or other approved explosives analysis shall be used to identify the explosives.

If feasible, when circumstances prevent use of methods that require less time on potentially live UXO (e.g., BIP), and when approved by the USACE OE Safety Specialist, a field Radiographic Unit (X-ray) will be used to identify MEC items that otherwise cannot be identified as inert or live. The X-ray may be used if the following conditions apply:

- No positive identification features are noticeable.

- No intrusive activities or minor intrusive activities are required to place and use X-ray unit.

- Weather conditions do not affect X-ray unit capabilities.

- Terrain conditions support the use of the X-ray unit.

The X-ray will be operated in accordance with approved procedures to be documented in the site specific RAWP.
H.2 MEC Disposal.

H.2.1 Transportation. It is not anticipated that there will be any movement or transportation off site of any MEC found on this site.

H.2.2 Detonation Operations. The safest and most expeditious methods of detonation will be utilized in every case. Verification of the UXO filler shall be required prior to detonation to determine the appropriate procedures. MEC found will be disposed the day on which encountered, if possible. Daily detonation operations may not be feasible due to availability of support staff. If an item cannot be immediately disposed, it may be left in place, covered and the location marked via GPS or moved to a secure consolidation point on site. The UXO Technician III will present a proposed course of action to the SUXOS. If the SUXOS and the USACE OE Safety Specialist approve the plan, the UXO Technician III will then implement the plan. The usual and normal method of MEC disposal will be BIP. If the area cannot withstand a high-order detonation and the MEC is not safe to be moved, render safe procedures by military EOD will be required. If render safe or movement is not an option, then design and implementation of engineering controls to mitigate the effects of a high-order detonation must be implemented. Coordination with and approval by the USACE OE Safety Specialist is required before detonating a MEC item under such circumstances.

H.2.3 Fort Ord Detonation Notification Procedure. Prior to any detonation, the appropriate notification and approval procedure will be initiated. The approval procedure includes notification to, and approval from the BRAC Environmental Coordinator and the POMFD. A list of local Points of Contact will be included in the site specific RAWP. As soon as it is determined that a detonation will be required, the SUXOS will initiate this procedure. The SUXOS will schedule the detonation to allow sufficient time to complete all notifications and approvals.

H.2.4 Consolidated Shots. Consolidated shots will only be performed with authorization from the on-site USACE OE Safety Specialist. Movement of MEC items can be performed with his approval. Consolidated shots may be performed in the Impact Area at a location designated by the USACE OE Safety Specialist.

H.2.5 Detonation Procedures. During detonation activities, the SUXOS will have overall control of the site. An EZ will be established around the detonation site. Only the SUXOS, the UXO Team, and UXO qualified safety personnel will be allowed within the EZ once the disposal operations have begun. The UXOSO and other assigned UXO Safety personnel will ensure safe work practices are observed, and the UXO Technician III will perform the necessary steps to safely dispose the MEC. Road guards will be placed around the work site area outside the EZ to ensure that unauthorized personnel do not enter the EZ.

H.2.6 Notification Procedures. Notification procedures will be conducted as follows:

- The appropriate MEC Disposal Checklists and notifications will be completed for each disposal operation.
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- Request the POMFD to come to the site and perform a fire risk assessment. All requests for risk assessment will require a 3-day notification and all detonation shots will require a 5-day notification.

- Complete a Detonation Approval Checklist/Risk Assessment and submit to the BRAC MMRP Manager (Fort Ord Field Office) for approval by the BRAC Environmental Coordinator.

- Mass detonations require coordination with the Federal Aviation Administration (FAA), but are not expected for this project. If necessary, the USACE OE Safety Specialist will contact FAA for air clearance and will hold on line until the shot is fired.

H.2.7 The following technical procedures will be followed for all disposals by detonation:

- Explosive materials will be ordered from the Government and delivered to the site for use on the day designated.

- The UXO Team comprised of the UXO Technician III and a UXO Technician II will inspect the location, condition, and net explosive weight of the MEC to be disposed.

- The UXO Technician III will ensure that permission to detonate explosives has been obtained from the SUXOS and coordinated with the USACE OE Safety Specialist.

- It is the responsibility of the SUXOS to schedule the detonations and to ensure that all project personnel are accounted for before disposal operations begin.

- The UXO Team will then prepare enough explosive charges and shock tube initiating systems materials to perform the planned detonations. The transportation vehicle will then be loaded with the explosives, shock tubing initiating systems, and other equipment required.

- Unless otherwise approved by the USACE OE Safety Specialist, all detonations will be tamped, except 40-mm grenades. Initiators will always be transported in a separate container from the main-charge explosives.

- A MSD of 50’ will be observed for initiators and main-charge explosives while at the disposal site.

- If several MEC items are located in close proximity to each other a mainline/branchline shot may be used to destroy these MEC simultaneously to increase the efficiency of the operation.

- The UXO Technician III will observe the UXO Technician II position the explosive charge against the MEC. The disposal shot will be tamped, except for 40-mm grenades, to minimize the effects of the detonation. However, the initiators (caps) will never be buried.
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- The UXO Technician III will then inspect the disposal shot and return to the safe firing point.

- POMFD will sound a one minute siren blast five minutes prior and a 30 second blast one minute prior to detonation.

- Prior to initiation, the UXO Technician III will ensure that guards are stationed at the roadblocks, scan the EZ for personnel, and sound three distinct blasts on an air or vehicle horn. He will then scan the area again and initiate the detonation charge if all is clear.

- In the event of a misfire, there will be a 60-minute wait time for Shock Tube Initiating Systems and a 60-minute wait time for electric misfires. A Misfire Checklist will be completed by the UXO Technician III and filed with the daily logs.

H.2.8 Post-Detonation Operations. After successful initiation of the explosive charge, the UXO Team will conduct an inspection of the shot to ensure complete destruction of the MEC. After verification that no more detonations will be required, an “all clear” notification will be sent out to all parties on the notification list.

The UXO Team will collect for disposal all sandbag fragments, large munitions fragments, and other debris, and generally clean and restore the site.

H.2.9 Engineering Controls. Engineering controls may be required to mitigate the effects of an intentional detonation. The goals of using engineering controls are to improve personnel safety and/or to reduce the MSD. The most common engineering controls are either soil cover or sand bags. HNC-ED-CS-S-98-7, 1998 provides guidelines for use of sandbags to mitigate blast and fragmentation effects during intentional detonations. DDESB TP No. 15, Ver 2.0, June 2004 authorizes use of this equipment during removal actions when appropriately used in accordance with established guidelines. HNC-ED-CS-S-96-8, 1997 provides guidelines for use of soil, water tamping or other forms of barricading during detonation operations to reduce fragmentation and/or blast range. DDESB TP No. 15, Ver 2.0, June 2004 authorizes use of these forms of barricading when appropriately used in accordance with established guidelines.

H.3 Disposition of Material Potentially Presenting an Explosive Hazard (MPPEH). This section is intended to guide UXO Technicians in the safe and efficient handling and disposal of MPPEH found within the Impact Area MRA. Figure H-1, “Logic Diagram for the Disposition of Range Residue,” contains a logic diagram for the disposition of MPPEH. Because the metal scrap recovered will ultimately be disposed or recycled off-site, it is imperative that procedures be established to preclude material documented as an explosive hazard (MDEH) from being commingled with MPPEH or material documented as safe (MDAS) and prevent it from being misidentified as MPPEH or MDAS once the explosive hazards it presents have been determined. The MPPEH management procedures shall also manage MDAS in such a manner as to prevent it from being commingled with MPPEH or MDEH once it has been
determined to be safe. The establishment of a chain of custody and audit trail is mandatory.

The following paragraphs provide procedures and guidance for management, demilitarization, and preparation of MPPEH. The Army will use an approved scrap metal dealer who will ensure the material is smelted.

H.3.1 Collection and Segregation Procedures. The Army will use a systematic approach for collecting and inspecting MPPEH. The approach is designed to ensure that all such material is 100 percent independently inspected and then 100 percent reinspected as part of certification and verification process.

Small Arms ammunition will be transported to an approved, state and/or RCRA permitted offsite facility for treatment and/or recycling.

The process will include:

- Non-munitions related scrap such as pop cans, paint containers, barrels, etc will be removed to facilitate the geophysical survey.
- Collecting and inspecting metallic objects larger than 2” weighing and recording by grid number.
- MPPEH inspection, evaluation, demilitarization, and certification will be accomplished daily.

Two scrap metal containers will be positioned at the operating site. One will be marked 5X scrap in yellow paint and will be used to collect non-hazardous scrap which has been visually inspected and determined to possess no hidden cavities or areas that could contain explosives. The other will be labeled 3X MPPEH and will be used to collect munitions related material which cannot be visually verified as free of explosives without undergoing additional procedures. Range-related debris will be tracked separately.

Collection procedures begin at the time MPPEH is discovered by a UXO Technician. In the event that MPPEH is encountered by someone other than a UXO Technician, such as a member of the DGM team, it will be immediately brought to the attention of the UXO Technician on site. At this point the UXO Technician makes a preliminary determination as to the classification of the item. If the item is identified as range debris or general trash, it will be collected for disposal as trash. If the item is identified as munitions related and all cavities and surfaces can be visually inspected, it will be placed in the 5X container. If the item is probably not explosive filled but will require additional procedures to visually inspect it will be placed in the 3X container. At the end of the day any of the cavities of 3X MPPEH will be vented using a jet perforator.

Buckets will be placed at each grid to facilitate transport of the smaller collected scrap and MPPEH to the 3X and 5X containers.

H.3.2 Venting of 3X MPPEH. 3X MPPEH will be vented in order to provide access to all cavities for visual inspection. This will be accomplished using a jet perforator in an area sufficient to accommodate the Explosive Safety Quantity Distance arc for the item if it
were high explosives (HE) filled. Once completed, the UXO technicians will confirm that all cavities are visually free of explosives and place the items in the 5X container.

H.3.3 **Demilitarization.** Once the material has been determined to be free of explosives, a UXO technician will demilitarize the items to the point it cannot be construed as a munitions item. Generally, this will require cutting the item in half using a partner saw or band saw. This process must meet or exceed the demilitarization requirements of DoD 4160.21-M-1.

H.3.4 **Certification/Verification/Disposal of Munitions Debris.** Once the demilitarization process has been completed all 3X, 5X, and expended small arms material will be 100 percent reinspected and placed in containers with serialized seals. A DD Form 1348-1A will be affixed to the side of each container. The form will include the serial of the seal and the signatures of the SUXOS as the “certifier” and a qualified government official as the “verifier.” The form will also contain the statement: “This certifies that the material listed has been 100 percent properly inspected and to the best of our knowledge and belief, are free of explosives hazards, engine fluids, illuminating dials, and other visible liquid HTRW materials.” At the completion of the removal action, the sealed containers will be shipped to an USACE approved facility for smelting. The facility will provide a letter stating that the material has been destroyed by smelting thus ensuring the proper chain of custody has been maintained. Using these procedures, the Army ensures that the collected scrap metal is properly inspected and classified. The method includes three distinct inspections, which are performed by persons of increasing levels of responsibility. A qualified UXO Technician performs the first inspection at the operating grid; the supervisor responsible for the operating grid performs the second; and the final inspection is performed by the SUXOS who is vested with overall responsibility.
Figure H-1 – Logic Diagram for Disposition of Range Residue

Recovered Item (MPPEH)

MDAS

Munitions Debris (MD)

US Munitions List Item?

YES

NO

Residual Utility or Capability?

YES

NO

Range Residue (Potentially Inert)

Demilitarize and Vent

FAIL

Inspect and Certify

PASS

Certify and Prepare for “In-Place Sale” by Defense Reutilization and Marketing Service or Approved Vendor

MDEH

Range-Related Debris (RRD)

FREE of MEC?

YES

NO

EOD/UXO Disposal (or other treatment as appropriate)

Remove if covered under Scope of Work