FINAL

Master Project Work Plan

Indefinite Delivery/Indefinite Quantity Services Contract for
Munitions & Explosives of Concern (MEC) Response Actions,
Former Waikoloa Maneuver Area (WMA), and
Honolulu District (POH) Area of Responsibility (AOR)
U.S. Army Corps of Engineers, Honolulu District

IDIQ Contract No. W9128A-09-D-0002
Task Order #0008

Prepared for:

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Project Name:	Indefinite Delivery/Indefinite Quantity Services Contract for Munitions & Explosives of Concern (MEC) Response Actions, Former Waikoloa Maneuver Area (WMA), and Honolulu District (POH) Area of Responsibility (AOR) U.S. Army Corps of Engineers, Honolulu District
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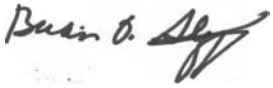

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Acronyms and Abbreviations

AOR	Area of responsibility
AMP	Archaeological Monitoring Plan
APP	Accident Prevention Plan
ARARs	Applicable or Relevant and Appropriate Requirements
ATF	Bureau of Alcohol, Tobacco, and Firearms
ATI	American Technologies, Inc.
CADD	Computer aided Design and Drafting
CAR	Corrective Action Request
CARA	CBRNE Analytical and Remediation Activity
CBRNE	Chemical, Biological, Radiological, Nuclear and High-Yield Explosives
CD	Compact Disk
CEHNC	Corps of Engineers, Huntsville Center
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
cm	Centimeter
CQDM	Chemical Quality Data Management
CSP	Certified Safety Specialist
CWM	Chemical Warfare Materials
DC	Data Cards
DDESB	Department of Defense Explosives Safety Board
DERP-FUDS	Defense Environmental Restoration Program for Formerly Used Defense Sites
DGM	Digital Geophysical Mapping
DHHL	Department of Hawaiian Homelands
DID	Data Item Description
DMM	Discarded Military Munitions
DoD	Department of Defense
DOT	Department of Transportation
DQO	Data Quality Objectives
EE/CA	Engineering Evaluation/Cost Analysis
EED	Electric Explosive Detonators
EM	Engineering Manual for Military Munitions Response
EMI	Electromagnetic
EMR	Electromagnetic Radiation
EP	Engineering Pamphlet
EPA	Environmental Protection Agency
EOD	Explosive Ordnance Disposal
ESRI	Environmental Systems Research Institute, Inc.
ESS	Explosives Safety Submission
ESP	Explosive Safety Plan
EZ	Exclusion Zone

FAR	Federal Acquisition Regulations
FGDC	Federal Geographic Data Committee
GIP	Geophysical Investigation Plan
GIS	Geographical Information System
GPO	Geophysical Prove-out
GPS	Global Positioning System
GSV	Geophysical System Verification
HE	High Explosive
HFD	Hazardous Fragment Distance
HTRW	Hazardous Toxic and Radiological Waste
IAW	In Accordance With
IBD	Inhabited Building Distance
ID	Identification
IDIQ	Indefinite Delivery/Indefinite Quantity
IGD	Interim Guidance Document
IME	Institute of Makers of Explosives
kHz	Kilohertz
LCDM	Life Cycle Data Management
LLC	Limited Liability Company
MD	Munitions Debris
MDAS	Materials Documented as Safe
MDC	Magazine Data Card
MDEH	Materials Documented as an Explosive Hazard
MEC	Munitions and Explosives of Concern
MRS	Munitions Response Site
MGDF	Munitions with the Greatest Fragmentation Distance
M	Meter
mm	Millimeter
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MR	Munitions Response
MRA	Military Range Area
MS	Microsoft
MSD	Minimum Separation Distance
MSL	Mean Sea Level
mV	Milivolt
N/A	Not Applicable
NAD83	North American Datum of 1983
NCP	National Contingency Plan
NEW	Net Explosive Weight
NFPA	National Fire Protection Association
NHO	Native Hawaiian Organization
OE	Ordnance and Explosives
OESS	Ordnance and Explosive Safety Specialist
OFB	Open Front Barricade

OPM	On-Site Project Manager
OSHA	Occupational Safety & Health Administration
PDF	Portable Document Format
PDS	Personal Decontamination Station
POH	USACE Pacific Division, Honolulu District Office
PM	Project Manager
PPE	Personal Protection Equipment
PWP	Project Work Plan
PWS	Performance Work Statement
QA	Quality Assurance
QC	Quality Control
QCI	Quality Conformance Inspection
QCIR	Quality Conformance Inspection Record
Q-D	Quantity Distance
RA	Removal Action
RAM	Random Access Memory
RCWM	Recovered Chemical Warfare Material
RF	Radio Frequency
RTK	Real-Time Kinematic
SDTS	Spatial Data Transfer Standard
SDSFIE	Spatial Data Standards for Facilities, Infrastructure, and Environment
SEF	Symmetric Electromagnetic Field
SOPs	Standard Operation Procedures
SSFR	Site Specific Final Report
STD	Standard
SUXOS	Senior UXO Supervisor
TDEM	Time Domain Electromagnetic
TIFF	Tagged Image File Format
TMK	Tax Map Key
TSD	Team Separation Distance
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering & Support Center, Huntsville
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
UXOSO	UXO Safety Officer
UXOQCS	UXO Quality Control Specialist
WMA	Waikoloa Maneuver Area
WP	White Phosphorus

Chapter 1 Introduction

1.1 Project Identification

Project Name:	Indefinite Delivery/Indefinite Quantity Services Contract for Munitions & Explosives of Concern (MEC) Response Actions, Former Waikoloa Maneuver Area (WMA), and Honolulu District (POH) Area of Responsibility (AOR) U.S. Army Corps of Engineers, Honolulu District
Contract Number:	**W9128A-09-D-0002** **Task Order #0008**
Company and Address:	650 Iwilei Road, Suite 204 Honolulu, Hawai`i 96817
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1.2 Purpose

1.2.1 This Project Work Plan (PWP) details the MEC response actions as stipulated in the United States Army Corps of Engineers (USACE), POH, Performance Work Statement (PWS) for Contract No. **W9128A-09-D-0002,** *Indefinite Delivery/Indefinite Quantity (IDIQ) Services Contract for Munitions & Explosives of Concern (MEC) Response Actions, Former Waikoloa Maneuver Area (WMA), and Honolulu District (POH) Area of Responsibility (AOR), U.S. Army Corps of Engineers, Honolulu District.*

1.2.2 The purpose of this PWP is to present the site background, project management, objectives, methodology for MEC removal actions, MEC accountability, explosive storage, demolition procedures, project personnel, and the equipment to be used for the removal action.

1.2.3 This document has been prepared in accordance with (IAW) USACE Data Item Description (DID) Munitions Response (MR)-005-01 *Type II Work Plan* and all associated and referenced DIDs within the MR-005-01 (USACE, 2003) as found on the Ordnance and Explosives Directorate, Military Munitions Center of Expertise, MR and other Related Munitions Services website, http://www.hnd.usace.army.mil/oew/CX_MR_DIDS.aspx.

1.2.4 The work required under this PWSPWS falls under the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS). MEC hazards exist as a result of Department of Defense (DoD) activities. MEC may exist on property owned or leased by the Department of Army. During this removal

action, it is the Government's intent that the contractor destroy all MEC encountered on-site and that the contractor's work is to be performed in a manner consistent with the Comprehensive Environment Response, Compensation, and Liability Act (CERCLA), Section 104 and the National Contingency Plan (NCP), Sections 300.120(d) and 300.400 (e) (United States Environmental Protection Agency (EPA)). MEC is a safety hazard and may constitute an imminent and substantial danger to the site personnel and local populace; thus U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Code of Federal Regulations (CFR) Part 29 No. 1910.120, Hazardous Waste Operations and Emergency Response policies apply.

1.3 Site Location

1.3.1 The former WMA (Figure B-1, Appendix B) is situated on the Island of Hawai'i, on the northwest side of the island approximately 30 miles north of the city of Kailua-Kona in the South Kohala District. The former WMA is bordered by Queen Kaahumanu Highway (State Highway 19) on the west, the South Kohala/North Kona District boundary line to the south, the South Kohala/Hamakua District boundary line to the east, and Kawaihae Road to the north (Earth Tech, Inc., 2000).

1.3.2 The Task Order #0008 MEC clearance area, which is approximately 1800 acres, is located in areas Q, J, D, 17C, and 17D of the Waikoloa Maneuver Area (see Figure B-2 through B-5, Appendix B). A portion of this task order is in the residential subdivision known as Anekona Estates, and another portion is located in an agricultural area known as Lalamilo Farm Lots. A third area is located along the Kohala coastline, beginning at Hapuna Beach State Park to the north, and terminating at Puako Beach Road to the south, bounded on the east by Queen Ka'ahumanu Highway. The balance of the acreage is planned to come from leasehold agricultural land to the southwest of the Lalamilo farm lot area.

1.4 Current and Future Land-Use

1.4.1 The former WMA current and future land use is a mixture of residential, commercial and agricultural.

1.4.2 The work areas in Task Order #0008 are comprised of parcels owned by multiple landowners (see Appendix A-Performance Work Statement). The majority of the parcels are zoned either agricultural or residential. The task order acres that are populated will be cleared in coordination with the local stakeholders and project delivery team in accordance with the notification and evacuation plan.

1.5 Topography

1.5.1 The rolling terrain characteristic of the former WMA encompasses two physiographic landforms: slightly dissected uplands and lava plains. The upland

area of the slope is cut by widely spaced gullies formed by erosion, while the lava plains are broad with little topographic relief. The lava areas are pocked and scarred by lava blisters and stacks formed by gas pockets rupturing the surface and breaking the lava's crust. Caves and lava tubes are prevalent in these areas.

1.5.2 From its coastal origin in the west, the former WMA rises eastward up the slope of Mauna Kea to a height of approximately 5,500 feet above mean sea level (msl). Except at its easternmost boundary, the slope of the land is less than 10 percent (%). Among the prominent landforms in the former WMA are ancient cinder cones. Pu'u Pa cinder cone rises approximately 300 feet (elevation 2,667 feet above msl) above the pastureland west of Mamalahoa.

1.5.3 To the east of Mamalahoa Highway is Holoholoku cinder cone, which rises approximately 350 feet (elevation 3,265 feet above msl) above the mildly sloping grasslands. South of the intersection of Mamalahoa Highway and Saddle Road is the Nahonaohae Pu'u. This pu'u and the surrounding area is a conservation area for native Hawaiian plants. South of Waikoloa Road is Pu'u Hinai, a cinder cone approximately 1 mile southeast of Waikoloa Village.

1.6 Climate

1.6.1 Due to the large size and varied elevation (to 5,500 feet above msl) of the former WMA, several climatic zones are present. At the westernmost boundary where the former WMA nears the Pacific Ocean, the climate is classified as a hot desert. As the land rises eastward up the slope of Mauna Kea, it is transected by a band of hot, semi-desert conditions that terminate at its far eastward reach in a summer-dry, warm temperate climate. Temperatures range from the high 90s to the low 50s (in degrees Fahrenheit). The leeward position of the former WMA is in the rain shadow of Mauna Kea, making it one of the drier regions in Hawai`i. Precipitation throughout the former WMA ranges between 10 and 20 inches per year.

1.7 Vegetation

1.7.1 The presence of plant species is closely related to elevation and climatic factors (e.g., temperature, rainfall). Vegetation is generally classified as Coastal Dry Communities consisting of dry grasslands, dry shrub lands, and dry forests and Lowland Dry Communities consisting of fountain grass grasslands and remnants of native Hawaiian forests. The primary pasture grasses are buffalograss and fountain grass. Eucalyptus is present in a grove and along the southerly base of Pu'u Pa.

1.7.2 Random stands of cactus are present throughout the area. Areas in the north-central region were recorded as having been intensely impacted by grazing and a variety of anthropogenic stresses; therefore, these areas are poor habitats for endangered plants. The Parker Ranch pasturage in this area exhibited relative homogeneity throughout with regard to topography and plant species variation and did not contain

a refuge or zones inaccessible to grazing livestock. Only one endangered plant has been identified in the former WMA. Portulaca scerocarpa, a federally listed endangered plant, was found on Pu'u Pa and in the Lalamilo area. However, several rare Hawaiian plant species were observed near Waikoloa Village. These species include nehe (Lipochaeta lavarum), kaunaoa (Cuscuta sandwichiana), iliahi (Santalum ellipticum), and akia (Wikstroemia pulcherima).

1.7.3 The most significant vegetation feature in the project area is an approximately 20 square kilometer area of native Kawelu Grassland, which extends between Kamakoa Gulch to Waiulaula Gulch and west from the rock wall to the coast. The Kawelu Grassland may support native and endangered plant species in normal rainfall years. A majority of the vegetation is nonnative grasslands.

1.8 Geology

1.8.1 The former WMA is situated on rolling upland slopes of ancient basaltic lava flows that are now covered with grassland vegetation and cut by widely spaced erosional gullies.

1.8.2 The area is surrounded by three of the five shield volcanoes that compose the Island of Hawai`i; on the north are the Kohala Mountains, the oldest volcanic feature on the island; on the southwest are the Hualalai Cone and Crater; and on the east is Mauna Kea.

1.8.3 Coastal land bounds the area on the west.

1.8.4 The majority of the former WMA lies within the Waimea Plains. The plains were formed by Mauna Kea lava flows that ponded against the older Kohala Mountains and are now covered with volcanic ash-type soils. The interior plains at Pohakuloa are covered with more recent lava flows from Mauna Loa that banked against Mauna Kea. The lava is predominantly basalt flows and scoria of the Hamakua Volcanoes. These rocks, like all Hawaiian basalts, are extremely iron rich. The composition of some basalt rocks exceeds 40 percent iron minerals. The high iron content causes geophysical "false positives."

The Lalamilo parcels of Task Order #0008 are primarily level and covered with varying soil depths greater than 24 inches. The Anekona Estates parcels of the Task Order are hilly mixtures of thin soil, 6 to 24 inches, and volcanic rock.

1.9 Site History

1.9.1 In December 1943, the U.S. Navy, through a licensing agreement with Richard Smart of Parker Ranch, acquired 91,000 acres in Waikoloa. The land was used as an artillery firing range on which live ammunition and other explosives were employed, with the remaining acreage utilized for troop maneuvers, and the largest

encampment on the island of Hawai`i consisting of approximately 467 acres of tents and Quonset huts. The 2nd Marine Division was assigned to Waikoloa in December 1943 for five months of training, in preparation for the Saipan-Tinian campaign. The 5th Marine Division began arriving in August 1944 at the camp vacated by the 2nd Marine Division. Property comprising the former WMA was surrendered to the Parker Ranch in September 1946, although the Marines had departed as of 30 June 1946. At least two ordnance clearance efforts were conducted, one in 1946 just prior to the departure of the 5th Marine Division, and another in 1954 following accidental detonation of a dud fuze or shell killing two civilians and seriously injuring another three. In the mid-to-late 1960's Parker Ranch subsequently sold off two parcels (Puako and O'uli) to the present owner, Nansay Hawai`i, Inc., which purchased a fee simple title to the properties in April 1990. Nansay Hawai`i, Inc. plans to construct golf communities thereon. Construction of a residential subdivision at the Ouli parcel of the Nansay Hawai`i site is currently ongoing while the Puako parcel remains vacant and undeveloped (Earth Tech, Inc., 2000).

1.10 ***History of MEC at the Site***

1.10.1 There were at least two ordnance clearance efforts conducted at the former WMA before it was determined as DERP-FUDS eligible: one in 1946 prior to the departure of the 5th Marine Division, and the other in 1954 following accidental detonation of a dud fuse or shell killing two civilians and seriously injuring three others. The 1954 effort detected as many as 400 dud items including hand grenades, 60 and 81 mm mortars, 75 mm shells, and 105 and 155 mm shell fuses, 31 mm anti-tank cannon shells, and 4.2 inch mortars. MEC continues to be discovered at the former WMA as development and ordnance removal actions have progressed.

1.10.2 Below is a partial list of the MEC that have been identified as present or potentially present on the Waikoloa Maneuver Area. The lava fields north and west of Waikoloa Village have a disproportionate amount of larger ordnance items, including 75mm, 105mm and 155mm projectiles, than other areas closer to the town of Waimea.

- 4.2 inch, 60mm and 81mm HE & WP mortars;
- 20mm-155mm projectiles;
- HE & WP rifle and hand grenades;
- 2.25, 2.36, and 4.5 inch rockets;
- Practice & HE land mines; and
- Japanese ordnance.

1.11 ***Previous Studies and MEC clearances***

1.11.1 In the years 1991-1992, WMA was determined to be DERP-FUDS eligible by the USACE. An EE/CA conducted in 3 phases - beginning with the Phase I EE/CA in 1997, Phase II in 2001, and Phase III completed in 2006 - identified approximately

51,000 acres within former WMA as ordnance sites to be included for removal action under DERP-FUDS.

1.11.2 In 2002, the USACE initiated ordnance removal at the former WMA, and to this date, approximately 13,700 acres have undergone clearance (Figure B-2, Appendix B)

1.11.3 In 2006-2007, MEC Clearances were conducted by American Technologies, Inc. in the Lalamilo Farm Lots and Anekona Estates, Task Order #7 Work Areas, and they reported MEC items ranging from MKII Hand grenades to 60mm and 81mm mortars in the final report. The Explosive Safety Submission (ESS) and munitions with the greatest fragmentation distance (MGFD) had not been amended to reflect these results.

1.11.4 A search of the contractor's final report revealed that a 105mm HE projectile was discovered unfuzed on the Southwestern boundary of Anekona Estates, Area Q, but this item has been deemed to be an anomaly in consultation with the POH OESS, especially considering the volume of the next smallest MEC item reported, the M49A2, 60mm HE Mortar. The 60mm mortar will be proposed for Anekona Estates, Area Q.

1.11.5 An 81mm HE Mortar was the largest MEC item reported during clearances conducted in the Lalamilo Farm Lots, Area J and will be proposed as the MGFD for that area.

1.11.6 Area D has had a wide variety of munitions found during EC/CA and MEC removal actions ranging from MKII hand grenades and 2.36 inch HEAT rockets to 81mm mortars and 155mm HE projectiles.

1.11.7 Area 17D has had MKII hand grenade, 2.36 inch HEAT rocket and mortar debris found during the EE/CA, but the only MEC discovered was a 60mm HE mortar, M49A2.

1.11.8 In June 2008, the USACE (POH) awarded a contract to a Native Hawaiian Organization (NHO) Joint Venture to continue the MEC removal action at the former WMA. The contract concluded in October 2009.

1.11.9 In May 2009, the USACE (POH) awarded a contract to Environet Inc. to continue the MEC removal action at the former WMA. The fieldwork was started in November 2009 and is currently on-going.

Chapter 2 Technical Management Plan

2.1 Technical Scope of the Project

2.1.1 The objective of this contract is to perform a removal action (RA) to remove and dispose of MEC and MD found at the selected project sites in the former WMA. A MEC subsurface clearance action will be performed in accordance with the POH PWS (Appendix A). All MEC operations in this technical management plan were developed in accordance with (IAW) USACE engineering manual EM 385-1-97, Explosives Safety and Health Requirements Manual and DID MR-005-02, Technical Management Plan (USACE, 2003).

2.2 Project Organization

2.2.1 The project team consists of the USACE Project Manager (PM) and the USACE contractor. Figure 2-1 is an organizational chart for the project team and operations. Personnel assigned to the project team meet the requirements of key personnel outlined in the PWS.

2.2.2 **Project Personnel**

2.2.2.1 On-Site Project Manager (OPM)

2.2.2.1.1 The OPM is responsible for communicating with USACE through the USACE PM or the On-Site USACE Ordnance and Explosive Safety Specialist (OESS). The OPM will execute all directions received from the USACE Contracting Officer, manage all aspects of the project, oversee the overall performance of all individuals on the project team, coordinate all contracts and subcontract work, and resolve project problems. The OPM is responsible for controlling the contractual cost and schedule milestones. The OPM will also coordinate the preparation of the PWP and the implementation of onsite field activities.

2.2.2.1.2 The OPM will interface directly with subcontractors to keep them advised of the PWSPWS, schedule, and budgets. The OPM is responsible for ensuring that the subcontractor costs are within budget and that schedule commitments are achieved.

2.2.2.1.3 The OPM will perform overall project management, including preparation and submission of purchase orders, approval and forwarding accounts payable, and review and approval of the Daily Activity Report.

2.2.2.1.4 The OPM will procure necessary equipment and supplies, maintain and track expenditures, review and approve timesheets, expense reports, and travel order requests, and submit equipment expense reports.

2.2.2.1.5 The OPM will coordinate activities of the Senior Unexploded Ordnance Supervisor (SUXOS), Unexploded Ordnance Safety Officer (UXOSO),

Unexploded Ordnance Quality Control Specialist (UXOQCS), and the Field Office Administrator.

2.2.2.2 Safety Manager

2.2.2.2.1 The Safety Manager, who is a Certified Industrial Hygienist (CIH) with experience in hazardous waste site operations, is responsible for the development, implementation and oversight of the project APP. The Safety Manager will oversee the development of the APP and review and initially approve all safety plans and recommended changes submitted to the USACE Contracting Officer for final approval. The Safety Manager will provide safety and health consultation to the UXOSO and conduct training of site personnel, as required. The Safety Manager will conduct periodic unannounced audits of this project safety program during the course of the contract work on this site.

2.2.2.3 QC Manager

2.2.2.3.1 The Quality Control (QC) Manager is responsible for the development, implementation and management of the quality control program and project/task order quality control plan. The QC Manager will provide guidance and support for the UXOQCS as well as an independent channel for communications about project quality issues. The QC Manager will review all deliverables from the project team to USACE, conduct quality system and control assessments, ensure effective root-cause analysis and corrective action, and interact and communicate between subcontractors and USACE Quality Assurance (QA) personnel when necessary. The QC Manager will ensure that all work is performed in accordance with the contract performance work statement, PWP, QC Plan and all Applicable or Relevant and Appropriate Requirements (ARARs).

2.2.2.4 Geographical Information System (GIS) Manager

2.2.2.4.1 The GIS Manager is responsible for performing all GIS and database management for the former WMA clearance project using Environmental Systems Research Institute (ESRI) ArcMap, Intergraph GeoMedia Professional, Oracle, MicroSoft Access, Excel and other software programs as needed. This management includes daily reports and maps of work accomplished by the company, transfer of data between the mapping system and the Trimble Global Positioning System (GPS) devices, communicating those results to management, field teams, the USACE representative, and others. The GIS Manager will also maintain Rights of Entry records, prepare maps to assist the company surveyor in placing boundaries and grids for the clearance teams, prepare charts, visual aids, instructional material, maps, web information and illustrations for presentations to the public, assist with proposals, work plans, interim and final reports, and research as needed.

2.2.2.5 Project Geophysicist

2.2.2.5.1 The Project Geophysicist will oversee all geophysical operations at the Waikoloa site including digital geophysical mapping and analog sweep detection. Areas of responsibility include implementation/use of the geophysical prove-out plots, review/testing/introduction of new detector technologies, and cooperative efforts with quality control to address detection oversight. Tasks include, as required, the performance of data reviews, monitoring of site-specific activities/progress of clearance, training and certifying selected UXO Technicians as operators, and addressing any identified problems. All problems will be reported to the OPM and corrected as soon as possible. In addition, the Project Geophysicist will help to manage the geospatial operations including GIS and site grid/boundary survey operations.

2.2.2.6 Field Operations Manager (FOM)

2.2.2.6.1 The Field Operations Manager will report to the OPM and is responsible for managing and reporting all aspects of daily site operations, including manpower status, resource status, and schedule progress status. In addition, the FOM will assist in the preparation and submittal of weekly and monthly reports, PWP's and other documentation required by the PWSPWS. The FOM will assist as required in all other aspects of project management, as directed by the OPM.

2.2.2.7 Field Office Administrator

2.2.2.7.1 The Field Office Administrator will report to the OPM and is responsible for receiving and distributing incoming communications, input of data for the Daily Activity Report, reviewing expense reports, timesheets, and other administrative records for accuracy, gathering the required communications for the weekly overnight shipment to contractor's main office on O'ahu, maintaining files and reconciling accounts.

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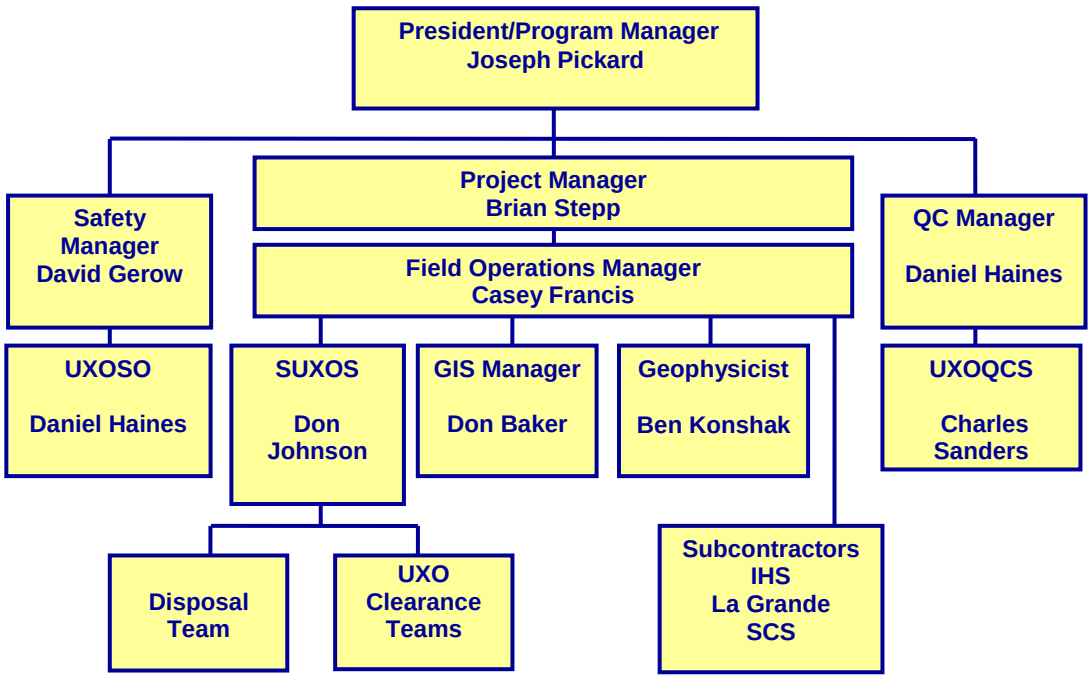
Figure 2-1: Organizational Chart



2.2.3 **UXO Personnel and Qualifications**

2.2.3.1 UXO personnel required for this project will include UXO supervisors and technicians, all of whom possess the relevant personal training and experience requirements set forth in the PWS and Department of Defense Explosives Safety Board (DDESB) TP18 (DoD, 2004). Personnel for this project have been selected from a pool of available UXO technicians. Resumes of key personnel are included in Appendix H. The following sections describe the specific qualifications and responsibilities of UXO personnel assigned to the project team.

2.2.3.2 SUXOS

2.2.3.2.1 The SUXOS has more than 10 years military/civilian explosive ordnance disposal (EOD/UXO) experience. The SUXOS will manage all on-site field activities. The SUXOS will keep the OPM apprised of activities requiring his notification. The responsibilities of the SUXOS include:

- identification of personnel and equipment requirements;
- supervision of all daily field team activities;
- early detection and identification of potential problem areas and institution of corrective measures;
- assisting with the preparation of all project reports;
- preparation of a daily report, which will include man-hours expended, grids cleared, explosives;
- expended and any other information required by the PM;
- providing on-the-job training for selected UXO Supervisor(s) who may be called upon to temporarily perform SUXOS duties during his absence from the site;
- supervising UXO Technicians, as well as other personnel who may be required in the field;
- planning, coordinating, and supervising all explosives operations;
- supervising multiple teams; and
- assisting in development of munitions response plans.

2.2.3.2.2 The SUXOS reports directly to the OPM and maintains day-to-day communications, assisting with documentation of site conditions and activities and interfacing with the USACE OESS.

2.2.3.2.3 Daily duties will include scheduling and executing a daily safety meeting, scheduling and coordinating subcontractor field team activities and oversight of all field activities.

2.2.3.3 UXOSO

2.2.3.3.1 The UXOSO has a minimum of 8 years of military/civilian EOD/UXO experience and is responsible for implementing all Accident Prevention Plan (APP) requirements, on-site training requirements and recommending changes to level of personal protection equipment (PPE) to the SUXOS as site conditions warrant. The UXOSO has Stop Work Authority for safety conditions. He will report all safety work stoppages immediately to the USACE OESS and the OPM. The UXOSO evaluates and analyzes any potential safety problems, implements safety related corrective actions, and maintains a Daily Safety Log. The UXOSO reports to the OPM. The UXOSO will:

- perform on-the-job training for selected UXO Technicians who may be called upon to temporarily perform the duties of UXOSO during his absence from the site, upon approval of the USACE OESS; and
- maintain daily liaison with the USACE OESS.

2.2.3.3.2 The UXOSO is also responsible for ensuring all MEC operations meet safety and quality requirements. He will:

- observe and inspect all disposal operations;
- assist the Safety Manager in developing and implementing an approved explosives and UXO health and safety program in compliance with applicable DoD policy and federal, state, and local health and safety statutes, regulations and codes;
- analyze operational risks, explosive hazards and safety requirements;
- establish and ensure compliance with all site-specific explosive operations safety requirements;
- enforce personnel limits and safety exclusion zones for explosives;
- conduct, document, and report the results of safety inspections to ensure compliance with all applicable explosives safety policies, standards, regulations and codes;
- conduct and document all required OSHA training for site personnel;
- ensure all protective works and equipment used within the exclusion zone are operated in compliance with applicable DoD policy, DDESB approvals, and Federal, state, and local health and safety statutes, regulations and codes; and
- ensure compliance with all requirements of this section.

2.2.3.4 UXOQCS

2.2.3.4.1 The UXOQCS has a minimum of 8 years of military/civilian EOD/UXO experience and will inspect/review all project operations, including explosives inventories, daily reports, timesheets and other documentation, and will inspect and approve each grid prior to turnover to the USACE OESS. The UXOQCS specific duties are outlined in Chapter 10. He maintains daily liaison with the

USACE OESS. The UXOQC is also responsible for ensuring all MEC operations meet safety and quality requirements. He will:

- observe and inspect all disposal operations;
- develop and implement the MEC-specific sections of the QC Plan for all explosive related operations;
- conduct and document quality control audits of all explosive operations;
- identify, document, report and ensure completion of all corrective actions to ensure all explosive operations comply with requirements; and ensure
- compliance with all requirements of this section.

2.2.3.5 Administrative/Operational Relationship

2.2.3.5.1 The SUXOS, UXOSO and UXOQCS will interact with all operations conducted on-site.

2.2.3.6 UXO Technician III

2.2.3.6.1 This individual, who supervises a project team, will be a graduate of a school in accordance with DDESB Technical Paper (TP) 18 and will have experience in MEC clearance operations and supervising personnel, and at least eight years combined active duty military EOD and contractor UXO experience. This individual will be able to fully perform all functions identified for UXO Clearance Personnel, UXO Technicians I and II. Specific duties of the UXO Technician III include:

- reconnaissance and classification of MEC;
- supervising field expedient identification procedures for identification (ID) of explosive contaminated soil;
- identifying fuzes and determining fuze conditions of all munitions, U.S. and foreign, including; guided missiles, bombs and bomb fuzes, projectiles and projectile fuzes, grenades and grenade fuzes, rockets and rocket fuzes, land mines and associated components, pyrotechnic items, military explosives and demolition materials, and submunitions.

2.2.3.6.2 The UXO Technician III also:

- supervises the segregation of MEC from non-munitions related debris, and associated safe handling procedures;
- performs the on-site demilitarization of MEC, and handling of demolition materials;
- assists in preparing of risk and hazards analyses;
- supervises team preventive medicine and field sanitation procedures, donning and doffing of PPE, operation of a personnel decontamination station;
- conducts maintenance and operation checks on all team equipment;
- conducts on-site evolutions directly related to MEC operations;
- locates subsurface MEC using military and/or civilian metal detectors and related equipment;

- excavates and recovers subsurface MEC by manual means or mechanical means;
- construction of MEC-related protective works; and
- locates surface MEC by visual means;
- transports and stores MEC assuring compliance with Federal, state, and local laws;
- disposes of MEC by burning/detonation;
- prepares MEC disposal site;
- prepares on-site safe holding area for MEC;
- determines MEC-related storage compatibility;
- prepares explosives storage plans in accordance with all applicable guidance;
- prepares required MEC- related administrative reports;
- prepares Standard Operating Procedures (SOPs) for on-site MEC operations;
- conducts daily site safety briefings;
- interprets x-ray of MEC; and
- determines a magnetic azimuth using a lensatic compass.

2.2.3.6.3 The UXO Technician III is also responsible for the supervision of the MEC disposal operation. He or she will:

- post individuals at entry points (if required);
- construct appropriate Engineering controls in accordance with HNC-ED-CS-S-98-7 Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions (August, 1998) (if required);
- assign team members to specific disposal duties;
- assure the area is clear prior to priming the explosives by placing blasting caps into the firing train, referred to as "capping in;" and
- check the area following each detonation (shot) or series of detonations (shots).

2.2.3.7 UXO Technician II

2.2.3.7.1 This individual will be a graduate of a school in accordance with DDESB TP18. If the individual is not a graduate of the military EOD School, he/she may be an UXO Technician I with at least 3 years contractor UXO experience. This individual will be able to fully perform all functions enumerated for UXO Clearance Personnel and UXO Technician I. In addition, the ability to perform the following functions is a requirement of the UXO Technician II:

- reconnaissance and classification of other MEC materials;
- identifying fuzes and determining fuze condition of all munitions U.S. and foreign including, guided missiles, bombs and bomb fuzes, projectiles and projectile fuzes, grenades and grenade fuzes, rockets and rocket fuzes, land mines and associated components, pyrotechnic items, military explosives and demolition materials, and submunitions;

- locating subsurface MEC using military and/or civilian metal detectors and related equipment;
- performing excavation procedures on buried MEC by manual and mechanical means;
- performing operator maintenance of military and/or civilian magnetometers and related equipment;
- locating surface MEC using visual means;
- operating a motor vehicle transporting MEC material, when appropriate;
- preparing an on-site holding area for UXO/MEC material; performing storage of MEC material and disposal materials in accordance with applicable guidance;
- preparing an MEC disposal site;
- preparing a non-electric firing system for an MEC disposal operation, an electric firing system for an MEC disposal operation, and detonating the cord firing system;
- disposing of MEC/explosives by burning and detonation;
- operating a personnel decontamination station;
- donning and doffing appropriate personal protective equipment in contaminated areas;
- inspecting salvage MEC-related material;
- erecting MEC-related protective works;
- determining a magnetic azimuth using current navigational/locating equipment;
- performing field expedient identification procedures to identify explosives contaminated soil, and
- perform demolition duties as assigned.

2.2.3.8 UXO Technician I

2.2.3.8.1 UXO Technician I may be utilized to perform MEC procedures when supervised by a UXO Technician II or above. This individual will be a graduate of a course in accordance with DDESB TP18. A UXO Technician I can advance to the UXO Technician II category after 3 years of contractor UXO experience.

2.2.3.8.2 The UXO Technician I's specific duties (under the supervision of a UXO Technician II, III, or a UXO-qualified individual of higher rank than the UXO Technician III) for this project will include:

- conducting reconnaissance and classification of other MEC materials;
- identifying all munitions, U.S. and foreign, including, guided missiles, bombs and bomb fuzes, projectiles and projectile fuzes, grenades and grenade fuzes, rockets and rocket fuzes, land mines and associated, components, pyrotechnic items, military explosives and demolition materials, and submunitions;
- locating subsurface MEC using military and/or civilian metal detectors and related equipment;
- performing excavation procedures on subsurface MEC by manual and mechanical means;

- locating surface MEC using visual means;
- transporting and storing MEC and disposal materials;
- preparing firing systems, both electric and non-electric, for destruction operations disposing of ammunition/ explosives by burning, or disposing of ammunition/explosives by detonation;
- operating a personnel decontamination station (PDS);
- donning and doffing personnel protective equipment in contaminated areas;
- inspecting salvaged MEC related material and erection of UXO/MEC related protective works;
- assisting in performing operator maintenance of military and/or civilian magnetometers and related equipment;
- operating a motor vehicle transporting MEC material, when appropriate;
- preparing an on-site holding area for MEC materials;
- preparing an MEC disposal site;
- determining a magnetic azimuth using current navigation/locating equipment;
- assisting in performing field expedient identification procedures to identify explosives contaminated soil; and
- performing disposal duties as assigned.

2.2.3.9 UXO Clearance Team

2.2.3.9.1 IAW EM 385-1-97 September 2008, Explosives Safety and Health Requirements Manual, the UXO Clearance Team shall:

A.) Be supervised by a UXO Technician III.

B.) Have a minimum of (2) UXO qualified personnel, (1) of which will be the UXO Technician III and up to (6) additional personnel.

C.) When the munitions response operations are limited to surface removals, a basic UXO team will consist of (1) UXO Technician III, (1) UXO Technician II, and up to (6) sweep personnel (for a total of (8) personnel). If the area to be cleared is large, (2) additional UXO Technician II and up to (12) UXO sweep personnel may be added to the basic team (for a total of 22 personnel).

2.2.3.10 Other Project Teams

2.2.3.10.1 The following will apply to all project teams, other than the UXO teams.

2.2.3.10.2 All other project teams (such as geophysical data collections, survey, brush clearing, etc.) must have a UXO Technician II or above assigned to the team when working in an area where MEC is suspected and where, at a minimum, a surface removal/remedial action has not been completed. “Completed” means appropriate quality control and quality assurance standards have been met. UXO

Technicians are required to perform anomaly avoidance or other functions to reduce the probability of these project teams from encountering MEC.

2.2.3.10.3 Skills and compositions of other project teams will be appropriate to the task being performed, including quality control. If the other project teams have been determined to be essential personnel to the project execution, they will maintain the minimum Team Separation Distance (TSD) (normally the K-40 distance of the Munitions with Greatest Fragmentation Distance (MGFD) for the Munitions Response Site (MRS) where the work is taking place) from other teams working in the area. This includes the UXO teams.

2.2.3.11 Disposal Team

2.2.3.11.1 The Disposal Team will consist of a minimum of one UXO Technician III and one UXO Technician II. A UXO Technician who is a licensed blaster in the State of Hawai`i will be in charge of and oversee all blasting operations of the Disposal Team. A copy of the blaster's license will be kept at the WMA site. Only UXO qualified personnel will be involved in actual explosive operations. Support from the contractor's teams may be utilized in building protective works, etc. (see Appendix P for the ATF explosives permit and list of authorized possessors).

2.2.4 Subcontractor Management

2.2.4.1 Subcontractors will be required to comply with requirements and procedures established in the work plan. Additionally, Federal Acquisition Regulation (FAR) Subpart 45.5 shall be incorporated by reference in all applicable subcontracts and purchase orders to ensure compliance with regulations regarding management of property in the possession of subcontractors.

2.2.4.2 Daily supervision of all subcontractor field activity will be the responsibility of the SUXOS, with oversight by the OPM. Subcontractor personnel will adhere to all applicable PWP, safety, health, and QC requirements. The APP specifies individual requirements for MEC safety and health.

2.3 Guidance, Regulations and Policy

2.3.1 MEC is a safety hazard and may constitute an imminent and substantial endangerment to the site personnel and local populace, thus 29 CFR 1910.120 applies (OSHA). The contractor will work in a manner consistent with CERCLA, Section 104 and the NCP, Sections 300.120(d) and 300.400(e) (EPA).

2.3.2 Discussion, Assumptions and Procedures Relating to identified or suspected unknown liquid filled munitions.

2.3.2.1 Unknown liquid filled munitions have not been identified and are not suspected at the former WMA. If, during MEC removal actions, contractor personnel identify or suspect unknown liquid filled munitions, then, all personnel will immediately withdraw upwind from the work area, and the SUXOS will contact the USACE OESS.

2.3.2.2 The SUXOS will secure the site by positioning two personnel as far upwind as possible of the suspected unknown liquid filled munitions, then while maintaining visual security of the area until they are relieved by the CBRNE (Chemical, Biological, Radiological, Nuclear and High-Yield Explosives) Analytical and Remediation Activity (CARA) or EOD personnel. White phosphorus (WP) munitions have been found at the site, but does not pose a CWM hazard.

2.3.3 Procedures for MEC that cannot be destroyed on-site or are unidentifiable

2.3.3.1 If MEC is encountered that cannot be moved due to its condition and the location prevents disposal in place, then the USACE OESS will be notified. If an unidentifiable MEC is found, the USACE OESS will be notified. If the USACE OESS is unable to identify the item, he will consult with the Corps of Engineers, Huntsville Center (CEHNC) OE Safety Office, at which time a decision will be made whether or not EOD support is called.

2.3.4 MEC Clearance Operations

2.3.4.1 This section and following subsections describe the standard practices for clearance operations and procedures for collecting, processing, and controlling the data associated with the clearance action conducted at sites within the former WMA. The objective is to safely locate, identify, and dispose of all MEC.

MEC clearance operations will begin by MEC detection/removal from 50 m by 100 m grids. The work grids will be laid as prescribed in Section 7, Geospatial Information and Electronic Submittals, and depicted in the specific task order map of Appendix B, Site Maps.

2.3.4.2 The UXO Clearance Teams will use the minimum separation distances (MSD) based on the blast overpressure and net explosive weight (NEW) of the area munitions with the greatest fragmentation distance (MGFD). MSDs and MGFDs are prescribed in the ESS in Appendix M. The ESS contains the new MGFD and MSDs for Areas Q and J and has been updated in accordance with the new September 2010, Department of Defense Explosives Safety Board (DDESB) Fragmentation Data Review Sheets and EM 385-1-97, Explosives Safety and Health Requirements Manual (September 2008)

2.3.4.3 MEC Contractor shall work in close coordination with qualified cultural resource and natural resource subcontractors to ensure that significant cultural resources and threatened and endangered species are afforded appropriate protection in compliance with CERCLA laws and regulations.

2.3.4.4 Sweep Procedures

2.3.4.4.1 The UXO Clearance Teams will locate the southwest corner of a grid; if necessary the team will use a GPS to locate grid stake corners. Based on the terrain and the density of munitions encountered, the UXO Technician III Team Leader will specify the distance between team members that will be used. In

addition based on the individual grid attributes, investigation of the grid may proceed north-south, east-west or in a cross direction.

2.3.4.4.2 The UXO Clearance Teams, consisting of all team members, will maintain the specified distance between team members. The team will stay on line and ensure that the metal detector head overlap is maintained during the clearance activity. The team members will use pin flags, as required, to stay aligned with the boundary and will ensure the detector head extends beyond the boundary line. Pin flags will be used, as required, to delineate the clearance boundary. The team members will align themselves on the individual holding the boundary line. The team member on the far side of the line will place temporary pin flags to mark the extent of clearance. Upon reaching the far boundary of the grid, the team will swing around and align themselves to clearance back to the starting boundary of the grid. The team member who previously placed boundary flags will now pull the previously placed pin flags. The team member on the original side of the line will now place temporary pin flags. The clearance will continue in this manner until the grid is cleared of MEC and MD. If required, at the end of each work day, pin flags will remain in place until the clearance is resumed the next morning.

2.3.4.4.3 The team will always utilize techniques to promote complete metal detection coverage of the grid area. For example, the sweep team will ensure boundary coverage by ensuring that detector head sweep goes beyond the grid lines. In addition the team will utilize techniques for maximum depth detection including detector height and orientation. The detector head will be kept as close as possible to the ground surface in a parallel orientation. The operators will avoid sweeping the detector up at the end of each swing. Grid points or areas with specific features (e.g., archeological sites, MEC, exception areas, etc.) will be acquired with a GPS receiver and a record of the data will be entered into the document system.

2.3.4.4.4 Each member will carry a Minelab Explorer SE metal detector as the primary detection instrument for clearance operations. In addition, the EM61-MKII metal detector may be used for specific conditions where allowed by terrain and/or for anomaly reduction/prioritization where there are conflicts with minimum separation distance (MSDs).

2.3.4.4.5 MEC determined to be live, or containing hazardous components, will be marked for final disposal procedures by a Disposal Team or as otherwise appropriate. If the condition of an item cannot be determined, it will be considered live and marked for the Disposal Team. For all MEC discoveries, the on-site OESS will be immediately notified. Live small arms rounds will be treated and/or disposed of in an approved manner by the contractor. Small arms rounds (e.g., 5.56, 7.62, .45, .50 caliber) are not considered MEC.

2.3.4.4.6 The SUXOS and/or a UXO Technician III will be responsible for final determination of a MEC item that is suspected to be live. At least **two** UXO Technician III personnel must agree on the condition of the MEC item before any disposal action is attempted. In addition, the USACE OESS must concur **before** any disposal action takes place. Site office publications will be researched, as

required. If publications are not available on-site, the SUXOS will request pertinent publications/information from the USACE OE Safety Specialist. MEC that have been deemed not acceptable to move will be "blown-in-place" on-site by the Disposal Team.

2.3.4.4.7 If submunitions or improved conventional munitions (ICMs) are encountered, the SUXOS will direct personnel to cease operations immediately and evacuate the area. The USACE OESS will be notified as soon as possible.

2.3.4.4.8 If the contractor identifies or suspects unknown liquid filled munitions, then refer to paragraph 2.3.2 for guidance. All live MEC items will be clearly marked with three pin flags. GPS coordinates will be recorded and reported to the Disposal Team.

2.3.4.4.9 All live MEC items located will be logged, marked and GPS coordinates will be taken prior to disposal. All data required by the PWS will be entered into the MEC database provided by USACE.

2.3.4.4.10 Disposal actions will generate fragments and MD that will be inspected and removed after disposal operations are conducted. A post-disposal investigation will be conducted with the detection instrument to clear the hole of all anomalies. All access, excavation, and detonation holes will be back-filled to grade as best as possible.

2.3.4.4.11 MD that does not require demilitarization will be collected, inspected by the UXO Team Leader, and carried in the on-site pick-up truck for transport to the consolidation point and processed at the end of the day. It is the UXO Team Leader's responsibility to assure that his team members handle only inert items during this process. MD which has been placed in the holding area will not be mingled with other types of material and will be held in locked containers.

2.3.4.4.12 In the event that live or suspected live MEC is discovered within MD piles the following procedures shall be followed:

1. Stop work immediately and evacuate the area of all non-essential personnel.
2. Secure the area to prevent access of non-essential personnel.
3. Notify the SUXOS and the UXOSO.
4. The SUXOS will notify the USACE OESS and PM and plan a course of action.
5. Prior to any course of action being taken, the USACE OESS will be consulted, for concurrence and approval.
6. After the application of the course of action, the SUXOS will prepare a report of the incident to be submitted to the USACE Contracting Officer and Program Manager.

2.3.4.4.13 If the SUXOS and UXOSO, with the concurrence of the OESS, determine the risk associated with the movement of live MEC is acceptable and necessary for the efficiency of either the activities being conducted or the protection of people, property or critical assets, then they may evaluate the munition and authorize its

movement within the MRS to an approved location for destruction. Both the SUXOS and UXOSO responsible for the activity being performed must agree with the risk determination. MEC items that are not acceptable to move will be "blown in-place" on-site by the Disposal Team (EM 385-1-97, Errata sheet No. 5, April 27, 2010).

2.3.4.4.14 If a scenario is encountered that precludes detonating MEC on-site, then the on-site USACE OESS will request the appropriate support.

2.3.5 Intrusive Investigations

2.3.5.1 This section describes the standard practices that will be utilized for subsurface investigations. Refer to Appendix L, The Exclusion Zone (EZ) Security, Notification and Implementation Plan for information concerning EZs and evacuation protocols. Refer to the ESS in appendix M for MGFDs, MSDs, Quantity-Distance (Q-D) Maps and EZ arcs for each munition response site (MRS).

2.3.5.2 Subsurface clearance procedures will be dependent upon the location and protection requirements of the specific site area. Protective measures, (e.g. barricades, etc.) will be employed when required to protect public and property. If protective measures are required, an anomaly reduction/prioritization survey may be completed to verify and potentially reduce the number of anomalies for excavation. For details, please reference Chapter 6, Geophysical Investigation Plan of this PWP.

2.3.5.3 All excavations will be completed by the minimum number of UXO personnel necessary using hand tools or mechanical means. During any excavation operation, a minimum of two personnel, one of which must be at least a UXO Technician II, will be present at each hole. The UXO Technician II or higher must be close enough to the excavation point to be able to see the bottom of the hole. Open Front Barricades (OFB) will be used, where applicable, to reduce the number of public evacuations. Engineering controls consisting of miniature OFBs (MOFB) will be used for 81mm mortars and below to protect personnel and property. For items larger than 81 mm (up to 105mm), OFB's or other engineering controls will be used to protect personnel and property and reduce evacuations.

2.3.5.4 MEC will be cleared to depth of detection subject to the capabilities of the detection instruments as determined by the GPO. *Minelab Explorer SE* will be programmed to the minimum sensitivity of 14 (the lowest level found to indicate all items during the previous GPO work at Waikoloa (Appendix I)). When possible the sensitivity level may be increased as long as false positive levels from geology or very small metallic pieces remain manageable. The EM61-MKII will use the minimum milivolt (mV) value as determined by the GPO results. Using the audio response in conjunction with the display on the instrument panel, anomalies will be selected. Each anomaly will be treated as a suspect MEC until it has been determined otherwise. Every

excavation hole will be checked thoroughly during the removal process. The clearance team will continue to excavate until no anomalies are detected.

2.3.5.5 MEC determined to be live, or containing hazardous components, will be marked for final disposal procedures by the Disposal Team.

2.3.6 Procedures for Change in Site Conditions

2.3.6.1 The following are possible changes in site conditions, which may occur during the project along with the procedures to be taken

1. Water covers the grid - Cease operations since MEC and/or MD cannot be seen.
2. Mud covers the grid to the extent that the MEC Removal Team is immobile - Cease operations.
3. Water or mud covers the grid but is deemed temporary due to weather conditions - The grid will be marked and will be revisited once the grid conditions have changed.

2.3.6.2 Regardless of the reason for the change in site conditions, the contractor will notify the USACE Contracting Officer and the USACE PM will be immediately notified of the changed condition and the action taken. Telephone communications will be followed up with a hard copy.

2.3.7 Mobilization Plan

2.3.7.1 Mobilization will commence upon notification to proceed from the USACE Contracting Officer. Emergency contacts for police/fire/medical responders, USACE officials, contractor management and external agencies as well as directions to the nearest hospital facility have been established and confirmed; the information is located in Figure 10-1 and Table 10-1 of the SSHP in Appendix D. Once mobilization to the site has occurred, the OPM will coordinate the following activities:

1. Establish and set-up a field office.
2. Contact the local telephone company and have telephone land lines installed at the field office.
3. Publish and disseminate to all project workers, the emergency treatment facility, point of contact, phone numbers, and directions to nearest hospital facility.

2.3.8 Site Preparation

2.3.8.1 Vegetation Removal

2.3.8.1.1 Areas that have been identified as having vegetation that will be problematic for handheld analog or digital geophysical surveys will undergo vegetation removal operations. Irregular terrain and treacherous lava rock flows will dictate the degree of removal necessary for effective detection and safe vegetation removal operations. For instance, lava flows with little or no soil containing sporadic fountain grass clumps will require little or no vegetation removal. In areas where the soil is deeper and the vegetation is thick, the removal standard will be less than 8 inches above ground surface. In any case, vegetation will be cut low enough to allow for an effective survey. QC and QA sampling along with the seeding program will ensure that the vegetation removal plans for each grid are sufficient for meeting the project data quality objectives (DQOs).

2.3.8.1.2 Only vegetation which is smaller than 3 inches in diameter measured on the trunk and 4 feet from the ground surface will be removed. The removal of endangered species will be prohibited until alternatives and a biological consultation can be discussed with the OESS and/or USACE PM. At a minimum, UXO avoidance techniques will be performed by a UXO Technician II with a *Minelab Explorer SE* metal detector prior to vegetation removal.

2.3.9 Environmental Sampling Plan

2.3.9.1 Environmental sampling is not required under this contract. The contractor will communicate and coordinate with other USACE contractors for this task if required.

2.3.10 Transportation of MEC

2.3.10.1 No transportation of MEC items off-site for disposal is anticipated.

2.3.11 Safe Holding Areas

2.3.11.1 A Safe Holding Area will not be established, as all live or suspected-live MEC will be blown-in-place or if deemed acceptable to move, transported to another area for disposal within the site.

2.3.12 Safety Precautions

2.3.12.1 The most recent DOD and USACE MEC safety guidance, regulations, instructions, manuals, and pamphlets will be observed during all MEC operations. Personnel will not attempt to remove any fuze(s) from the MEC, or dismantle or strip components from any MEC. Personnel are not authorized to inert any MEC items found on-site. MEC and MD items will not be taken from the site as souvenirs.

2.4 Disposal and Post Disposal Operations

2.4.1 Disposal activities will be in compliance with:

- EM 385-1-97 September 2008, Explosives Safety and Health Requirements Manual.
- TM 60A-1-1-31 EOD Disposal Procedures.
- DoD 6055.9-M, DoD Ammunition and Explosive Safety Standards (DoD, 2010).
- Hawaii Administrative Rules Title 12, Subtitle 8, Part 3, Chapter 125.1.
- Demo Operations Checklist
- Appendix P, Demolition Procedures Supplement
- And the WMA ESS in Appendix M of this PWP

2.4.2 General

2.4.2.1 The contractor's primary method for disposal will be an electronically initiated firing circuit which has 100% positive control. The electronic initiating system can be either an electronic blasting machine or a remote firing device as determined by the blaster in charge. An electric firing system is one in which electricity is used to fire the primary initiating element. The chief components of an electric firing system are the electric blasting cap, firing wire, and the blasting machine, or remote system. Near or under overhead power lines, an alternate method using the shock tube initiation system shall be utilized, which also has 100% positive control. General rules for disposal and post disposal operations include reviewing electromagnetic radiation (EMR) hazards and precautions and electrical grounding procedures, and carrying blasting caps in approved containers and keeping them out of direct sunlight. Specific safety rules for demolition operations are located in Appendix P, Demolition Procedures Supplement.

2.4.3 Handling Disposal Materials

The handling of disposal material will only be conducted at the direction of a licensed blaster. General rules for handling demolition material include always pointing the explosive end of blasting caps, detonators, and explosive devices away from the body during handling. Such practice will minimize injury should the item inadvertently detonate. It is the responsibility of the handler to be certain there is no obstruction in the conical cavity of shaped charges, or between the charge and the target, as any obstruction will materially reduce the penetration effect. Specific safety rules for handling disposal materials are located in Appendix P, Demolition Procedures Supplement.

2.4.4 Preparation for Firing

2.4.4.1 Preparations for electrical initiation for firing disposal charges begin with preparing and placing all explosive charges. The firing wire will be laid out and tested after determining the safe area. If using the blasting galvanometer, the galvanometer is checked by holding a piece of metal across its terminals. If the battery is good, there should be a wide deflection of the needle. For testing firing wire, specific procedures are located in Appendix P, Demolition Procedures Supplement.

The designated explosive handler shall use only standard blasting caps of at least the equivalent of a commercial No. 8 blasting cap and use electric blasting caps of the same manufacture, whenever possible, for each demolition shot involving more than one cap. It is the responsibility of the handler to keep blasting caps in approved containers, located at least 7.62 m (25 feet) from other explosives, until needed for priming. Specifically, the handler shall never bury blasting caps, and shall use detonating cord to position blasting caps above the ground. Buried blasting caps are subject to unobserved pressures and movement, which could lead to premature firing or misfires. For blasting caps, specific safety rules are located in Appendix P, Demolition Procedures Supplement. The UXO person in-charge will order the final priming of the shot.

2.4.4.2 If the Rothenbuhler Model 1664 RFD is used, follow applicable steps and comply with manufacturer instructions and Hawai`i State law as mandatory guidance. See Appendix P, Demolition Procedures Supplement for this firing device's operating procedures and the demolition operations checklist.

2.4.5 Firing Disposal Charges & Precautions

2.4.5.1 Prior to the application of detonation-in-place procedures, an EMR survey shall be conducted to determine if there are any transmitting antennas of radio, radar, or other electromagnetic-generating devices located in the vicinity. Radio frequency (RF) EMR hazards consist of waves of electrical energy. These waves are radiated in a line-of-site from the antennas of electronic devices that transmit radio, radar, television, or other communication, to include cellular telephones, or other communication or navigation radio frequency signals.

2.4.5.2 Appendix P, Demolition Procedures Supplement contains tables with the minimum safe distance between electro-explosive devices (EEDs) and the transmitting antenna for all RF emitters. The tables contain the minimum safe distances, which will be maintained between mobile RF transmitters and electric blasting operations. The factors to be considered when evaluating the degree of hazard that the RF EMR energy represents are:

- strength of the field (power);
- frequencies transmitted;
- distance from the transmitter antenna to the ordnance; and
- amount or type of protection available.

2.4.5.3 Lightning is a hazard to both electric and non-electric blasting caps. A strike or a nearby miss is almost certain to initiate either type of cap as well as other sensitive explosive elements such as caps in delay detonators. Lightning strikes, even at remote locations, may cause extremely high local earth currents, which may initiate electrical firing circuits. Effects of remote lightning strikes are multiplied by proximity to conducting elements, such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduit. The only safe procedure is to suspend all blasting activities during electrical storms and when one is impending. All blasting activities will be suspended when lightning-thunder storms are within ten miles of the project site.

2.4.5.4 Many electric blasting caps have been detonated because they grounded static electricity that was in the air. Static electricity is produced by a great variety of causes; among them, dust storms, which have caused a large number of detonations; snow storms, less dangerous, but known to have caused premature explosions; and escaping steam, known to have charged the air and detonated electric caps. Enough static electricity to detonate electric caps also can be generated by such sources as moving belts and revolving automobile (truck) tires. Static electricity is an increased hazard when operating in an extremely cold climate or area of low humidity.

2.4.5.5 Electric power lines also pose a hazard with respect to electric initiating systems. It is recommended that any disposal operation closer than 155 meters (517 feet) to electric power lines be done with a non-electric system.

2.4.5.6 The signal for detonation will be given by the blaster-in-charge only after all personnel in the area have reached cover or a safe distance from the charge. After all smoke has cleared, the blaster- in- charge and a safety observer shall check the shot following the detonation.

2.4.5.7 The team will search the area after each firing for any remaining explosive components and loose explosives. Scattered explosive material should be carefully gathered and destroyed by detonation with the next shot; if left in place these items can create an additional explosive hazard. This search includes verifying that a secondary item is not present in the area after conducting “blow-in-place” operations. Always check the “blow-hole” for secondary items and remove all MD and fragmentation.

2.4.5.8 For misfire prevention, causes and clearance, specific safety rules and procedures are located in Appendix P, Demolition Procedures Supplement.

2.5 Minimum Separation Distances (MSD) & Exclusion Zones

2.5.1.1 Exclusion zones apply to MEC areas for non-project personnel during ongoing surface or intrusive activities. Project personnel are defined as those contractor and DoD employees who are onsite to conduct the MEC response, plus any authorized visitors. All other personnel are considered non-project personnel. The MSD of the exclusion area is based on the MGFD for the area. In addition, the MSD is based on the potential risk from intentional or unintentional detonations as described in the sections below.

2.5.1.2 Appropriate measures will be taken to eliminate and reduce risk for exposures within the exclusion zone. Such measures (including the use of protective works, engineering controls, evacuation of inhabited buildings, area closures and traffic control) will be available for the duration of the project. Any actions that require interaction with the public will be facilitated through the appropriate local departments. If protective measures or evacuation are required, a anomaly reduction/prioritization survey may be completed to verify and potentially reduce the number of anomalies for excavation. For details, please reference Chapter 6, Geophysical Investigation Plan of this PWP.

2.5.1.3 In addition to the public exclusion zones, project personnel will follow MSDs for unintentional and intentional detonations as outlined in the WMA ESS, Appendix M.

2.5.2 Intentional Detonations

2.5.2.1 When the specified trajectory or MSD cannot be met, sandbag mitigation or the Buried Explosion Module may be used to meet the requirements. The sandbag mitigation shall be constructed in accordance with HNC-ED-CS-S-98-7, (a copy will be maintained on site).

2.5.2.2 Refer to the WMA ESS, Appendix M, for MGFDs, MSDs, Quantity-Distance (Q-D) maps and EZ arcs for each area.

2.5.3 Sandbag Mitigations

2.5.3.1 Sandbags may be used for MEC up to 155 mm (M107 Comp. B Only) in diameter as an engineering control to mitigate the fragmentation and overpressures generated during an intentional MEC detonation. Only 155mm projectiles that can be confirmed to be M107 Composition B filled munitions are authorized for sandbag mitigations; otherwise, another approved engineering control, e.g., the buried explosive module (BEM), must be utilized. The Disposal Team will refer to HNC-ED-CS-S-98-7 and the specific MEC item Fragmentation Data Review Sheet listed the WMA ESS Appendix M for sandbag mitigations.

2.5.3.2 Refer to the WMA ESS, Appendix M, for MGFDs, MSDs, Quantity-Distance (Q-D) maps and sandbag mitigation requirements listed on MSD calculation sheets.

2.5.4 Unintentional Detonation

2.5.4.1 Refer to the WMA ESS for MGFDs, MSDs, Quantity-Distance (Q-D) maps and EZ arcs for each area.

2.5.5 Open Front Barricades and Miniature Open Front Barricades

2.5.5.1 The use of the CEHNC designed, DDESB-approved OFBs and miniature OFBs will be available during intrusive activities. Both the OFB and miniature OFB are designed to defeat fragments to the rear and sides of the OFB and miniature OFB in the event of an accidental/unintentional detonation during intrusive activities. The MSD to the front of the OFB and miniature OFB is the same as the MSD without the OFB and miniature OFB. The OFB and miniature OFB are not designed to reduce the effects of blast overpressure. The OFB and miniature OFB may not be used for intentional detonations. Also, the OFB may not be utilized for areas where a 155mm HE projectile is the MGFD.

2.5.5.2 Refer to the WMA ESS, Appendix M, for MGFDs, MSDs, approved engineering controls, Quantity-Distance (Q-D) maps and EZ arcs for each area.

2.6 MEC Accountability and Records Management

2.6.1.1 A detailed accounting of all live MEC items encountered during the investigation activities will be accomplished. This accounting will be entered into the USACE Database.

2.6.1.2 The Team Leader will provide validated data to the SUXOS at the close of each working day. The SUXOS will:

- collect and review the raw field data for accuracy;
- provide a second review of the data by another project team member; and
- provide the verified data to the home office for USACE Database entry that will be posted onto the contractor's website. The USACE PM as well as the other members of the USACE Project Delivery Team will have access to the website.

2.6.1.3 As MEC is located, it will be documented on the working map and entered into the GIS database from the GPS to include coordinates within the grid location. The final documentation will be provided in the MEC Accountability Log (Appendix F).

2.6.1.4 A detailed accounting of all live or suspected UXO or MEC items encountered during the MEC removal action will be accomplished. MEC Accountability Form (Appendix F) will be completed on each live or suspected MEC item encountered. This accounting will include:

- identification number (a unique ID);
- type, condition, and grid location (GPS coordinates);

- nomenclature;
- fuze description;
- fuze condition;
- alignment (the longitudinal axis orientation of the item);
- placement (the location with respect to ground surface);
- additional comments, if required;
- date and recorder of log;

2.6.1.5 Each type of live or suspect MEC item encountered at the project site will be identified using a unique numerical identifier, such as 0001. Photographs of live or suspect MEC items will be taken for documentation purposes. A white board with an item for scale positioned beside the UXO, with the date, UXO Team number, UXO description and GPS location written with a white board erasable felt tip pen, will be placed adjacent to the item. The photographer will know that these photographs will be utilized in the final report; thus, a focused, well-thought out photograph is necessary.

2.6.1.6 For documentation purposes, photographs taken of encountered live MEC and MD stockpiles will be used for the Final Report. Photographs of live MEC will be taken to show detail and will be annotated with the grid coordinates. Photographic records will be used to supplement information recorded as needed.

2.6.2 Additional Tasks

2.6.2.1 Meetings

2.6.2.1.1 Project personnel, as directed by the USACE Contracting Officer, will be available to participate in public meetings, as required, and make presentations and answer questions concerning project activities. Press releases, materials to be provided to the public, and presentations will be approved in advance by the USACE.

2.6.3 Site Specific Final Report

2.6.3.1 A Site Specific Final Report (SSFR) will be prepared in accordance with MR-030.

2.7 Material Potentially Presenting an Explosive Hazard (MPPEH) Certification, Treatment, and Final Disposition Procedures

2.7.1 MPPEH Responsibilities and Procedures

2.7.1.1 Procedures outlined in EM 1110-1-4009, Engineering and Design, Military Munition Response Actions (June 2007) for processing MPPEH for final disposition will be complied with. MEC response services will include an inspection procedure of the exterior and interior surfaces of all recovered MPPEH to ensure these items do not present an explosive hazard. Disposal activities will be performed daily. If not

disposed of daily, Environet will provide security until disposal can be accomplished in accordance with EP 1110-1-18 and EM 385-1-97

2.7.1.2 All munitions debris and cultural debris that could be mistaken for an MEC item or is larger than 2 inches in width by 2 inches in length will be picked up by the UXO Clearance Team during surface clearance operation. Expended small arms casings will be removed when significant numbers are encountered to prevent anomaly masking. Small arms rounds (e.g., 5.56, 7.62, .45, .50 caliber) are not considered MEC. Live small arms rounds will be treated and disposed of in an approved manner. Disposal activities will be performed daily. If not disposed daily, Environet will provide security until disposal can be accomplished in accordance with EP 1110-1-18 and EM 385-1-97.

2.7.1.3 Sweep personnel, if used, will only mark suspected items and will not be allowed to perform any assessment of suspect items to determine its status.

2.7.1.4 UXO Technician I can tentatively identify a located item as MD, followed by a required confirmation by a UXO Technician II or III.

2.7.1.5 UXO Technician II will:

- Perform a 100% inspection of each item as it is recovered to determine if the item classification is UXO, discard military munitions (DMM), munitions debris, or range related debris; explosive, inert material, or other fillers are present; demilitarization or remote explosive access are required; and engine fluids, illuminating dials and other visible liquid hazardous, toxic or radiological waste (HTRW) materials are present.
- Segregate items requiring demilitarization or venting procedures from those items ready for certification.
- Process items found to contain explosives hazards or other dangerous fillers will be processed in accordance with applicable procedures.

2.7.1.6 UXO Technician III will:

- Perform a 100% re-inspection of all recovered items to determine if free of explosives hazards or other dangerous fillers and engine fluids, illuminating dials and other visible liquid HTRW materials.
- Supervise detonation of items found to contain explosive hazards or other dangerous fillers and oversee demilitarization procedures.
- Supervise the consolidation of MPPEH for containerization and sealing.
- Segregate MD and range-related Debris.

2.7.1.7 UXOQCS will:

- Conduct daily audits of the procedures used by UXO teams and individuals for processing MPPEH.
- Perform and document random sampling (by pieces, volume or area) of all MPPEH collected from the various teams to ensure no items with explosive hazards, engine fluids, illuminating dials and other visible liquid HTRW materials are identified as MD or range-related debris as required for

completion of the Requisition and Turn-in Document, DD Form 1348-1A (Appendix F, Site Forms).

2.7.1.8 UXOSO will:

- Ensure the specific procedures and responsibilities for processing MPPEH for certification as MD or range-related debris specified in the work plan are being followed.
- Ensure all procedures for processing MPPEH are being performed safely and consistent with applicable regulations.

2.7.1.9 SUXOS will:

- Be responsible for ensuring work and QC Plans specify the procedures and responsibilities for processing MPPEH for final disposition as MD or range-related debris.
- Ensure a Requisition and Turn-in Document, DD Form 1348-1A is completed for all MD and range-related debris to be transferred for final disposition.
- Perform random checks to satisfy that the MD and range -related debris is free from explosive hazards necessary to complete the Form, DD 1348-1A. Certify all MD and range-related debris as free of explosive hazards, engine fluids, illuminating dials and other visible liquid HTRW materials.
- Be responsible for ensuring that inspected debris is secured in a closed, labeled and sealed container and documented as follows:

1. The container will be closed and clearly labeled on the outside. The first container will be labeled with a unique identification that will start with USACE/Installation Name/Contractor's Name/0001/Seal's unique identification and continue sequentially.
2. The container will be closed in such a manner that a seal must be broken in order to open the container. The seal will bear the same unique identification number as the container or the container will be clearly marked with the seal's identification, if different from the container.
3. A documented description of the container will be provided by the contractor. The description will include the contents, weight of container, location where munitions or range-related debris was obtained, name of contractor, names of certifying and verifying individuals, unique container identification, and seal identification, if required. The contractor in a separate section of the final report will also provide these documents.

2.7.2 Inspection Procedure

2.7.2.1 A UXO Technician II will perform the initial inspection of MPPEH in the field. Another UXO Technician II and the UXO Technician III team leader will confirm

and agree on the safety status of each item prior to moving it and/or leaving the field area.

- 100% visual inspection by UXO Technician II
- 100% visual inspection by UXO Technician III
- All UXO will be blown in place.
- All MPPEH (including inert ordnance) that cannot be 100% visually inspected will be perforated explosively and/or detonated with countercharges to allow for filler exposure and/or access for inspection and disposal of any potential explosives and explosives components.
- All material classified as hazardous waste that is non-explosive will be reported, locally treated and/or properly segregated, packaged and labeled for shipment to a qualified receiver for disposal. All MD that does not require explosive disposal will be collected, segregated by metal composition and loaded in the team pick-up truck for transportation to the consolidation point at the end of the day. It will be the Team Leader's responsibility to assure that only safe items are transported to the consolidation point.

2.7.3 Consolidation Point

2.7.3.1 No "materials documented as an explosive hazard (MDEH)" will be transported to the consolidation point. The Disposal Team will treat all material with known explosive hazards onsite and the contractor will maintain custody of all munitions debris until it can be classified as "material documented as safe" (MDAS) with a 1348-1a, thermally treated, demilitarized, disfigured beyond recognition as MEC and/or MEC debris, and cleared for unrestricted transfer to an authorized recycling center with end-use certification.

2.7.3.2 Munitions debris will not be co-mingled with other types of material and will be held in secured containers.

2.7.4 Processing Point

2.7.4.1 When containers are full, the lock is replaced with a serialized seal and the material is classified as "safe" and transported to the MEC debris processing point. The processing point will be located within the FUD site while avoiding transportation routes on public roads and highways. Preferably, mobile thermal treatment, demilitarization and deformation equipment will be used to process all of the MDAS at the completion of field work at or near the consolidation point to avoid public roadways before final disposition. MDAS will not be co-mingled with other types of material or HTRW and will be held in secured containers.

2.7.5 Thermal Treatment

2.7.5.1 Prior to conducting thermal treatment operations, the trained and outfitted team will assemble for a pre-burn safety briefing. The briefing will cover all procedures, roles and responsibilities and quality standards. Areas for performing MDAS inspection and re-inspection will be far enough apart and plainly marked as to not confuse

treated materials from untreated materials. The UXOQCS will perform a preparatory and initial inspection.

2.7.5.2 A mobile batch furnace will be utilized to conduct thermal treatment. Prior to thermal treatment, all MDAS will receive two additional 100% inspections by the Thermal Treatment operators who will be UXO Technicians II or above. The batch burner furnace has two VT 3-3Vapor Torches, each having an approximate flame temperature of 2050 degrees Fahrenheit. Batches will be heated to 650 degrees Fahrenheit for a minimum of 30 minutes.

2.7.5.3 Upon completion of the thermal treatment, an Expray Kit, or equivalent, will be used to validate the MD is free of explosive residue and then certified as Explosive Free. Daily inspection will be made to insure the security of treated material. All processed material will be sealed and locked in secure containers with a unique identification number assigned for each container.

2.7.6 Demilitarization and Disfigurement

2.7.6.1 After all MPPEH has been certified as MDAS, the material will be demilitarized and disfigured beyond recognition as military or ordnance items and will closely resemble raw metals.

2.7.6.2 The methods for disfiguring the material will exceed the DoD demilitarization standards and will be custom designed to the type of MD being demilitarized. These operations will be coordinated with and under the safety oversight of the USACE OESS.

2.7.7 MPPEH Certification and Verification (DD Form 1348-1A)

2.7.7.1 MPPEH will be properly inspected in accordance with the procedures above. Only personnel who are UXO qualified personnel will perform these inspections. The SUXOS will certify and the POH OESS will verify that the debris is free of explosive hazards.

2.7.7.2 DD Form 1348-1A will be used as certification/verification documentation. All DD1348-1A will clearly show the typed or printed names of the SUXOS and the POH OESS, organization, signature, and contractor's home office and field office phone number(s) of the persons certifying and verifying the debris as free of explosive hazards.

2.7.7.2.1 In addition to the data elements required, the DD 1348-1A will clearly indicate the following for MD:

1. Basic material content (type of metal; e.g., steel or mixed)
2. Estimated weight
3. Unique identification of each of the containers and seals stated as being turned over.
4. Location where munitions debris or range-related debris was obtained.
5. Seal identification, if different from the unique identification of the sealed container.

2.7.7.2.2 The following certification/verification statement will be entered on each DD 1348-1A for turn-over of MD or range-related debris and will be signed by the SUXOS and the USACE OE Safety Specialist: "This certifies that the material listed has been 100 percent properly inspected and, to the best of our knowledge and belief, are free of explosive hazards, engine fluids, illuminating dials and other visible liquid HTRW materials." This statement will be used on any ranges where Range Related Debris is being processed along with munitions debris.

2.7.7.2.3 The following certification/verification statement will be entered on each 1348-1A for turn-over of MD and will be signed by the SUXOS on properties where only MD is being processed: "This certifies and verifies that the material listed has been 100 percent inspected and to the best of our knowledge and belief, are inert and/or free of explosives or related materials."

2.7.8 Maintaining the Chain of Custody and Final Disposition

2.7.8.1 In coordination with the USACE, the chain of custody and final disposition of the certified and verified materials will be maintained. For work completed in the former WMA, Big Island Scrap Metal, LLC or an authorized recycler will be used.

2.7.8.2 All certified and verified material will only be released to an organization who will agree to the following:

2.7.8.2.1 Upon receiving the unopened labeled containers, each with its uniquely identified and unbroken seal ensuring a continued chain of custody, and after reviewing and concurring with all the provided supporting documentation, the receiver will sign for and agree with the provided documentation that the sealed containers contained no explosive hazards when received. This will be signed on company letterhead and stating that the contents of these sealed containers will not be sold, traded or otherwise given to another party until the contents have been thermally treated and are only identifiable by their basic content.

2.7.8.2.2 Send notification and supporting documentation to the sealed container-generating contractor documenting the sealed containers have been thermally treated, disfigured/mutilated beyond recognition as muntions-related debris, and are now only identifiable by their basic content, e.g. pieces of steel or aluminum.

2.7.8.2.3 This document will be incorporated by the contractor into the final report as documentation for supporting the final disposition of munitions debris and range-related debris.

2.7.8.2.4 If the chain of custody is broken, the affected MPPEH must undergo a second 100 percent re-inspection, and be documented to verify its explosives safety status (identified as either munitions debris or range related debris).

2.7.8.2.5 Material that has been documented as safe is no longer considered MPPEH as long as the chain of custody remains intact. A legible copy of inspection, re-inspection, and documentation must accompany the material through final disposition and be maintained for a period of 3 years thereafter.

2.7.9 Quality Control Inspections and Sampling

2.7.9.1 In addition to the Expray Explosive Detection Kit, or equivalent, sampling, all MPPEH will receive QC inspections throughout the MPPEH and MDAS process and before the USACE OESS and SUXOS "Explosive Free" inspections and documentation.

2.8 Lessons Learned

2.8.1 The SUXOS, the UXOQCS, and the OPM will all be responsible for logging and reporting Lessons Learned as specified in Section 10.14. The OPM will record these items in the Weekly Status Report, and will ensure they are included in the Final Report.

Chapter 3 Explosives Management Plan

3.1 Description and Quantities

3.1.1 This Explosives Management Plan and all MEC disposal operations will comply with USACE Explosives Safety and Health Requirements Manual EM 385-1-97, USACE EP 385-1-95a, Basic Safety Concepts and Considerations for Ordnance and Explosive Operations, FAR 45.5, local and state laws and regulations, Alcohol, Tobacco, and Firearms Publication (ATFP) 5400.7, DOD 6055.9-STD, DOT regulations and DID MR-005-03, Explosives Management Plan, and approved WMA ESS and Amendments.

3.1.2 Explosive materials used during the commission of MEC disposal actions at Waikoloa Maneuver Area, Hawai`i will be obtained from commercial sources. These explosive materials will be for the specific purpose of disposal of live or suspect MEC and inert MEC items, if required, which are located during the ordnance and explosives clearance action. A firing system that has 100% control will be utilized. An electrical system will be used unless within minimum safe distance from transmitters as detailed in Appendix P, Demolition Procedures Supplement, or within 155 meters of energized power lines. In these cases a non-electric system of shock tube and non-electric detonators will be used. Quantities of explosive materials required to conduct a single-day operation will be drawn from the storage magazines.

3.1.3 The maximum quantity of explosives inventory in storage is 100 lbs NEW (refer to the WMA ESS in Appendix M). The explosive items stored are listed in the table below.

Table 3-1: Explosives Storage Inventory

90 gram booster (Class 1.1D)	1 box @ 200 each	39.7 lbs
Electric blasting caps (Class1.4B)	1 box @ 200 each	.42 lbs
23 gram perforators (Class 1.4S)	3 boxes @ 150 each	7.6 lbs
Detonation cord (Class 1.4D)	3 boxes = 1500 feet	17.2 lbs
39 gram perforators (class 1.4S)*	22 each	1.9 lbs
Non-electric Firing System (Shock tube) (class 1.4S)	1 box	.044 lbs
Detonator assembly non-electric (Class 1.4B)	1 box @ 90 each	.243 lbs
Shotshell primers (Class 1.4S)	2 boxes @ 200 each	.03 lbs
Total Explosive Weight		**67.137 lbs**

*Items will not be reordered.

3.2 Acquisition

3.2.1 The contractor will purchase, supply and deliver all disposal explosives. The proper permits, licenses, and trained personnel records will be provided to the OESS for approval.

3.2.2 Initial Receipt Procedures

3.2.2.1 Upon receipt of donor materials, an inventory will be conducted to ascertain the correct type and serviceable condition.

3.2.2.2 A copy of the invoice(s) for the incoming donor materials will be kept in the on-site donor materials accountability file. Upon receipt, a separate memorandum will be prepared and retained on-site with the following information:

- date of acquisition;
- name of manufacturer or brand name;
- manufacturer marks of identification;
- quantity;
- description; and
- name, address, and license number of the persons from whom the explosive materials are received.

3.2.2.3 Upon receipt of donor materials, two Magazine Data Cards will be completed. One copy will be kept in the magazine with the materials and one copy will be kept in the on-site project office in the donor accountability file.

3.2.2.4 If during the initial receipt inventory a discrepancy is found between the quantity listed on the invoice and the quantity being delivered, the quantity received will be annotated on the invoice. The Disposal Team Supervisor will notify the supplier of any discrepancy as soon as possible. The OPM will be notified and provided a copy of the memorandum and a copy of the invoice.

3.2.3 Storage

3.2.3.1 The contractor or approved subcontractor will store donor explosives in a Bureau of Alcohol, Tobacco and Firearms (ATF) approved Type II, magazine with a separate attached cap box. The magazine location will be on an approved and sited area within the contracted work area. Location of the explosive magazine is specified in the ESS. Blasting caps will be stored in the cap box and all donor explosives will be stored in the magazine. The magazine and cap container will be secured with four each, ATF approved padlocks (two on the magazine and two on the cap box). The padlocks will have five tumblers and a casehardened 3/8 inch diameter shackle. Appendix P contains a list of key control procedures for the padlock keys. A 6 foot high chain link fence will be placed around the magazine. The magazine will be at least 6.5 feet from the nearest fencing. The storage area will be maintained clear of volatile

material for a minimum of 50 feet and vegetation for a minimum of 25 feet. An ATF approved Type I Magazine may be used if deemed advantageous to the project.

3.2.4 Transportation

3.2.4.1 Vehicles used for transportation of explosive materials shall not be loaded beyond their rated capacity and the explosive materials shall be secured to prevent shifting of load or dislodgment from the vehicle; when explosive materials are transported by a vehicle with an open body, a day box or closed container shall be securely mounted on the bed to contain the cargo. All vehicles transporting explosive materials shall display all placards, lettering, and/or numbering as required by Department of Transportation (DOT) and the State of Hawaii. The vehicle will have a minimum of two each Class 2A 10B:C fire extinguishers on board.

3.2.4.2 Explosive materials and blasting supplies shall not be transported with other materials or cargoes; blasting caps (including electric) shall not be transported in the vehicle or conveyance with other explosives unless the conditions of 49 CFR 177.835(g) are met (i.e. an IME-22 container is used to transport the blasting caps).

3.2.4.3 All vehicles for transportation of explosive materials shall be in the charge of and operated by a person who is physically fit, careful, reliable, able to read and understand safety instructions, and not under the influence of intoxicants or narcotics.

3.2.4.4 Only the authorized driver and his or her helper shall be permitted to ride on any conveyance transporting explosive materials or detonators.

3.2.4.5 Explosives shall not be exposed to sparking metal during transportation of materials and all electric wiring shall be completely protected and securely fastened to prevent short circuits; a written record of such inspection shall be kept on file.

3.2.4.6 Vehicles transporting explosive materials shall be operated with extreme care; full stops shall be made at approaches to all railroad crossings and main highways and the vehicles shall not proceed until it is known that the way is clear.

3.2.4.7 No vehicle shall be refueled while explosive materials are on the motor vehicle except in an emergency.

3.2.4.8 Persons employed in the transportation, handling, or other use of explosive materials shall not smoke or carry on their persons or in the vehicle, matches, firearms, ammunition, or flame-producing devices.

3.2.4.9 Provision shall be made for safe transfer of explosive materials to magazine vessels including substantial ramps or walkways free of tripping hazards.

3.2.4.10 Vehicles transporting explosive materials shall not be left unattended.

3.2.5 Receipt Procedures

3.2.5.1 Daily transactions, which include receipt, issue, and/or turn-in of donor materials, will be annotated on Data Cards (Appendix F).

3.2.5.2 Only the Disposal Team Supervisor is authorized to request to order and receive explosives from the supplier.

3.2.5.3 Only the onsite Disposal Team is authorized to issue donor explosives (See Appendix P).

3.2.5.4 The following individuals are authorized to transport and use donor explosives:

- Disposal Team Supervisor (Authorized Possessor, Appendix P);
- Disposal Team Personnel

3.2.6 Explosive Use Certification

3.2.6.1 At the conclusion of the Contract the Disposal Team Supervisor will complete a memorandum stating that all the donor explosives expended during MEC removal operations were used for their intended purpose.

3.2.7 Inventory

3.2.7.1 Physical Inventories

3.2.7.1.1 Physical inventories will be conducted to verify the accuracy of the amounts indicated on the Magazine Data Card. The results of the inventory will be annotated on both copies of the data card (the magazine copy and the file copy). Two personnel will conduct the inventory. If a subcontractor is utilized, then one of their employees will be present for the inventory. Consecutive inventories will not be conducted by the same individuals. The SUXOS and UXOSO will alternate inventory duties.

3.2.7.2 Reconciling Discrepancies Resulting from Inventories

3.2.7.2.1 Inventory discrepancies will be resolved immediately. If it is determined that a theft or loss has occurred procedures in the section below will be followed.

3.2.7.3 Weekly Inventories

3.2.7.3.1 Inventories of explosives in stock shall be conducted weekly.

3.2.8 Lost, Stolen, or Unauthorized Use of Explosives

3.2.8.1 Upon discovery, lost, stolen, or unauthorized use of explosive materials will be reported as follows:

1. Within 24 hours, the Project Manager will give an immediate notification by telephone to the USACE Contracting Officer, followed by a written report.
2. Notify the ATF at 800-800-3855 within 24 hours of discovery, complete ATF Form 5400.5, Report of Theft or Loss - Explosive Materials and mail to U.S. Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives, Los Angeles Field Division, 550 North Brand Avenue, 8th Floor, Glendale, California 91203
3. Notify the local law enforcement agency.

3.2.9 Return of Excess Daily Issue

3.2.9.1 Donor explosives that are drawn but not used will be returned to the magazine as soon as possible. The Magazine Data Card in the magazine and in the file will be annotated to reflect the return.

3.2.10 Disposal of Unused Explosive Materials

3.2.10.1 All unused explosive materials remaining upon completion of the contract will be disposed of on site or transported off site. Unused explosive materials will be returned to the supplier located on the Island of Hawaii. All procedures outlined in the section above on transport of explosive materials will be followed.

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Chapter 4 Explosives Siting Plan

4.1 An Explosive Siting Plan is not required for MEC Removal Contracts where an approved ESS is in place.

(See Appendix M. WMA ESS)

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Chapter 5 Geophysical Prove-Out Plan and Report

5.1 Geophysical Prove-Out (GPO) Plan

5.1.1 GPO Purpose

5.1.1.1 The purpose of a GPO is to demonstrate and document the site-specific capabilities of the proposed sensors, navigation equipment, data analysis, and data management along with the associated equipment and personnel. As a whole, the GPO demonstrates the ability of the site team to operate an integrated system capable of meeting data quality objectives (DQO) for project performance goals.

5.1.1.2 A full GPO is not required under the general PWSPWS for this contract. Extensive GPO testing has been performed in the former WMA. The government has three existing WMA GPO locations for instrument and operator certification prior to beginning field operations. One GPO location in Waimea currently has limited rights of entry. The second GPO located in Kawaihae, has a test strip design with a limited selection of seed items. The third GPO is located in Waikoloa with a variety of items at relatively shallow depth. For Task Order #0008, the Waikoloa or Waimea GPO will be utilized depending on access or other constraints. The project area for Task Order #0008 has variable geological and soil conditions similar to both Waikoloa and Waimea.

5.1.1.3 Extensive GPO instrument testing has been performed in the former WMA during past removal actions as described in the next section (American Technologies, Inc. (ATI), 2003). Additionally, the Kawaihae GPO, completed for the former WMA in 2008, produced a GPO Letter Report describing the approach, methods and results. Based on the 2008 GPO Letter Report, past GPO testing, and similar project objectives and conditions, the contractor intends to utilize the Geonics EM61-MKII and *Minelab Explorer SE* as the primary MEC detection instrument for this contract.

5.2 Summary of Previous Reports

5.2.1 Geophysical Prove-Out Report (9 September – 16 September 2003)

5.2.1.1 ATI performed a GPO survey at the former WMA between 9 and 16 September 2003. The GPO was performed to support a Conventional OE Removal Action in the area. The results of the GPO were used in determining portions of the Geophysical Work Plan for the subsequent geophysical field investigation(s).

5.2.1.2 A summary of the results and recommendations of the ATI report are presented below. The following overall conclusions were reached during the GPO survey and confirmed during the subsequent MEC removal actions by ATI.

5.2.1.3 The electromagnetic (EMI) technology, specifically the EM61-MKII, is an effective instrument for detecting MEC items in areas where background noise levels due to geologic/cultural conditions are minimal. Since the EM61-MKII is a proven durable and effective instrument under a variety of weather, cultural and geologic/environmental conditions, it is recommended that the EM61-MKII will be

utilized as required. The following target anomaly selection criteria and survey parameters were determined from the GPO survey effort:

- For the EM61-MKII, a reasonable target selection protocol was established as the following: a MEC-like anomaly having amplitude above background of at least 5 milivolts (mV) within Channel 2 and/or 4 mV within Channel 3 of the post-processed EM61-MKII data sets.
- Traverse spacing of 0.9 m (2.95 feet) was adequate to identify the expected targets in most areas. If the terrain to be surveyed was determined to be very difficult to traverse, a line spacing of 0.6 m (1.97 feet) was implemented to ensure total coverage.

5.2.1.4 *Geosoft Oasis Montaj/UXO Detect™* was used to grid, contour, and analyze target selections. The reacquisition test indicated the GPS was able to relocate the expected MEC items with sufficient accuracy.

5.2.2 Geophysical Prove-Out Report (26 December 2003- 4 January 2004)

5.2.2.1 The previous contractor, ATI, performed a GPO survey at the former WMA between 26 December 2003 and 4 January 2004. The GPO was performed to support a *Conventional OE Removal Action* in the area. The results of the GPO were used in determining portions of the *Geophysical Work Plan* (ATI, 2003) for the subsequent geophysical field investigation(s).

5.2.2.2 A summary of the results and recommendations from that report are presented in the GPO Letter Report. The following overall conclusions were reached during the prove-out survey:

- The *Minelab Explorer SE*, a handheld, multiple frequency, 1.5 to 100 kilohertz (kHz) metal detector was selected for use on the Waikoloa area site surveys because of the sophisticated detection capability to discriminate between geologic and cultural features.
- For the *Minelab Explorer SE*, primary selection of possible targets was based on the strength of the transmitted audible response. When the equipment traveled over a possible buried item, the cross-hair display on the control panel indicated whether the item buried was ferrous or non-ferrous and displayed the approximate depth.
- For the EM61-MKII, the target anomaly selection criterion was any MEC-like anomaly having amplitude above background of at least 5 mV within Channel 2 and/or 4 mV within Channel 3 of the post-processed EM61-MKII data sets.
- Traverse spacing of 0.9 m (2.95 feet) was adequate to identify the expected targets in most areas. If the terrain to be surveyed was determined to be very difficult to traverse, a line spacing of 0.6 m (1.97 feet) was implemented to ensure total coverage.

Chapter 6 Geophysical Investigation Plan (GIP)

6.1 Introduction

6.1.1 General Information

6.1.1.1 This GIP provides the details of the approach, methods, and operational procedures to be employed to perform geophysical surveys at the former WMA. Overall the GIP will describe how the geophysical investigation will meet the project's DQOs.

6.1.1.2 Geophysical investigations will be completed IAW the USACE DID for munitions response geophysics, DID MR-005-05.01 (USACE, 2007). In addition, the work will be performed under guidance from the Engineering Manual for Military Munitions Response Action, EM 1110-1-4009 Chapters 6-9 (USACE, 2007).

6.1.2 UXO Safety

6.1.2.1 All geophysical investigations covered in this chapter will comply with UXO safety guidance, requirements, and policy presented in Chapter 2. Specifically, UXO qualified personnel will be present for all field operations requiring UXO escort and avoidance.

6.1.3 Personnel Qualifications

6.1.3.1 The geophysical investigations will be managed by a qualified Project Geophysicist meeting the qualification requirements listed in Chapter 2. Personnel for any required digital geophysical mapping teams will come from the contractor's pool of UXO technicians who are cross-trained in geophysical operations.

6.1.3.2 UXO qualified personnel who meet or exceed the qualification requirements listed in DDESB TP 18 will be present for all field operations to provide MEC safety and avoidance.

6.2 Survey & Data Quality Objective

6.2.1 Geophysical Survey

6.2.1.1 Geophysical surveys will be comprised of two different techniques. The predominant detection technique will be in an analog or real-time mode of operations with operators using audio tones and visual indicators to select anomalies. A MEC clearance team will perform simultaneous investigation and removal of anomalies with a *Minelab Explorer SE*. Specific details on the analog handheld detector sweep team operations can be found in Chapter 2. In specific situations, the sweep clearance teams may also use a EM61-MKII in the analog mode. The second site technique, digital geophysical mapping (DGM) incorporates data collection along with a GPS unit to create accurate metal detection maps. DGM may be used with the EM61-MKII to perform specialty tasks such as quality control sampling, potential elimination of anomalies in evacuation areas, measuring anomaly values, creating digital maps, and delineating dump site boundaries.

6.2.2 DQO – Detection Equipment Ability

6.2.2.1 The DQO for MEC items at former WMA is to supply all personnel, tools, equipment, communications, transportation, materials and supervision to integrate, manage, and safely execute the destruction and/or removal, and disposal of MEC and MD to a depth of detection. The GPO including previous project efforts and research studies have demonstrated the basic capabilities of the geophysical instruments on site. The specific mV values for DGM anomaly selection have been determined by the GPO results. For both analog sweep detection and DGM, anomalies will be investigated down to the average level of the background geological noise for each site area. Due to the analog nature of the primary metal detection instruments, there are few quantifiable parameters for detection operations. The DQO parameters for geophysical operations are as follows:

6.2.2.1.1 Excavated items (MEC or Metallic Trash) should be found within .5 M of the marked anomaly location.

6.2.2.1.2 Real-time kinematic (RTK)-GPS navigation equipment will be checked daily against a known point. The equipment must be accurate within .1 meter of the known point.

6.2.2.1.3 In accordance with the PWS on QC/QA operations: "If any ferrous object is found that is similar in size and mass to the MEC expected in that area, within the depth of detection, that grid will be failed, and shall be completely re-swept by the contractor at no cost to the government." The depth of detection caveat is applicable when the original detection equipment is not utilized, such as the EM61-MKII locating an item in an area swept by the Minelab Explorer SE or when an item is discovered beneath another anomaly during excavation.

6.2.3 DQO – Detection Characterization Abilities

6.2.3.1 The analog equipment used at former WMA has the ability to perform basic characterization of anomalies in certain circumstances. For areas of dense metallic trash, the site analog handheld detector, the *Minelab Explorer SE* has a programmed characterization setting that can be set to exclude various targets. The characterization technique was developed in the field and tested in the GPO during recent removal work at former WMA in the Waimea area. Most recently a characterization setting was designed for ranch metallic debris such as horseshoes, barbed wire and nails. The characterization functions have some detector limitations including unintended anomaly masking, reduced signal and altered performance characteristics. For this reason, use of the characterization setting has been limited and strictly controlled. Utilization of a Minelab characterization setting is not anticipated for Task Order #0008.

6.2.3.2 The DGM instrument, the EM61-MKII, also has the ability to reduce the number of anomalies. Since the handheld analog instrument detects many very small metallic pieces, the EM61-MKII, which is designed for larger item detection, can be used as a

way to focus detection for areas with dense metallic trash. Additionally, the EM61-MKII can eliminate the need to excavate small metallic analog anomalies near residential areas; anomalies that otherwise would trigger evacuation procedures. The instrument may also be used to quantify anomaly sizes to reduce MSD areas based on MEC risk profiles. Anomaly reduction/prioritization will only be utilized in extraordinary circumstances such as dump sites, decayed structures (i.e. old fences) or for operations that would otherwise cause community or cultural impacts. Where possible, DGM will be the preferred method of characterization due to the ability to closely examine the detection results and the creation of quantifiable digital records. If analog EM61-MKII characterization is employed, the operators will be trained and certified in the GPO.

6.2.4 Anticipated MEC Types

6.2.4.1 The EE/CA (Earth Tech, 2000) investigation and the previous WMA contract work indicated that a variety of high explosives rounds were used on the former WMA.

6.2.4.2 Waikoloa Village – West was used for artillery training and as a live-fire target area for off-shore naval gun bombardment. Live MEC and MD have been found previously in and around the Waikoloa Village. This area consists of approximately 4,507 acres. Two predominant types of MEC items were recovered in this area during the EE/CA field investigation and removal contract for the WMA: the 75mm and 105mm projectiles.

6.2.4.3 Waimea/Kamuela area was the site of Camp Tarawa from 1943 to 1946. The base encampment consisted of approximately 467 acres of tents, Quonset huts, and other temporary facilities. Infantry maneuvers were conducted in and around Camp Tarawa. Two predominant types of MEC items were recovered in this area during the EE/CA field investigation and removal contract for the WMA. The predominant types of MEC found in this area include MKII hand grenades and M9 rifle grenades.

6.2.4.4 Waimea/Kamuela – O'uli Parcel area was used as an artillery firing range and as a ground attack training area. Types of MEC found in this area during the EE/CA field investigations and removal contracts included 60mm and 81mm mortars, 2.36-inch rockets, Mk2 hand grenades, and 37mm projectiles. MEC continues to be discovered at the former WMA as development and ordnance removal actions have progressed.

6.2.4.5 Following is a partial list of MEC items of concern that have been identified as present or potentially present on the WMA and Nansay Sites:

- 4.2 inch, 60mm and 81mm HE & WP mortars;
- 20mm-155mm projectiles;
- HE & WP rifle and hand grenades;
- 2.25, 2.36, and 4.5 inch rockets;
- Practice & HE land mines; and
- Japanese ordnance.

6.2.5 Depth Anticipated

6.2.5.1 One hundred percent of the MD and MEC found during the intrusive investigations during the EE/CA in Areas J and O were found at a depth between 0 and 6 inches (0

and 0.15 m) (Earth Tech, 2000). One hundred percent of the MD and MEC found during the intrusive investigations during the EE/CA in Area D, P and 17D were found at a depth between 0 and 12 inches (0 and 0.3 m). Ninety-eight percent of all metallic anomalies recovered from the EE/CA were recovered at depths from 0 to 12 inches (0 to 0.3 m). One percent of the anomalies were recovered at depths from 12 to 24 inches (0.3 to 0.6 m), and another 1% from 24 to 36 inches (0.6 to 0.9 m). No anomalies were recovered at depths of greater than 36 inches (0.9 m). Similar results were identified during prior MEC removal contracts. The low number of metallic items recovered at deeper depths is consistent with the rocky, shallow substrate found in the majority of areas at Waikoloa.

6.3 Project Specific Conditions & Constraints

6.3.1 Topography

6.3.1.1 Waikoloa has variable topography from gentle slopes to steep gullies and hills covered with sharp basalt rocks. Kamuela/Waimea is predominantly flat with widely spaced gullies formed by erosion. The topography towards Kawaihae is uneven, consisting of low hills and rock outcrops. Several locations in the former WMA have ‘a’a basalt flows which are formed of sharp, loose crumbly material. The ‘a’a terrain is exceptionally difficult to traverse, often only possible with a lightweight handheld instrument.

6.3.2 Vegetation

6.3.2.1 Vegetation at the former WMA is generally classified as Coastal Dry Communities consisting of dry grasslands, dry shrub lands, and dry forests and Lowland Dry Communities consisting of fountain grass grasslands and remnants of native Hawaiian forests. Vegetation in Waimea/Kamuela has been intensely impacted by livestock grazing (USACE, POH, 1997).

6.3.3 Geologic Conditions

6.3.3.1 The clearance areas lie within the Waimea Plains. The plains were formed by Mauna Kea lava flows that ponded over the older Kohala Mountains and are now covered by a relatively thin veneer of soils. The lava is predominantly composed of basalt flows and scoria of the Hamakua Volcanics. These rocks, like all Hawai`i basalts, are extremely iron rich. Additionally, the tholeiitic and alkali olivine basalts associated with the Hamakua Volcanics have high magnetite and ilmenite contents.

Basalt will often oxidize and weather in a similar manner as oxidized ordnance. Secondary iron oxides (such as maghemite) cause geophysical “false positives” in the EMI detection of subsurface ordnance. Not only will EMI metal detection equipment indicate ferrous ordnance, it will also detect iron rich basalt cobbles, sub-crops, or changes in the iron composition from lava flow to flow. In general, project employees with experience at Hawai`i sites note that the Waikoloa substrate has “false positive” attributes similar to locations on the North Shore of O`ahu and Maui. The problem is significantly less than on the Island of Kaho’olawe where over 30% of false positives were attributed to geology in previous UXO detection surveys. For

the Geonics EM61-MKII detector, the primary source of geological false positives at Waikoloa seem to arise from terrain features and loose rocks that cause temporary reductions in the coil to ground distance. The handheld detector used at former WMA, the *Minelab Explorer SE* has a feature to adjust the iron mask which reduces the amount of false postitive anomalies.

6.3.4 Soil Conditions

6.3.4.1 Soil types within the project area are largely shallow, dry, and/or stony, and are subject to aeolian (wind-blown) conditions leaving a thin veneer of silt loam as topsoil. Table 6-2 shows estimated soil depths for different areas of the Waikoloa site (Earth Tech, 2000).

Table 6-1: Estimated Soil Depths

Area	Location	Depth (Inches)
P	Waikoloa Village-West	0-12
J, Q, R	Waimea/Kamuela	0-48
O, D	O'uli	0-12
17D	Hapuna Beach	0-12
M	Puako Parcel	0-6

6.3.5 Shallow Groundwater Conditions

6.3.5.1 There are no permanent watercourses in the vicinity of the former WMA due to the low level of annual precipitation. Waikoloa Stream and other minor watercourses are seasonal, flowing only during the rainy season (typically November through April) and at times subject to occasional flash flooding (WMA Phase I EE/CA Report, Earth Tech, 2000).

6.3.6 Cultural Site Features

6.3.6.1 Most of the investigation areas are a mixture of residential, agricultural and recreational areas. Residential and commercial structures such as pipelines, water tanks, buildings, power stations, fences, roads, driveways and other features may result in exception areas where geophysical investigation is not possible. Power utilities are of special concern due to the electromagnetic influence on the detection instrument operation.

6.3.7 Overall Site Accessibility and Impediments

6.3.7.1 The majority of form WMA is accessible by four-wheel drive truck or all terrain vehicles. Some grids may be located in areas that require an additional 30 minutes or more to reach on foot.

6.4 Equipment and Field Procedures

6.4.1 Detection Instruments

6.4.1.1 Based on the previous Waikoloa removal action and GPO results, the *MinelabExplorer SE* will be used as the primary handheld analog detection instrument for the majority of the work area. Similarly, based on previous success, the EM61-MKII will be the instrument of choice for Waikoloa DGM surveys. The EM61-MKII will also be used in an analog mode of operation for special situations, such as areas of dense metallic litter (i.e. small arms). Both instruments have ferrous/non-ferrous detection ability and can be utilized as the primary and final instruments for sweeping areas for MEC.

6.4.2 Analog Handheld Detection - *MinelabExplorer SE*

6.4.2.1 The *Minelab Explorer SE* will be the handheld detector used for the analog "detect and flag" investigation. The instrument has some of the most advanced digital filtering available in consumer metal detection devices. The *Minelab Explorer SE* can be "trained" to recognize an item at different depths and orientation using a stored library of known items. The control panel also indicates ferrous or non-ferrous characteristics of an anomaly as well as the estimated depth to the item. The *Minelab Explorer SE* uses a reduction approach for elimination of ground mineralization via ground balance and iron mask functions. The use of this instrument in the MEC removal industry is relatively new. The instrument was originally designated as the Explorer II, but with an updated user interface the model was renamed to the Explorer SE. For the Waikoloa project, the *Minelab Explorer SE* has been outfitted

with an after-market coil made by Excelerator called the Symmetric Electromagnetic Field (SEF) coil. Compared to the stock coil from MineLab, the SEF coil is larger measuring 18 by 15 inches in size, with associated increase in depth detection and sweep coverage.

6.4.3 Cultural and Natural Resource Field Procedures

6.4.3.1 MEC Contractor shall work in close coordination with Contractors and/or Subcontractors in the field of cultural resources and natural resources to ensure that significant cultural resources and threatened and endangered species are afforded appropriate protections compliance with CERCLA laws and regulations.

6.4.4 Analog & DGM - EM61-MKII

6.4.4.1 The Geonics EM61-MKII is an instrument that has the ability to collect data along with a Real-Time Kinematic (RTK) GPS system to create metal detection maps or DGM. The EM61-MKII collection software combines navigation and metal detection data streams into a singular file for processing. The EM61-MKII also has the ability to be used as a real-time analog instrument with a tone and numeric response available to the operator. A Time Domain Electromagnetic (TDEM) system, the EM61-MKII generates up to 16 EM pulses per second and measures during the off-time between pulses. After each pulse, secondary EM fields are induced briefly in moderately conductive soils and for a longer time in metallic objects. Between each pulse, the EM61-MKII waits until most of the response from the conductive earth dissipates and then measures the prolonged buried metal response. This response is recorded in milivolts (mV). The EM61-MKII measures multiple time gates (216, 366, 660, and 1266 microseconds) to provide information about the response decay.. The MKII can record up to 16 times per second with the 4 time gates included in each record. If the top coil is used, one time gate is eliminated. For the Waikoloa operations, the EM61-MKII will be used with only the bottom coil engaged to allow for collection of all 4 time gates.

6.4.5 Positioning Instrument (RTK GPS)

6.4.5.1 The navigation work for the DGM will be accomplished with a Trimble RTK GPS unit and base station. In accordance with the PWS, a state certified surveyor will verify the base location and a percent of the grid/boundary locations for the project. All coordinates will be recorded in meters referenced to Universal Transverse Mercator (UTM) and the North American Datum of 1983 (NAD83). The GPS quality will be checked by verifying centimeter accuracy indicators within the data and on the field program display. Additionally, after setting up the base station, daily equipment checks will be performed before data collection with the GPS rover over the base point or a known point such as a grid stake. The operator will verify the position to be within 1/10 meter. Due to the tree canopy, some areas may not allow for the use of the GPS. At such times the contractor may use an odometer/fiducial system for areas where GPS coverage may be limited. Field Procedures

6.4.5.2 Analog handheld detection field procedures are detailed in Chapter 2. Analog EM61-MKII operations will be conducted under the same protocols as DGM surveying described below including survey coverage and QC procedures.

6.4.5.3 DGM will be accomplished with a two-person data collection crew to support data acquisition and reacquisition. The team will be responsible for ensuring that survey activities are performed in accordance with the quality control procedures and established procedures. Site and data collection information will be documented on field forms containing, at a minimum, the information in DID MR-005-05.01, Attachment A. The project geophysicist will review the forms on a periodic basis. A lane spacing of 2 feet along with an EM61-MKII setting of 10 readings/second (10 Hz.) will be used to maintain survey coverage. GPS data will be collected at a rate of 1 Hz. Based on previous experience, these settings will result in a data spatial density sufficient to identify all anomalies above the noise threshold. The survey area and coverage requirements for the WMA DGM efforts will be based on the deliverable product. Reacquisition will be combined with excavation and clearance of the anomaly to save time and reduce the chance of field errors.

6.5 DGM Data Processing

6.5.1 DGM Data Format, Storage & Database

6.5.1.1 As appropriate, the DGM data processing of production, quality control and dig sheet tasks will follow the guidance of DID MR-005-05.01 (USACE, 2007) for formats, tables, delivery and storage. Certain entries in the database tables may be omitted based on the DGM survey type. For example, the “Speed Table” is more appropriate for towed array operations where data spatial density could be an issue. Personnel will work cooperatively with the USACE geophysicist to apply the standards in an expedient and appropriate manner.

6.5.2 Field Data Analysis

6.5.2.1 Geophysical data will be downloaded/converted using Geonics Dat61® software and verified for completeness by the field geophysical team. Any stand-alone RTK GPS points will be downloaded using Trimble survey software into Microsoft Excel spreadsheets. The following will also performed during initial field processing:

- Completion of field notes with collection location, site specific conditions, line numbers, survey direction, start and end points;
- Recording of baseline measurements for quality control monitoring.

6.5.3 Standard Data Analysis

6.5.3.1 The primary geophysical data processing and interpretation software is as follows: Oasis Montaj® (Geosoft®) with the UX-Detect extension for the EM-61 MKII. The program is primarily used to process data for DGM but also can be used for other purposes like map generation or GPO target comparisons. Colored contour maps and profile data will be evaluated in the program to make appropriate picks of MEC targets. A target/dig list will be generated as required.

6.5.3.1.1 For DGM processing, UX-Detect target selection tools will be utilized to find large anomalies that may represent a MEC item. The data processor will then analyze the data to find smaller/difficult anomalies by reviewing each line profile and mapped data section. The following will be performed during standard data analysis if necessary:

- removal of spikes
- positional offset correction
- sensor drift removal, background leveling and/or standardization
- latency correction
- geophysical noise identification (cultural features) and removal as possible
- gridding of data with grid cell size of .25 and blanking distance of .75
- Linear Transform Contour level selection for the gridded data at -2 to 7 mV and 0 contour interval

6.5.4 Anomaly Identification and Dig Sheets

6.5.4.1 Anomalies will be identified in the processed data sets using colored contour maps and profile views based on a variety of factors including survey type, most probable munition, and background noise level. The general anomaly selection criteria that was determined for use in DGM operations during previous GPO efforts is the following: any potential EM61- MKII anomaly having amplitude above background of at least 5 mV within Channel 2 and/or 4 mV within Channel 3 of the post-processed data sets. These anomaly thresholds may be adjusted based on new GPO results, area specific goals or survey mission protocols. Additionally, the DGM data may be examined with advanced processing parameters including tau (time constants between time gates), anomaly footprint size, and signal to noise ratio. In addition, the utilization of a sum channel for a threshold will be examined.

6.5.4.2 Anomalies will be processed into dig sheets constructed with guidance from DID MR-005-05.01 (USACE, 2007) as adapted. Dig sheet forms are presented in Appendix F. The USACE Geophysicist may provide additional QA targets to be evaluated after their evaluation of the target selection data. The contractor's Project Geophysicist will review target information from the reacquisition and excavation activities. This information will be evaluated and used to refine the target pick criteria.

6.5.5 Deliverables

6.5.5.1 With the exception of extraordinary circumstances, the timeline for geophysical data deliverables will be in accordance with Attachment C of DID MR-005-05.01 (USACE, 2007) As close as possible, the data submittals will follow the section 5 of the same standard including a data, metadata and digital planimetric map.

6.5.6 Records Management

6.5.6.1 Project documentation will be kept on-site during the field portion of a geophysical investigation for inspection by client personnel. Selected data may be managed and posted on website or file transfer site. In general, all data management will be consistent with Huntsville's Draft Life Cycle Data Management (LCDM) guidelines.

6.5.7 Electronic Data Backup

6.5.7.1 There are several programs that manipulate the various files used by the processing of DGM data. In addition many of the field notes, quality control parameters and other information are digitized or entered into a database. Due to hard disk limitations, Random Access Memory (RAM) limitations, or human error these programs occasionally crash, and the files being manipulated by these programs may be partially or totally corrupted. To limit the effects of data loss and/or file corruption, these files will be backed up weekly.

6.6 Geophysical Quality Control - Instrument

6.6.1 Instrument Standardization

6.6.1.1 Geophysical instrument standardization quality control tests with the frequency summarized in Table 6-2 below. The testing will be completed using the guidance of Chapter 9 of EM 1110-1-4009 (USACE, 2007). Some of the quality control tests are specific to DGM surveys and have been adapted to analog instrument techniques as noted below. The test will be documented in the team leader's field log book or by QC personnel.

6.6.2 Equipment/Electronics Warm-up

6.6.2.1 The purpose of the equipment/electronics warm-up is to minimize sensor drift due to thermal stabilization. The EM61-MKII needs a few minutes (typically 5 minutes) to warm up before data collection begins. The *Minelab Explorer SE* has a smaller coil that is ready for operation immediately after the instrument is engaged. The manufacturer's instructions will be followed or, if none are given, the instrument will be observed until it stabilizes.

6.6.3 Personnel Test

6.6.3.1 The purpose of Personnel Tests is to ensure survey personnel have removed all potential interference sources from their person. Common interference sources which can produce data anomalies similar to MEC targets are multi-function tools, steel-toed boots or large metallic belt buckles. All personnel who will be coming within close proximity of the EM61-MKII during survey operations must approach the sensor and have a second person monitor and record the results. For the *Minelab Explorer SE*, the operators will check each other for audible tone interference sources on a daily basis.

6.6.3.2 Acceptance Criteria (EM61- MKII): +/- 2 mV

6.6.4 Record Relative Sensor Positions (DGM)

6.6.4.1 The purpose of record relative sensor positions is to document relative navigation and sensor offsets, detector separation, and detector heights above the ground surface. The documentation ensures that the detector/GPS offsets are recorded for the data processor to produce surveys with accurate and repeatable navigation results. For the EM61-MKII at WMA, sensor offset is not an issue due to the use of a fixed GPS mount over the center of the coil.

6.6.4.2 Acceptance Criteria: +/- 1 inch (2.54 cm)

6.6.5 Vibration Test (Cable Shake)

6.6.5.1 The purpose of the Vibration Test is to identify and replace shorting cables and broken pin-outs on connectors. With the EM61-MKII held in a static position and collecting data, shake all cables to test for shorts and broken pin-outs. An assistant is helpful to observe any changes in instrument response. If shorts are found, the cable should be immediately repaired or replaced. After repair, cables need to be rigorously tested before use. The test is not necessary for the *Minelab Explorer* SE due to the cable locations in a fixed protected tube.

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6.6.5.2 Acceptance Criteria (EM61- MKII): Data Profile is clean of data spike responses.

6.6.6 Static Background and Static Standard Response (DGM)

6.6.6.1 The purpose of Static Background and Static Standard Response (Spike) Tests are to quantify the EM61-MKII background readings, electronic drift, locate potential interference spikes in the time domain, and determine impulse response and repeatability of the instrument to a standard test item. Improper instrument function, the presence of local sources of ambient noise (such as EM transmissions from high-voltage electric lines), and instability in the earth's atmosphere or magnetic field (as during a thunderstorm) are all potential causes of inconsistent, non-repeatable readings. A minimum of three minutes static background collection after instrument warm-up, followed by a 1 minute Spike test followed by a 1-minute static background data will be performed. The operator must review the readings to confirm their stability prior to continuing with the geophysical survey. Since the *Minelab Explorer SE* does not have a quantifiable output, this test is not possible with the instrument. The daily test site described below is an equivalent response test. Additionally, Explorer SE has an internal noise cancelation feature and frequency channel adjustment which can be adjusted to eliminate ambient noise or interference from other detectors in the sweep line.

6.6.6.2 Acceptance Criteria (EM61- MKII): Static Background Test: +/- 2.5mV

6.6.6.3 Acceptance Criteria (EM61- MKII): Static Spike Test: +/- 20% of standard item response, after background correction.

Table 6-2 Quality Control Test Frequency

Test #	Test Description	Specific Detector	Power On	Beginning of Day	Beginning and End of Day	1st Day of Project	Repeated Last Two Lines on Each Grid
1	Equipment Warm-up	EM61-MKII	x				
2	Personnel Test			x			
3	Record Sensor Position			x			
4	Vibration Test (Cable Shake)	EM61-MKII		x			
5	Static Bacground and Static Spike	EM61-MKII			x		
6	6 Line Test	EM61-MKII				x	
7	Repeat Lines (only on 100%DGM surveys)	EM61-MKII					x
8	Calibration	EM61-MKII		x			
9	Positioning Device Check			x	x		
10	Height Optimization						
11	Ground Balance/Noise Cancel	EM61-MKII		x			
12	Calibration	Minelab Explorer II		x			

6.6.7 Minelab Explorer SE Calibration

6.6.7.1 A known test site with buried inert ordnance items at various depths will be utilized to calibrate each *Minelab Explorer SE* daily, before surveying begins. At least three inert ordnance items will be placed in the quality control test lane. The MPM and smallest expected munition for the work area being cleared will be placed at the edge of the deepest detection depth. The team members will individually locate the buried targets and verify an audible instrument response while pinpointing the locations. UXO quality control personnel will monitor the daily Minelab Explorer SE calibration testing program. Field team leaders will and observe and record the daily calibration testing. The form used to record the instrument testing is located in Appendix F with the label "UXO Instrument QC".

6.6.7.2 Acceptance criteria: All items in the test lane must be successfully detected by each *Minelab Explorer SE* and its operator daily before beginning detection operations. If a Minelab Explorer SE and/or its operator do not detect one or more of the seed items, instrument repair/replacement and/or operator refresher training will be implemented and the test will be repeated.

6.6.8 Six Line Test (DGM)

6.6.8.1 The purpose of the Six Line Test is to document latency, heading effects, repeatability of response amplitude, and positional accuracy of the EM61-MKII. This test will be performed in an area relatively clear of anomalous response. The test line will be well marked to facilitate data collection over the exact same line each time the test is performed. Heading effects, repeatability of response amplitude, positional accuracy, and latency are evaluated. The following procedure will be completed:

- Lay out a 30 m non-metallic tape in a north-south or east-west direction. Run a survey along the 30 m line going one direction.
- Run a survey along the 30 m line in reverse direction.
- Place target on clean area of the line at an inline distance of 15 m.
- Run a survey along the 30 m line in one direction.
- Run a survey along the 30 m line in opposite direction
- Run a survey along the 30 m line in one direction, moving very fast.
- Run a survey along the 30 m line in opposite direction, moving very slowly.

6.6.8.2 Acceptance Criteria (EM61- MKII): Repeatability of response amplitude +/-20%, Positional Accuracy +/- 20cm.

6.6.9 Repeat Data (DGM)

6.6.9.1 The purpose of repeat data is to determine positional and geophysical data repeatability for the EM61-MKII. The data will be viewed in profile form and compared to original data as a means of evaluating the ability of the instrument to respond consistently and the positional accuracy of the data. The position data will be evaluated by superimposing the initial and repeat line to verify that they do not deviate by more than 30 centimeter (cm). Due to the variability of the terrain at

WMA and increased potential for operator deviation when completing a repeat line, the site has a relatively liberal acceptance standard.

6.6.9.2 Acceptance Criteria: Repeatability of response amplitude +/- 30%, Positional Accuracy +/- 30cm.

6.6.10 GPS Position Check

6.6.10.1 For any geophysical operations that use RTK GPS, such as DGM, a known survey point shall be visited and its measured position recorded. The test will be completed at the beginning of each day.

6.6.10.2 Acceptance criteria: Measured position should be within +/- 10 cm.

6.6.11 Instrument Maintenance & Calibration

6.6.11.1 If an instrument does not meet the manufacture's standards or quality control standardization tests, it will be re-calibrated, repaired or replaced. Operational and test procedures will conform to manufacturer's standard instructions. All geophysical instruments and equipment used to gather and generate field data are calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with manufacturer specifications. Calibration, repair, or replacement records will be filed and maintained by the Project Geophysicist or OPM and may be subject to audit by the QA/QC Manager.

6.7 Geophysical Quality Control - General Practices

6.7.1 Project Quality Control Collaboration

6.7.1.1 The quality control of analog and DGM geophysical operations will be completed by the project geophysicist in collaboration with UXO quality control personnel. All of the requirements and protocols in the QC Plan will apply to all geophysical operations.

6.7.2 GPO Testing Protocols

6.7.2.1 All personnel and equipment will be certified in the GPO test plot (Waimea or Waikoloa) at the beginning of site operations and as deemed necessary by UXO quality control personnel. Any equipment that is new to the site or returning for repair will be certified in the GPO. The protocol and extent of the testing will be determined by the project geophysicist in collaboration with UXO quality control personnel. A record will be kept of all GPO activities. Additionally, a record will be kept of all GPO activities by quality control.

6.7.3 Seed Items & Quality Control Philosophy

6.7.3.1 A blind seeded item program will be used as a quality control monitoring system. For DGM operations, there are multiple elements including data collection, processing and reacquisition that can lead to errors that degrade or destroy survey goals. As

well, analog sweep operations have many variables such as battery life, detector settings and operator training that could lead to serious errors. A blind seeded item successfully located demonstrates the ability of the whole system to perform properly. Although a seed item that is missed does not isolate the operational element, it provides a starting point for finding the problem issue. For analog and DGM surveying, blind seed items will be placed by UXO quality control personnel in accordance with the plan in the QC section of this work plan.

6.7.4 Quality Control DGM

6.7.4.1 The DGM quality control program may be implemented in order to provide a higher standard of quality control for the *Minelab Explorer* SE handheld detector sweep operations. DGM with the Geonics EM61-MKII over analog sweep clearance areas may assist in identifying any problems associated with team operations, terrain, vegetation or other factors. With the DGM QC program, samples from different grids would be collected in order to represent these different elements of production. The project geophysicist in collaboration with UXO quality control personnel may plan and conduct a regular program of DGM sampling. The effort may utilize the MIL-STD-1916 as a sampling methodology.

6.7.5 Corrective Measures

6.7.5.1 Problems will be identified and documented. The corrective action(s) necessary to fix a problem will be determined, documented, and implemented. Appropriate preventive actions to preclude the problem from recurring will also be determined, documented, and implemented.

6.7.6 Quality Assurance/Quality Control Standards

6.7.6.1 The government quality assurance failure criteria shall be no surface or subsurface MEC or MEC-like item (i.e. similar size & shape). Any non-conformances or failures will initiate a root-cause analysis and corrective actions will be recommended.

6.7.6.2 For DGM operations, positional accuracy for reacquisition is expected to be less than 1.0 m radius of the original surface location on the dig sheet. At the ground surface 95% of all excavated items must lie within 35 cm of their mapped survey locations. This value may be increased in areas of rough/steep terrain.

Chapter 7 Geospatial Information and Electronic Submittals

7.1 Site Specific Requirements

7.1.1 In accordance with the PWS and DID MR-005-07.01, *Geospatial Information and Electronic Submittals* (USACE, 2007), this chapter describes the survey, mapping and database procedures that will be utilized in the performance of the MEC RA.

7.1.2 All required surveying will be overseen and certified by a certified land surveyor in Hawai'i.

7.1.3 The master coordinate system to be used is the Universal Transverse Mercator (UTM), NAD83 Zone 5 North (meters). The bounding rectangle for the entire former WMA, using UTMz5nNAD83m, has a southwest corner coordinate of (197250. E, 2194210. N) and a northeast corner coordinate of (229880 E, 2218750 N). Each 1000 by 1000 meter grid will be identified by its southwest corner coordinate (such as 197000 E, 2187000 N).

7.1.4 Within the WMA, a 100 m by 50 m sub-grid system will be established. The sub-grid identifiers are also based on the UTM coordinate of the southwest corner of the sub grid, with a unique eight digit identifier. The first four digits are derived from the easting value of the southwest corner of the grid, which are placed every 100 meters within the master grid. The easting coordinate is always a 6 digit value, ranging from 197200 to 229800. The first and last characters of the easting string are dropped, leaving the remaining 4 characters to be used in the identifier. (That is, 197200 yields "9720"). The last four digits of the grid identifier are derived from the Northing value of the southwest corner of the grid. The northing coordinate within the WMA is always a 7 digit number (before the decimal point), ranging from 2194200 to 2218750. The four characters indicating the northing portion of the grid area SW corner are derived characters 3-6 from the northing coordinate value. Example: a 100m by 50m grid (100 meters in the east-west direction) with its southwest corner at 219550 E, 2208600 N would be identified as "1955 0860". This grid numbering system is consistent with current and past practice for removal actions within the former WMA. Parcel numbers (County Tax Map Key) may be used as grid identifiers in special cases where parcels are too small to effectively overlay the 50 x 100 m grids.

7.1.5 If necessary, the contractor will also establish survey monuments at locations and UTM coordinates. Concrete monuments with 3-1/4 to 3-1/2 inch domed brass, bronze or aluminum alloy survey markers (caps) with witness posts shall be established at each location. The concrete monuments will be located within the project limits, set at least 10 meters from the edge of any existing road in the interior of the project limits, and a minimum of 300 m apart. The top shall be set flush with

the ground. The caps for the new monuments shall be stamped in a consecutively numbered sequence. The dies for stamping the numbers and letters into these caps shall be 1/8-inch to 3/16-inch in size. All coordinates and elevations shall be shown to the closest one thousandth of a meter (0.001 m) and one hundredth of a foot (0.01 feet).

7.1.6 All surveying of the boundary and grid corners will be performed using a Survey Grade GPS system.

7.1.7 MEC Safety Provisions

7.1.7.1 During fieldwork, qualified UXO Technician II or above will be used to escort the survey crew. The qualified UXO technician(s) will conduct visual surveys for surface ordnance. Prior to driving marking stakes in the area, the UXO escort will check the area using a *MinelabExplorer SE* metal detector which will be checked on a daily basis to ensure the instrument is operating correctly.

7.1.8 Accuracy

7.1.8.1 Horizontal control of "Class 1, Third Order" for all external boundary points and monuments will be established. The grid corners will be surveyed to +- 0.3 m (one foot). All coordinates will be in UTM – in meters and referenced to the NAD83. MEC will be plotted to an accuracy of plus or minus 1 meter.

7.1.8.2 All control points (i.e., boundary points), will be plotted on reproducible electronic maps or hard copy media for production of planimetric or topographic maps at scales appropriate for the parcel size being described. Maps shall be produced in accordance with the DID MR-005-07.01 (USACE, 2007) for submission with the Final Report. The location, identification and coordinates of all control points recovered and/or established at the site shall be plotted on reproducible electronic format. Each map will include a grid north, a true north, and a magnetic north arrow with the differences in degrees, minutes and seconds shown. Grid lines or tic marks, with their values shown on the edge of map will be provided. Grid corners, with appropriate UTM coordinates will be shown on the map.

7.2 GIS Incorporation

7.2.1 A GIS will be developed and maintained for the life cycle of this project. The Geographical Information System Plan will be developed in accordance with DID MR-005-07.01 (USACE, 2007).

7.2.2 All spatial data shall conform to the CADD/GIS Technology Center Spatial Data Standards. All MEC related spatial data will conform to the USAESCH OE-GIS standards. Federal Geographic Data Committee (FGDC) standards will apply to only the core spatial data layers, which are defined as part of the USAESCH OE-GIS standards as outlined in this task order.

7.2.3 The USACE MR-GIS standards, Spatial Data Transfer Standard (SDTS), and the FGDC metadata standards will be implemented to all core spatial data entered into the project specific GIS, and applied to the project to the extent required to create the products outlined in the specific task order PWS. The standard will be used as a starting point to load data and to create a GIS tailored for this task. All GIS data will be created, modified, and updated using software in accordance with USACE standards. GIS technology is used to manage the project, assemble data for the administrative record, help determine areas requiring further investigation and to separate MEC from background anomalies. A program that uses a subset of the GIS data does the separation between background anomalies and MEC items.

7.2.4 All final versions of the project specific spatial data will conform to the SDTS format. All imagery (such as orthophotography, remote sensing, data, and satellite-photography) will be provided in either Tagged Image File Format (TIFF) or *Lizerdtech MrSID* encoded image format.

7.2.5 Tabular data supporting the site-specific GIS will be developed, converted, and or maintained in Microsoft Access format through-out the life cycle of the project. The GIS will be created, managed and updated through-out the life cycle of the project.

7.2.6 Existing non-MEC spatial data will be gathered by the GIS Specialist from past USACE projects and/or state-run GIS clearing houses to aid in creating an accurate base map for the project area. A grid design layout upon the project coordinate system will be used to track information in accordance with the standards put forth in DID MR-005-07.01 (USACE, 2007). All spatial data will conform to the MR-GIS data standard. Metadata will be prepared for each of the core spatial data layers. Maps will be created for reports that relate to the project. A final version of the GIS will be packaged to compact disk (CD) and/or DVD for submittal to the USACE.

7.3 Sources and Standards

7.3.1 The developed GIS deliverables for this task order comply with the standard for GIS implementations at DoD installations and USACE Civil Works activities. This provides a GIS implementation schema for approved FGDC Data Standards, to provide a "nonproprietary" standard designed for use with commercially available "off-the shelf" CADD, GIS, and relational database software, and to provide a de facto standard for GIS implementations in other Federal, State, and local government organizations, public utilities, and finally, private industry.

7.4 Computer Files

7.4.1 GIS data will be submitted in a format that is in accordance with DID MR-005-07.01 (USACE, 2007). All final text files generated by this task will be furnished to USACE POH in MS Office 97 or higher software, IBM PC compatible format and in Adobe portable document format (PDF), suitable for viewing, without modification, on the Internet. Freeware versions of Adobe Acrobat Reader and Internet Explorer will accompany the text files on CD-ROM, so that the user can use the CD to either install the programs and text files on a machine, or use the CD in a stand-alone mode to view the text files.

7.4.2 The basic software supported to the field will be capable of operating on a typical single Intel Pentium processor PC utilizing the Windows XP version 5.1 operating system with a minimum of 1 GB of memory and adequate disk storage for project data.

7.4.3 All final GIS data generated by this contract and other individual Task Orders will be submitted as ESRI *ArcView* shapefile or ArcMap personal geodatabase format. In-progress and fielded GIS data, drawings, survey data, relational databases, geophysical data, and other data may be available on line to the Government by http or ftp download. All formal GIS data submittals will be made on PC CD-ROM and/or DVD, and will be submitted in the proper format and media that will permit the loading, storage and use without modification or additional software on the USAESCH GIS workstations.

7.4.4 Digital Design Data

7.4.4.1 An overall planimetric design file shall be created and digitized into a file type which is in accordance with DID MR-005-07.01 (USACE, 2007). Each sheet shall have a standard border, revision block, title block, bar scale, legend, and grid lines or tic lay out in meters. Each sheet shall also contain a true north, a magnetic north and a grid north arrow.

7.4.4.2 All production and work files shall be fully documented into a concise data manual. The manual will be included as an ASCII file titled READ.ME and will be included

with all distributed digital data. All digital data will be compatible with the USACE POH Graphics System.

7.4.5 Digital Format for Survey/Mapping Data

7.4.5.1 All data will conform to the Spatial Data Standards for Facilities Infrastructure and Environment (SDSFIE). Deliverables will be designed so that they will interface with other surveying firms, Government contractors and customers so that the final product will be usable with consistent computer aided design and drafting (CADD) documents and will be submitted on CD-ROM.

7.4.6 Items and Data

7.4.6.1 Field Survey

7.4.6.1.1 Original copies of all field books, grid layout sheets, computation sheets, abstracts, and computer printouts of the method used to establish grids and boundaries of the clearance activities for this project will be provided, as requested.

7.4.6.2 Control Point List

7.4.6.2.1 A tabulated list of all control points used for this survey shall be provided.

7.4.6.3 Aerial Photographs

7.4.6.3.1 There has been no task established for the taking of aerial photographs during activities under the PWS.

7.4.6.4 MEC List

7.4.6.4.1 The contractor shall provide a tabulated list of MEC cleared.

7.4.6.5 Report on Establishment of Survey Mark

7.4.6.5.1 A report on establishment of survey marks will be provided for any monuments installed for this project. Reports shall be drafted per DID MR-005-07.01 (USACE, 2007).

7.4.6.6 Drawings and Digital Data

7.4.6.6.1 Drawings and digital data shall be submitted with the Removal Report in accordance with DID MR-005-07.01 (USACE, 2007) and the PWS.

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Chapter 8 Work, Data and Cost Management Plan

8.1 Work Management

8.1.1 All MEC operations in this chapter will comply with DID MR-005-08, *Work, Data, and Cost Management Plan* (USACE, 2007). The SUXOS will be responsible for the day-to-day operations on-site and the OPM will be responsible for ensuring that all work tasks, data and cost management is performed IAW the contract and task order PWS. He will ensure that the tasks outlined in the PWS are accomplished according to the project on time and under budget. The SUXOS and OPM duties are detailed in Chapter 2.

8.1.2 The UXOQCS is the key person to ensure management and subcontractors are conforming to established procedures and that work is completed in a timely manner. He will perform quality inspections of all work tasks as specified in Chapter 10, Quality Control Plan. Any nonconformance that cannot be immediately resolved on site will be elevated to the OPM and/or the QA/QC Manager.

8.1.3 All data files can be retrieved on an as needed basis through custom queries by the contractor project team. Data will be collected from various operations on the work site and recorded on computer disks, in logbooks and on the various contractor, ATF, and DoD forms. Records of the limits of the areas mapped, and cleared, the type and location of MEC encountered, and the disposition of MEC will be recorded. The forms, logs, and disks will remain in the contractor site office while portions of the data will be copied and sent to the PM for inclusion in reports that need to be submitted.

8.1.4 All data, whether electronic or paper, will be reviewed by the site UXOQCS.

8.2 Cost Management

8.2.1 The OPM and SUXOS will control and manage costs through the use of Purchase Orders and Travel Orders. A record of expenditures will be kept by the OPM. The OPM will, using an Excel Cost Tracking Program, monitor man-hours and monies used.

8.3 Schedule

8.3.1 Appendix K, the Project Schedule, presents a schedule containing task deliverables for this specific task order. An electronic schedule compatible with MS Project or similar software (i.e. Primavera) will be updated periodically and be provided to POH according to DID MR-085. The Project Status Report shall be submitted monthly when the contractor is not performing field work and weekly when the contractor is conducting field work. Reports for each previous week are due by facsimile or e-mail on the first working day of each week.

8.4 Recurring Deliverables

8.4.1 A Project Status Report will be submitted to the USACE PM to arrive on the first working day of each week. The Project Status Report shall be submitted weekly when the contractor is conducting field work and monthly (not later than the 10th calendar day of each month) when the contractor is not performing field work. The report will contain a MEC Progress Summary and will include the status of all work completed during the previous month. The report will be prepared IAW with DID MR-085 (USACE, 2008). The report will also contain Exposure Data required by EM 385-1-1 (USACE, 2008).

8.4.2 A Draft Site Specific Final Removal Report (SSFR) shall be submitted to the government not later than 30 calendar days following completion of field work. This report will be prepared IAW DID-MR-30 (USACE, 2003).

8.4.4 A Final SSFR shall be submitted to the government no later than 30 calendar days following receipt of comments from the USACE Contracting Officer.

Chapter 9 Property Management Plan

The use of Government Property during activities under this contract is not anticipated. Therefore, the requirements of this chapter do not apply.

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Chapter 10 QC Plan

10.1 QC Objectives

10.1.1 This section presents the project QC Plan as required by the CEPOH PWS and to meet the guidelines of MR-005-11, *Quality Control Plan* (USACE, 2006). The QC procedures described in this section will be used for all work performed during the MEC Removal Actions at the former WMA. This site specific QC Plan is designed to manage, control, and document performance of work efforts in accordance with the CEPOH PWS to ensure quality throughout the execution of the tasks described therein. This QC plan will achieve the following objectives.

- Identify QC procedures and responsibilities for MEC removal actions.
- Ensure CEPOH notifications as required by the CEPOH PWS.
- Document the quality of work efforts via audits and independent staff reviews of deliverables.
- Ensure data integrity through implementation of data management QC procedures.
- Ensure the development of an appropriate ordnance accountability ledger and appropriate MEC chain of custody and disposal.

10.2 QC Policies

10.2.1 All services will be consistent with the public good and will meet all applicable laws and regulations.

10.2.2 Quality management will be applied through all phases of a project - from the first time a potential customer calls, until the Final Report is accepted.

10.2.3 Emphasis will be placed on preventive actions. All employees and team members will be empowered to identify and evaluate potential quality problem areas and are encouraged to recommend solutions or corrective actions.

10.2.4 The project will be staffed by the best qualified, trained, available personnel, based upon their knowledge and prior experience with the type of operations and hazards expected to be encountered. The minimum qualifications will meet or exceed the customer's requirements.

10.2.5 All personnel will be provided with all of the information necessary to accomplish their assigned tasks in a safe, responsible, cost-efficient manner and they will be held accountable for the quality of their work.

10.2.6 Personnel will be provided with an approved PWP and APP prior to the performance of any MEC-related activities on a project site. All personnel will be

required to read and understand the plans, as well as receive training and a question and answer session before the commencement of work. All personnel will be required to sign a training document that records their understanding of the plans and their participation in the training event.

10.2.7 An inspection system that is acceptable to the customer will be maintained.

10.2.8 Corrective actions will be made on any complaint, quality defect, or audit of operations.

10.3 ***Definitions***

1. OE Safety Specialist: A USACE employee that meets the prerequisites identified in ER 385-1-92 as well as OSHA requirements.
2. Government Representative: An on-site Government employee with specified responsibilities and authority.
3. Nonconformance:
   - A minor nonconformance is not likely to materially reduce the usability of the services. It is generally a departure from the approved procedures that have little bearing on the end-product.
   - A major nonconformance is likely to result in failure of the services or to materially reduce the usability of the end-product.
   - A critical nonconformance is likely to result in hazardous or unsafe conditions for individuals using or depending upon the services.
4. Purchaser: When used in the Quality Systems definitions of U. S. Government contracts, the term purchaser shall refer to the body of the Government Agency administering the particular contract involved, or the authorized representative of that Government body.
5. Quality Conformance Audits: Normal inspections/audits conducted by authorized contractor personnel during the accomplishment of the organization's mission to determine conformance to contract requirements.
6. Quality Control: The process by which the contractor manages, controls, and documents its activities in the accomplishment of the mission.
7. Quality Defect: A nonconformance issue with published policy and/or a contractual requirement that requires corrective action(s).
8. Quality Management: All those control and assurance activities instituted to safely and effectively accomplish the assigned mission.
9. Root Cause: The basic reason for an undesirable condition or problem which, if eliminated or corrected, would have prevented it from existing or occurring.
10. Stop-Work-Authority: The right and obligation to stop all work when serious quality or safety concerns arise.
11. Subsurface Clearance: Locating and removing MEC which are not visible or not partially visible on the surface, requiring the use of geophysical detection equipment, to the clearance standard.

1. Surface Clearance: Locating and removing MEC which are visible on the surface, or partially visible. This includes items that are partially exposed, which will require only minimal hand excavation to determine identification.

See FAR Part 2.1 for additional definitions.

10.3.1 The contract PWS will be reviewed to determine if specific references are required, in addition to, or in lieu of, the following:

- USACE engineering manual EM 385-1-97, Explosives Safety and Health Requirements Manual, AR 385-64, Ammunition and Explosive Safety Standards;
- The contractor's program for Quality Assurance/Quality Control

10.4 ***QC Responsibility***

10.4.1 The contractor will be solely responsible for the control of product quality. Only those products/services that conform to contractual requirements will be offered to the Government for acceptance.

10.5 ***Quality Management***

10.5.1 The Quality Manager has the responsibility of ensuring that QC procedures are implemented in accordance with the PWS.

10.5.2 The QC Manager will provide the quality management oversight for the project. The QC Manager is a part of the project team, but is authorized to elevate any quality problems that cannot be resolved by the project team. The QC Manager interacts with the Program Manager, OPM, SUXOS, UXOQCS, subcontractor QC staff, as appropriate, and USACE OESS personnel to prevent and/or correct problem situations, as necessary. Vendors and subcontractors will be monitored to assure that they supply items and services, which meet the contractor's Quality Assurance requirements. Periodic audits will be performed to verify that the quality system and the UXOQCS are performing as required. The QC Manager also ensures that:

- Required site training is conducted prior to the start of field activities.
- The UXOQCS is qualified and trained.
- Quality controls are built into the Project Work Plan to support the MEC removal action.
- The requirements of the Quality Control Plan are adhered to.

10.5.3 Effective day-to-day field QC management is delegated to the on-site UXOQCS. He will interact daily with the project team to ensure that all QC procedures presented in the Project Work Plan are followed in the accomplishment of all project tasks. The UXOQCS reports directly to the QC Manager. Scheduled activities are

coordinated with the OPM, SUXOS, UXO Safety Officer, and all other project team members as needed.

10.5.4 The UXOQCS has the authority to:

- Initiate action to prevent the occurrence of nonconformance's relating to the provided services.
- Identify and record any problems relating to the services.
- Initiate, recommend, or provide solutions through the on-site management channel.
- Verify the implementation of solutions.
- Control further actions of any nonconforming services until the unsatisfactory conditions have been corrected.
- Elevate quality concerns, which cannot be resolved on-site, to the QC Manager.

10.5.5 All project team members are responsible for and will be held accountable for the quality of their work. Every team member has Stop-Work-Authority when an immediate safety situation is observed which could cause personal injury or damage to property and equipment. All project team members are encouraged to identify potential quality problems and are encouraged to suggest solutions or corrective actions to ensure all work conforms to the approved work plan and Quality Assurance requirements. During site-specific training, personnel will be briefed by the QC Manager or the UXOQCS, on the importance of quality work and the above stated requirements. This briefing is aimed at insuring that all site personnel understand the contractor's commitment to quality.

10.6 ***QC Plan Processes***

10.6.1 This section documents the processes and essential steps to ensure a quality product is delivered to the Government.

10.6.2 Scheduled Audits

10.6.2.1 Periodic audits will be performed by the QC Manager to ensure that the requirements of this QC Plan are being followed. This may include on-site visits as well as document review activities. Training records, periodic reports, and adherence to all aspects of this QC Plan will be monitored to assure compliance.

10.6.3 Daily QC Audits

10.6.3.1 All instruments, vehicles/machinery, and equipment will be checked prior to the start of each workday, batteries will be replaced as needed, and instruments requiring calibration will be checked against a known source. Metal detectors will be checked against buried ordnance items in a test strip appropriate for the area being swept. The UXOQCS is responsible for ensuring that personnel accomplish all QC checks and

that the appropriate logbook entries are made. The UXOQCS performs random, unscheduled Quality Conformance Inspections (QCI) to ensure that personnel accomplish all work specified in the Project Work Plan. The QCI Schedule will follow the basic guidelines outlined in the following table. The UXOQCS has the latitude to modify this schedule based on the quality of work being performed and the frequency of noted activities. The task areas in the first column of the QCI Schedule (Table 10-1) are inspected using the QCI Record in Appendix F. Inspection of the Task areas will be conducted using the appropriate DID and this PWP.

10.6.4 Quality Control Seeding Plan

10.6.4.1 The UXOQCS will execute and monitor the QC seeding plan. The seed plan includes the placement, recording, and monitoring of seed items that consist of inert 37mm Armor Piercing projectiles and/or black pipe surrogates. A minimum of 5% of all work grids will contain a QC emplaced seed item at depths up to 12". A variety of orientations, depths, azimuths, and type of seed items will be utilized. The seed items will be painted blue, marked inert, and designated by a unique seed item number. The surrogates will be a mixture of small (1" X 4"), medium (2" X 8"), and large (4" X 12") black pipes with threaded ends, as encouraged by the latest Geophysical Survey Verification (GSV) guidance for standardization of response. The UXOQCS will record and safe guard the GPS location and data features of all seed items on the Seed Item Tracking Log. As items are discovered by the field teams, the seed number will be reported on the grid sheets and verified by QC before QC acceptance sampling/inspection and the log will be updated accordingly. If seed items are not discovered and/or recorded on the grid sheet, then the grid will be failed, turned back over to the SUXOS and a root cause analysis will be performed. In almost every circumstance, the root cause analysis will result in corrective actions that include the rework of the grid. The Seeding Item Tracking Log will be reconciled as soon as data is available and at least weekly.

10.6.5 QA/QC Standards

10.6.5.1 Subsurface Clearance

10.6.5.1.1 The Government QA failure criteria will be any MEC-like item (i.e. size and mass) expected to be found in that area.

10.6.5.1.2 The UXOQCS will perform UXO Search Effectiveness QCI involving a minimum of 10% of the square footage, to depth. The exact location of this square footage is at the discretion of the UXOQCS. In the event of subsurface work performed with Geophysical protocols, the UXOQCS will perform a MEC QCI on at least 10% of the anomalies excavated, in addition to the routine QCI inspection of the grid. Additionally, the UXOQCS will check 10% of all holes excavated as a result of geophysical operations. The MEC QCI will be performed using one of the following two methods, or a combination of the two methods. Inspection results will be documented on the QCIR Form, located in Appendix F of the PWP, filed in the project records, and included as part of the final report in both hard copy and electronic version.

10.6.5.1.3 In the first method, the UXOQCS will accompany the UXO Clearance Team while they re-acquire and excavate selected anomalies. He will observe the team's procedures to ensure quality standards are met. Following excavation, the UXOQCS will check the location using the same detection instrument used during the geophysical survey to ensure the team has removed all anomalies.

10.6.5.1.4 In the second method, following the UXO Team's clearance, the UXOQCS will reacquire and check selected anomaly locations using the same navigation and detection instruments used during the geophysical survey to ensure the team has located and removed the anomaly.

10.6.5.1.5 Contractor will deliver grids ready for QA by submitting a list of the grids ready for inspection to the OESS.

10.6.5.1.6 Each grid is QA inspected separately, in the event of a failure, the entire grid will be re-swept and a root-cause analysis performed. The team that produced the failed grid will receive refresher training and process through the GPO again, in addition to any other required corrective actions, as per findings of the analysis.

Table 10-1: QC Inspection Frequency Chart

Task	100%	Daily	Weekly	Bi Weekly	Monthly	As Needed
Safety and Health Plan Compliance		$X_{2,3}$				
Class V Storage/ Accountability			$X_{2,4}$			
Documentation Control/ Data Management/GIS			X_2			
Instrument Prove-Out			X_2			
Excavation Activities			$X_{2,4}$			
Demolition Operations			$X_{2,4}$			
Surveying Operations			$X_{2,4}$			
Surface Clearance			$X_{2,4}$			
Digital Geophysical Mapping			$X_{2,4}$			
Analog Geophysical Survey			$X_{2,4}$			
Vehicle & Equip. Inspections/ Preventive Maintenance				X_2		
Communications Effectiveness/ Equipment Inspection				X_2		
Management of Project Equipment					X_2	
Physical Security (After hours)						X_2
Personnel Qualifications/ Site Specific Training	X_2					
Visitor Briefing						X_3
Accident/Incident Reporting	$X_{1,2}$					
MPPEH Processing & Management			$X_{2,4}$			
Explosives – UXO/MEC Transportation						X_2
Brush Clearance			$X_{2,4}$			$X_{2,4}$
Project Plans Management (FCR)						X_2
Hazard Assessment – Risk Analysis						X_2

Notes:

1. EM 385-1-1 requires a documented weekly inspection by the QC. Accident/Incident reporting will be also be documented IAW EM 385-1-1
2. Observations will be documented on a QC Daily Report and Inspection Report as required.
3. Document on Daily Report
4. Three Phase Inspection Conducted (Preparatory, Initial, Follow-on Inspections)

10.7 ***QC Files***

10.7.1 The following files will be established and maintained by the UXOQCS:

- QCI Record File,
- Non-Conformance Report (NCR) file,
- QC Seeding Log, and
- Corrective Action Request (CAR) File.

10.7.1.1 The QCI Record File will be a two-part file, containing Active and Inactive Sub-files. The Inactive Sub-file will contain Quality Conformance Inspection Records (QCIRs) for tasks that were found to be in compliance with the Work Plan and those that were not in compliance, but have been re-inspected and found to have been corrected. The Active Sub-file will contain those QCIR for tasks that were found to be not in compliance and have not yet been corrected. The NCR and CAR files will be a two-part file containing an Active and an Inactive Sub-file as well. A NCR or CAR will be maintained in the Active file until a satisfactory follow-up has been conducted. Once the follow-up is completed, the CAR will be placed in the Inactive File.

10.8 ***QCIRs and NCRs***

10.8.1 The QCIRs may be legibly hand completed, in ink, but the preferred method is via computer (Microsoft Word) electronically.

10.8.2 A QCIR will be completed for tasks when they are in conformance with the PWP and contract specifications. QCIRs for conforming tasks will not generally be distributed off the project site, but will be including in the SSFR.

10.8.3 A QCIR will be completed for tasks when they do not conform to the PWP and contract specifications will initiate a NCR. Non-conformances will be documented the QCIR and a Non-Conformance Report (NCR). The NCR will document the reason for the nonconformance and describe the corrective actions taken to resolve the problem and the actions taken to prevent reoccurrence. NCR's are intended to document, correct and prevent QC failures. NCRs and QCIs are important for continuous improvement of site operations and services. NCRs will be forwarded by facsimile or email to the SUXOS, OPM, and the QC Manager.

10.8.4 A QCIR will be completed for re-inspection of a nonconformance. If the re-inspection indicates that the nonconformance has been corrected, then the NCR will annotate verification and closed out. Both the QCIR and NCR will be filed in the Inactive Sub-file and a copy of the re-inspection QCIR will be forwarded to the SUXOS and the OPM, and the QC Manager. If the re-inspection indicates the nonconformance has NOT been corrected, both QCIR and NCRs will remain in the Active Sub-file until corrective action is completed as required. A copy of the re-

inspection QCIR results and any requests will be forwarded to the OPM and the QC Manager.

10.8.5 Non-conformances will be evaluated and corrective action implemented by on-site management. The SUXOS, the OPM, UXOQCS and QC Manager will track all non-conformances to assure that they have been resolved, actions to prevent re-occurrence have been implemented, and that lessons learned are communicated effectively.

10.9 Customer Complaints/CAR

10.9.1 Customer complaints will be addressed immediately. The complaint may come in the form of a verbal comment, written correspondence, a corrective action request from the contracting officer, or a HND Form 948 from the OESS. Whatever the vehicle, the OPM will be informed of the complaint and involved in the investigation to analyze the complaint and assure corrective action has been initiated. The corrective action will address not only the root cause but also the application of corrective actions to assure the control's effectiveness.

10.9.2 The UXOQCS/QCM will utilize the contractor's CAR form (Appendix F. Forms) to document the complaint and response. The UXOQCS will utilize a NCR for documenting and investigating non-conformances issued by the OESS on a HND form 948. A CAR or OESS HND form 948 will require a response back to the government describing the root cause analysis and the corrective action taken; therefore, the UXOQC/QCM will report the root cause and corrective actions taken. Lessons Learned will be documented and communicated to project personnel and the QC Manager.

10.9.3 The action on the CAR or HND form 948 is not complete until the follow-up/verification inspection has been performed and the corrective action has passed. The corrective/preventative actions have to be adequate to prevent reoccurrence and the customer must be satisfied with these actions. The OPM or QCM and the OESS will sign the CAR or NCR when both parties feel the corrective actions have been resolved.

10.9.4 A follow up QCIR will be scheduled for 30-90 days later to ensure that the corrective/preventative actions have in fact addressed the issue and the solution is still effective.

10.10 Document Control and Data Management

10.10.1 Document Completion

10.10.1.1 Rigid control must be maintained over the production of QC documents and the guidelines below will apply to all documentation generated by QC staff.

10.10.1.2 All sections of forms shall be completed. Any unused spaces will be marked not available (N/A). In long columns of empty lines, N/A may be written in the first and last lines of that column with a single line connecting the entries. Large areas of unused spaces may be designated N/A by drawing a single line through the unused areas with the letters N and A on either side of that line.

10.10.1.3 To eliminate misunderstanding, the following formats will be used on all official reports and correspondence:

- Time: 24-hour
- Examples: 0730, 1930
- Date: MM/DD/YY
- Examples: 04/05/01, 11/15/01

10.10.1.4 Specifically:

- All report work will be accomplished by word processor or with a BLACK ink pen. No pencils or colored-ink pens may be used.
- All signatures will be accompanied by the date the signature was made, either in a date block or with the date written following the signature.
- White opaque correction fluids/tape may not be applied to records to correct mistakes.
- Incorrect entries shall be drawn through with a single line with the initials of the author and the date of the correction immediately adjacent. Corrected entries will be placed above or immediately following the line through or otherwise entered on the document in a legible, understandable means.
- Any entries or corrections to a document, other than in document control blocks, made after its date of inception, shall be considered a "late entry."
- Late entries will be clearly designated with the capital letters "LE," the initials of the person making the late entry, and the date the late entry is made. Any impressions made on an official document with rubber stamps shall be inked with an intense red ink. The red ink will indicate that the sheet is an original, but standard photocopiers will reproduce the red ink as black.
- A Field Document Control Log shall be maintained for all inspection records generated. Each document will be registered in the logbook and assigned a registration number from the log, which will be inscribed on each page of the original document.

10.10.2 Data Management

10.10.2.1 Electronic data and records will be managed to prevent accidental loss of information. All data will be backed up periodically and data will not be stored only on one single media. Floppy disks, Zip disks, CDs or other means of storage will be used in addition to standard computer hard drives to assure data is not lost by the failure of any one device. Since conventional Document Control Practices do not always lend themselves to electronic records, the guidelines will be in the following paragraph for all electronic QC records.

10.10.2.2 Once an electronic record is completed and saved to disk, the file name will be used as the registration number for that document and shall appear on each page of the

electronic record such that it also appears on printed copies. This file name will be entered in the Field Document Control Log as that documents registration number.

10.10.2.3 Changes, additions, late entries, and corrections to completed electronic records will be accomplished by creating a revision to the previously completed record. Included in the file name of the completed record will be the sequential revision number of that record. The first such revision of any record will be designated as R1 at the end of the file name. Subsequent revisions will be designated R2, R3, etc.

10.10.2.4 The original record will not be deleted electronically, and each revised record will include a description of the changes made to that particular revision, as well as retaining the description of any previous revisions.

10.10.2.5 Any document that is revised after any required distribution either off-site or to any electronic or hard copy file will be likewise distributed to all recipients as the original document. The revision will be filed along with the original and any previous revisions.

10.10.2.6 Electronic forms, which require signatures, will be printed, and the printed original signed and dated in black ink as required. The words "signature on file" shall be entered on the electronic copy, in the signature space, of all documents requiring signatures. The signed original will be filed in the proper location. Subsequent revisions to forms requiring signatures will also be printed, signed and filed. As an option, secure electronic signatures are authorized.

10.10.2.7 Logs maintained electronically may be updated as required for daily activities without going through the above revision process. Each day's log; however, will be saved electronically with the date included in the file name. Previous day's logs will not be deleted from the database and will serve as additional back up should the current days log be damaged or lost.

10.11 Photographic Records

10.11.1 Photographic records will be maintained by site personnel in accordance with the PWS. Photographs and videotape will be utilized to document significant site activities, the locations of ordnance occurrence along the beach, and representative ordnance before and after it is cleared. Locations, along with orientations of picture/videos, shall be indicated on a map. MEC discoveries may be documented by color images. Photographic records may be used to supplement information recorded in the daily logs, to include photographs of equipment prior to use, and the condition of the site prior to any activity. Photographs and videos should clearly show the task being accomplished and provide for a visual record of the operations. Operations are not to be staged. Photographic records should be taken during normal conduct of the operations. These photographic records will be included in the Final Report.

10.12 Logs and Reports

10.12.1 Field activity logbooks will be maintained in ink. All personnel will use bound and numbered field logbooks with consecutively numbered pages. These logbooks are

QC records and will be completed in accordance with this section of this QC Plan. These activity logbooks will become part of the Final Report; thus, it is imperative that they be completed clearly and legibly. Appropriate documentation will be maintained regarding the location and disposition of all MEC and munitions debris. Locations will be documented on a site map and entered in the Ordnance Accountability Log. Weekly Summary Reports will be prepared by the UXOQCS and forwarded via facsimile or email to the Manager on a timely basis.

10.12.2 Daily Activity Log

10.12.2.1 Daily Activity Logs will be maintained and will include the following:

- date and recorder of field information;
- start and end time of work activities including lunch and down time;
- visitors;
- weather conditions;
- important telephone calls;
- any deviations from planned activities;
- equipment checks and calibrations;
- equipment monitoring results, if applicable;
- QCI Performed;
- nonconforming conditions;
- lessons learned; and

10.12.3 Safety Log

10.12.3.1 Safety Logs will include the following:

- date and recorder of log;
- significant site events relating to safety;
- accidents;
- stop work due to safety concerns;
- lessons learned;
- safety audits; and
- signatures of the SUXOS and UXOQCS indicating concurrence.

10.12.4 Training Log

10.12.4.1 Training will be documented in the Training Log as follows:

- date and recorder of log;
- nature of training;
- tailgate safety briefings (including time conducted, person conducting the briefing and attendees);
- visitor training (including names of visitors, description of training, and person performing training); and
- signatures of the SUXOS and UXOQCS indicating concurrence.

10.12.5 Ordnance Accountability Log

10.12.5.1 The Ordnance Accountability Log will include:

- identification number (a unique ID #);
- type, condition, and grid location;
- nomenclature;
- fuze description;
- fuze condition;
- alignment (the longitudinal axis orientation of the item);
- placement (the location with respect to ground surface); and
- additional comments, if required
- date and recorder of log, and
- signatures of the SUXOS and UXOQCS indicating concurrence.

10.13 Field Office/Communications

10.13.1 All official contractor visitors will report to the SUXOS to sign in, receive a safety briefing/training and obtain an escort within the project site. All visitors will be announced to the site via 2-way radio, telephone, or verbally. All internal communications will be by Motorola MTX portable radios or equivalent (radios will NOT be operated within 10 feet of electric blasting caps or firing circuits). All official external communications shall be via cellular telephone, landline or in some cases email external communications shall be via cellular telephone, landline or in some cases email.

10.14 Lessons Learned

10.14.1 Lessons learned from day to day activities are an important part of the continuous improvement process. They can prove vital to prevent similar problems from occurring at other sites. Lessons Learned from daily activities and from the occurrence of nonconforming conditions will be documented by the UXOQCS and/or the SUXOS, as appropriate. Lessons Learned as a result of nonconforming conditions are captured and documented on the QCIR as a result of its investigation and disposition. Other Lessons Learned, from both positive and negative events will be documented in the Daily Activity Log and/or Safety Log. These items will be included in the Final Report. The QC Manager will maintain a database of Lessons Learned for communication to other sites and for incorporation into Training Requirements.

10.15 Reviews and Approvals

10.15.1 All contract submittals (reports, work plans, etc.) undergo peer review and QC to ensure that they meet contract requirements prior to being submitted to the Government for acceptance. This review will include, but is not limited to the Program Manager and the QC Manager. Work Plans and Reports are checked

against the PWS and applicable DIDs to ensure they are in conformance. Changes to approved documents will undergo the same review process as the original document and will be communicated to all personnel affected by the revision.

10.16 Training

10.16.1 The OPM will verify that all project personnel have completed the following training prior to their assignment:

- U.S. Naval Explosive Ordnance Disposal, Indian Head, Maryland / Eglin Air Force Base, FL or EOD Assistance Course, Redstone Arsenal, AL / Eglin Air Force Base, FL, or other DoD Certified Equivalent Course.
- OSHA 40 Hour Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) in accordance with 29 CFR 1910.120 and 8 hour refreshers as need.

10.16.2 Current Site Training

10.16.2.1 Personnel without USACE UXO numbers will be submitted for registration and approval prior to assignment. Site Specific Training on this PWP and additional training, as needed, will be performed and documented on a QCIR, which will be forwarded to the OPM for review.

10.16.2.2 Safety Meetings will also be documented. The UXOQCS will ensure that all personnel using geophysical detection equipment are properly trained to use that piece of equipment. This may include verification of past experience as well as on-site training on using specific equipment in site-specific conditions, which will be documented on a QCIR and forwarded to the OPM. An additional 8 hour HAZWOPER supervisor training is required for site supervisors and managers in accordance with 29 CFR 1910.120.

10.16.2.3 The UXOQCS will conduct, as necessary, site-specific training and/or review of known MEC to ensure that all site personnel are thoroughly familiar with the hazards and the general safety precautions and procedures required. Contractor personnel and site visitors will also receive site-specific training and safety briefings, as required, to ensure safety on the project. Visitors must be briefed on all of the known or anticipated hazards of the site, required PPE to be worn while on the site, and site emergency procedures. Visitors will be escorted by a UXO qualified person whenever they enter the exclusion zone and all MEC operations will cease whenever a visitor is within the exclusion zone.

10.16.2.4 HTRW or CWM are not expected at this site per the PWS; therefore, a Chemical Quality Data Management (CQDM) Sub-plan is not applicable.

10.17 QC Documentation Submittal

10.17.1 All QC documentation required by this PWP will be submitted as part of or as supporting documentation for the SSFR.

10.17.2 All analog and digital QC data will be delivered in accordance with Appendix B of DID MR-005-05.01.

10.18 QC Record Retention

10.18.1 All original QC Records and documentation will be maintained on-site and made available for government inspection upon request or in file archives for 3 years after the project completion date.

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Chapter 11 Environmental Protection Plan

11.1 Purpose

11.1.1 This Environmental Protection Plan is a site specific plan that describes methods and procedures used during site activities to minimize pollution, protect and preserve natural resources, and to control noise and dust within reasonable limits to meet the guidelines of MR-005-12, *Environmental Protection Plan* (USACE, 2006). The goal is to complete the Performance Work Statement on schedule and without a safety incident or environmental incident. Through careful planning, training, supervision, and quality control related to all aspects of the project.

11.1.2 The Archaeological Monitoring Plan (AMP) will be submitted separately and will be included in Appendix N.

11.1.3 The project site work and restoration (as required) will be performed in accordance with applicable regulations, guidance, and procedures and in coordination with appropriate officials and agencies.

11.1.4 A surface and subsurface clearance will be performed within the former WMA, which was used as a training area and impact target area for gunnery practice exercises.

11.1.5 MEC contractor shall work in close coordination with qualified cultural resource and natural resource subcontractors to ensure that significant cultural resources and threatened and endangered species are afforded appropriate protection compliant with CERCLA laws and regulations.

11.2 Existing Conditions Survey

11.2.1 The OPM and the USACE OESS, or other on-site government inspection personnel, will make a joint existing conditions survey, if required, prior to beginning field-work. The survey will identify areas within the project site where proposed work may have a negative environmental impact. Sensitive areas will be identified and marked. Workers will be given instructions on the activities that can and cannot be performed in these areas.

11.3 Potential Environmental Resource Impact

11.3.1 Endangered, Threatened or Sensitive Species

11.3.1.1 In 1997, a flora and fauna survey of the former maneuver area was conducted (USACE POH, 1997). The former maneuver area supports little habitat for native and sensitive species due to intense cattle grazing and a variety of anthropogenic

stresses. However, a number of threatened, endangered, or sensitive species may exist in the vicinity of the former WMA.

11.3.1.2 The Dark-rumped Petrel (Pterodroma phaeopygia sandwichensis) is an endemic species that is listed as endangered by the United States Fish and Wildlife Service (USFWS) and may occasionally fly over the former maneuver area. However, the area does not provide suitable nesting habitat for this species and the species was not observed during the biological survey. Hawaiian Goose (Branta sandvicensis) is another endemic species that is listed as endangered by the USFWS. The Hawaiian hoary bat (Lasiurus cinereus semotus) is Hawai`i's only endemic terrestrial mammal and is listed as endangered by the USFWS and a species of concern for the Hawaiian Islands.

11.3.1.3 The majority of the vegetation on the project area is non-native grasslands. Areas in the north-central region of the former maneuver area were recorded as having been intensely impacted by grazing and a variety of anthropogenic stresses; therefore, these areas are poor habitats for endangered plants. The Parker Ranch pasturage in this area exhibited relative homogeneity throughout with regard to topography and plant species variation and did not contain refuges or zones inaccessible to grazing livestock. During the biological survey, only one endangered plant or plant species of concern was discovered by the project botanists at WMA. Portulaca scerocarpa, a federally listed endangered plant or species of concern, was found to occur within the central region of the former maneuver area. Thirty-four individual plants of Portulaca sclerocarpa were found on Pu‘u Pa scattered from the base of the pu‘u to just below its summit. The Pu’u Pa area is not a part of the FUDS for the WMA.

11.3.1.4 The most significant vegetation feature in the WMA is an approximately 20 square kilometer area of native Kawelu Grassland, which extends between Kamakoa Gulch to Waiulaula Gulch and west from the rock wall to the coast. The Kawelu Grassland may support native and endangered plant species in normal rainfall years. In addition, several rare Hawai‘ian plant species were observed on the former maneuver area near Waikoloa Village. These species include Nehe (Lipochaeta lavarum), kauna‘oa (Cuscuta sandwichiana), ‘Iliahi (Santalum ellipticum), and ‘Akia (Wikstroemia pulcherima). The Puako parcel also supports a small population of endangered flowering maple (Abutilon menziesii Seem.) (USACE POH, 1997).

11.3.1.5 Field teams will be trained on threatened, endangered or sensitive species at the WMA. Training will include recognition and protection of these resources.

11.3.2 Wetlands

11.3.2.1 There are no known wetlands within the former WMA.

11.3.3 Cultural, Archaeological, and Water Resources within the Project Area

11.3.3.1 Cultural, archaeological, and water resources within the project area are discussed in the Archaeological Monitoring Plan (AMP), a separate, stand-alone report. Per the AMP, employees will be made aware of known cultural and archaeological sites at daily briefings by the Project Archaeologist. If an item is discovered during work activities that may be culturally or archaeologically significant, its location will be

noted and the Project Archaeologist and the USACE will be notified. The final Archaeological Monitoring Plan (AMP) will be submitted separately and will be included in Appendix O when approved.

11.3.4 Coastal Zones

11.3.4.1 There are no costal zones within the expected work areas except Area 17D, Hapuna Beach. The Hawaii State Department of Land and Natural Resources (DLNR) is the responsible party of this work area and will provide guidance on work restrictions to protect the coastal zone environment. At the time of submittal of this PWP, MEC operations in this area are still under discussion. The contractor's biological consultant will coordinate with DLNR to develop and present sensitive features and additional work restrictions to the contractor's employees before field operations begin to ensure protection of sensitive coastal species and habitats.

11.4 ***Existing Waste Disposal Sites***

11.4.1 There are no active waste disposal sites within the project area. There are currently no known previous disposal sites.

11.5 ***Mitigation Procedures***

11.5.1 Manifesting, Transportation, and Disposal of Wastes

11.5.1.1 The contractor does not plan on the packaging, transportation and/or disposal of hazardous wastes. If such a need should arise, then the OPM will coordinate with the PM and ensure that the waste is handled, stored, treated, packaged and/or transported in accordance with federal, state and local lows, policies and regulations. The only exception would be MPPEH; please see section 2.7 for detailed discussion of certification, treatment, final disposition.

11.5.2 Burning Activities

11.5.2.1 There are no brush burning activities associated with this project.

11.5.3 Dust and Emission Control

11.5.3.1 Light trucks will be used on a limited basis and will, to the extent practicable, avoid creating high traffic areas. Lighter vehicles will be used to collect MD from the grids and consolidate it for pick up by heavier vehicles. All vehicles will be operated at low rates of speed to reduce dust. Dust emissions will be controlled through the use of administrative controls, such as speed limits and varied traffic patterns.

11.5.4 Spill Control and Prevention

11.5.4.1 Vehicles designed to travel on roads will be fueled at commercial filling stations that are designed to prevent and control potential spills. Fuel for use in utility vehicles will be transported and dispensed from fuel cans designed to reduce the potential for

spills. Fuel will be transported in small containers (5 gallons or less) and fueling will be in areas designated by the SUXOS. Spill kits will be maintained in the same vicinity. Fuel will not be stored on site and will be delivered in small quantities, as needed.

11.5.5 Storage Areas and Temporary Facilities

11.5.5.1 The contractor will store donor explosives in a Bureau of Alcohol, Tobacco and Firearms (ATF) approved Type II, magazine with a separate attached cap box. Explosives may also be stored in a Type I magazine, if deemed advantageous to the project. The magazine location will be on an approved and sited area within the contracted work area. Blasting caps will be stored in the cap box and all donor explosives will be stored in the magazine. The magazine and cap container will be secured with four each, ATF approved padlocks (two on the magazine and two on the cap box). A 6 foot high chain link fence will be placed around the magazine. The storage area will be maintained clear of volatile material for a minimum of 50 feet and vegetation for a minimum of 25 feet. The magazine area will be sited in a previously disturbed area to avoid disturbing existing natural features. Due to the enclosed nature of the magazine and explosive packaging, the risk of explosive material being released is negligible.

11.5.5.2 The workshop to support the project vehicles and assorted equipment contains an outdoor storage locker for flammable materials. The locker is kept locked with key control limited to the workshop personnel and the SUXOS. All flammable materials will be stored in sealed containers within the locker. The workshop does not store any expended fluids.

11.5.6 Access Routes

11.5.6.1 The need to construct access routes is not anticipated. The site will be accessed from existing roads and off-road routes designated by the SUXOS. Off-road routes will be modified and/or varied to prevent erosion and/or dust problems.

11.5.7 Trees and Shrubs Protection and Restoration

11.5.7.1 The removal action is not anticipated to not have a major effect on any trees or shrubs. Only vegetation that will hamper a safe MEC removal action will be cut. Only vegetation which is smaller than 3 inches in diameter measured on the trunk and 4 feet from the ground surface will be removed. The removal of endangered species will be prohibited until alternatives and a biological consultation can be discussed with the OESS and/or USACE PM.

11.5.8 Control of Water Run-on and Run-off

11.5.8.1 There are no anticipated concerns with water run-on or run-off in the Clearance Sites.

11.5.9 Decontamination and Disposal of Equipment

11.5.9.1 During and after completion of the project, equipment will be cleaned to remove dirt and dust. Methods will include both dry decontamination and wet decontamination. Wet methods will be performed in an approved location or wash facility. Disposable

equipment will not be decontaminated but it will be transferred to an appropriate disposal facility.

11.5.10 Minimizing Areas of Disturbance

11.5.10.1 Work will only take place in areas defined in the PWS.

11.6 Post-Activity Clean-up

11.6.1 After completing the removal action, the SUXOS will ensure that all areas included in the scope are properly cleaned. No debris will be left as a result of activities on the site. Facilities will be cleaned and restored to their original condition.

11.7 Air Monitoring

11.7.1 The requirements and methods of monitoring are described in the Site Safety and Health Plan, Appendix D-1 in Appendix D of the APP, of this PWP. No air monitoring requirements are anticipated during the work associated with this removal action.

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Chapter 12 Investigative Derived Waste Plan

An Investigative Derived Waste Plan is not required by this contract.

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Chapter 13 Interim Holding Facility Site Plan for RCWM Projects

An Interim Holding Facility Site Plan for RCWM projects is not required by this contract.

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Chapter 14 Physical Security Plan for RCWM Project Sites

A Physical Security Plan for RCWM Project Sites is not required by this contract.

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Chapter 15 References

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