DRAFT FINAL
REVISION 1

FEASIBILITY STUDY (FS) REPORT

FORMER WAIKANE TRAINING AREA
KANEOHE, OAHU, HAWAII

Contract: W912DY-04-D-0007
Task Order: 0025

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and

U.S. Army Corps of Engineers, Honolulu District

by:
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FEBRUARY 2013

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The views, opinions, and/or findings contained in the report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

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ABBREVIATIONS AND ACRONYMS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
asl	above sea level
ATV	All-terrain Vehicle
bgs	Below Ground Surface
CEPOH	U.S. Army Corps of Engineers, Honolulu District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	centimeter
COPC	Chemical of Potential Concern
DERP	Defense Environmental Restoration Program
DGPS	Differential Global Positioning System
DoD	Department of Defense
EAL	Environmental Action Level
EE/CA	Engineering Evaluation/Cost Analysis
EMI	Electromagnetic Induction
ESA	Endangered Species Act
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
GPS	Global Positioning System
HDOH	State of Hawaii, Department of Health
HE	High Explosive
HEAT	High Explosive Anti-Tank
LUC	Land Use Control
MC	Munitions Constituent
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MEC HA	MEC Hazard Assessment
mg/kg	milligram/kilogram
mm	millimeter
MRA	Munitions Response Area
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTCRA	Non-time Critical Removal Action
PRG	Preliminary Remediation Goal
RAO	Remedial Action Objective
RI	Remedial Investigation
RTS	Robotic Total Station
TBC	To Be Considered
TPP	Technical Project Planning
USACE	United States Army Corps of Engineers
USAESCH	United States Army Engineer Support Center, Huntsville
USEPA	United States Environmental Protection Agency
USMC	United States Marine Corps
UXO	Unexploded Ordnance

WTA	Waikane Training Area
WVTA	Waikane Valley Training Area

1.0 EXECUTIVE SUMMARY

1.1 BACKGROUND

1.1.1 The Waikane Training Area (WTA) Munitions Response Area (MRA) is located in Waikane Valley in the District of Koolaupoko on the windward side of the island of Oahu, Hawaii. The WTA MRA is a portion of the former Waikane Valley Training Area (WVTA), which consisted of approximately 1,061 acres that were used from 1942 to 1976 by the Department of Defense (DoD) as a training and artillery impact area. Live fire at the WVTA reportedly ceased in the early 1960s, but numerous types of munitions have since been recovered from the site. The WTA MRA covers approximately 933 acres[1] of the WVTA and is the property that was evaluated during this Feasibility Study (FS). The remainder of the WVTA is currently owned by the U.S. Marine Corps (USMC) and is therefore not an eligible property under the Defense Environmental Restoration Program-Formerly Used Defense Sites (DERP-FUDS) program.

1.1.2 The U.S. Army Corps of Engineers (USACE) has designated the WTA MRA as FUDS Property Number H09HI0354. The WTA MRA consists of three Munitions Response Sites (MRSs) (Figure B-1, Appendix B):

- **Southeastern Region MRS** (RMIS ID: H09HI035401R01-1);
- **Southern Impact Region MRS** (RMIS ID: H09HI035402R02-2); and
- **Western/Mountainous Region MRS** (RMIS ID: H09HI035402R03-3).

1.1.3 The WTA MRA is currently owned by several private and public land owners and includes residential areas and undeveloped open and densely forested lands. The majority of the area consists of extremely rugged terrain that limits accessibility and future development activities due to steep gulches, canyons, rocky outcrops, and mountains at elevations over 2,200 feet above sea level (asl).

1.1.4 Based on the results of the Remedial Investigation (RI) and previous investigations completed at the site (ZAPATA, 2012), the three MRSs have been recommended for an FS to assess response action alternatives for managing risk associated with potential human interaction with munitions and explosives of concern (MEC). The results and discussion of the FS conducted for the three MRSs are included in this stand-alone document. The purpose of the FS is to ensure appropriate remedial alternatives are developed and evaluated and an appropriate remedy selected [NCP, 40 CFR 300.430(e)]. An analysis of alternatives was not performed for Munitions Constituents (MC). The risk assessments conducted during the RI concluded that the potential for adverse risks to human health or ecological receptors from exposure to MC in soil and sediment would be negligible at the WTA MRA.

[1] Of the 1,061 acres of the WVTA, only 873.64 acres were considered eligible under the Defense Environmental Restoration Program – Formerly Used Defense Sites program. However, during the EE/CA investigation, the MRSs were refined and the acreage increased to 933 acres.

1.2 REMEDIAL INVESTIGATION

1.2.1 Based on the confirmed presence of MEC and heavy concentrations of munitions debris (MD), a RI was conducted in 2011 to determine the nature and extent of MEC and MC contamination at the WTA MRA in order to adequately characterize each MRS to support the development and evaluation of effective remedial alternatives.

1.2.2 The WTA MRA contains three MRSs and the remedial investigation expanded into other areas, including a suspected 2.36-inch firing point area located outside of the WTA MRA boundary and two streams exiting the WTA MRA boundary due to their potential to transport munitions offsite (Figure B-1, Appendix B). The RI concluded that MEC items are not anticipated to be present in these areas. Therefore, these expansion areas are not evaluated in this FS report.

1.2.3 Concurrent with the RI, two Areas of Concern (AOC) within the Southern Impact Region MRS and Southeastern Region MRS (AOC #1 and AOC #2, respectively) underwent a Non-Time Critical Removal Action (NTCRA) which was a surface and subsurface MEC removal action. Although these areas were not included in the field investigation for the RI, intrusive results from the removal actions were incorporated into the RI report to assist in the decision making process. Figure B-2 in Appendix B shows the locations of AOC #1 and AOC #2.

1.2.4 Field tasks performed during the RI and previous investigations included surface reconnaissance, brush cutting, geophysical surveys, surface removal actions, intrusive anomaly investigation, and soil and sediment sampling. The characterization used information from previous investigations (e.g., Engineering Evaluation/Cost Analysis [EE/CA]), data from the NTCRA (AOC #1 and AOC #2), and RI data results to assess risks associated with potentially complete exposure pathways. Based on the laboratory analytical results of MC in soil and sediment samples, the risk assessment concluded that the potential for adverse risks to human health or ecological receptors from exposure to MC in these media would be negligible at the WTA MRA.

1.2.5 The State of Hawaii, Department of Health (HDOH) requested that confirmation subsurface soil samples be collected at the location where the highest lead concentration was detected during the RI. Samples were collected post-RI and the results are discussed in Section 2.2.2.2 and presented in Appendix E, herein. The confirmation subsurface soil sample lead concentrations were each below the HDOH Environmental Action Level (EAL); therefore, MC are not evaluated in this FS report.

1.2.6 Complete MEC exposure pathways are possible when there is a source (MEC), a receptor (e.g., resident, worker, hunter, etc.), and interaction between the receptor and the source (e.g., striking or handling the munition). Based on the confirmed presence of MEC on the surface and subsurface, historic land use as an artillery training impact area, or high MD density within the MRSs, there is the potential for a residual MEC hazard within the MRSs.

1.2.7 No MEC and only very limited MD (small arms ammunition) have been found within the Western/Mountainous Region MRS; therefore, MEC are not anticipated to be present in this MRS. However, although this area does not appear to have been affected by concentrated

munitions use, and exposure to explosive hazards in these areas is unlikely, the potential for explosive hazards cannot be completely dismissed. Because the potential for MEC is considered to be minimal in the MRS, a qualitative MEC Hazard Assessment was not conducted for the Western/Mountainous Region MRS. In the Southern Impact Region and Southeastern Region MRSs, potential MEC hazards were determined to exist and MEC exposure pathways are potentially complete; as such, a qualitative MEC Hazard Assessment (MEC HA) was conducted using information from historical documentation and previous studies and removal actions, combined with field observations made during the RI. The results of the MEC HA assigned scores between 370 and 420 (out of 1,000) to the two MRSs, which equates to the minimum MEC HA hazard level of 4. The results of the MEC HA provide the baseline for assessment of response alternatives to be conducted during this FS.

1.2.8 Each MRS will be addressed in the Proposed Plan and Decision Document, which will be submitted following the FS for the WTA MRA.

1.3 REMEDIAL ACTION OBJECTIVES (RAO)

The Preliminary Remediation Goal (PRG) for MEC at the WTA MRA is to mitigate human exposure to, and interaction with MEC, should it be present. The close-out statement from the Technical Project Planning Process (TPP) process is: "To manage the munitions and explosives of concern (MEC) and MC risk through a combination of removal/remediation, administrative controls, and public education; thereby rendering the site as safe as reasonably possible to humans and the environment and conducive to the anticipated future land use." Table 1-1 presents the RAOs to limit exposure to potential MEC at each MRS.

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TABLE 1-1 REMEDIAL ACTION OBJECTIVES TO LIMIT EXPOSURE TO POTENTIAL MEC

MRS	Source*	Current Land Use	Future Land Use	Access	Current/Future Receptor	Pathway	MEC RAO
Western/Mountainous Region MRS	Limited MD; no MEC recovered during previous investigations or RI	Undeveloped, surface recreational	Proposed agricultural, unauthorized recreational	Access available; very limited in most areas due to steep terrain	Authorized contractors and visitors, agriculture workers, recreational users or trespassers	Potentially Complete	Minimize direct contact with potential MEC.
Southern Impact Region MRS	MD down to 16-inch bgs; MEC recovered during EE/CA; no MEC recovered during RI and NTCRA	Undeveloped, surface recreational	Proposed agricultural, unauthorized recreational	Access available; limited in most areas due to steep terrain	Authorized contractors and visitors, agriculture workers, recreational users or trespassers	Potentially Complete	Minimize direct contact with potential MEC.
Southeastern Region MRS	MD down to 16-inch bgs; MEC recovered during EE/CA and NTCRA; no MEC recovered during RI.	Undeveloped, residential, light agriculture, surface recreational	Residential, agricultural, unauthorized recreational, proposed City & County park	Access available; limited in areas due to steep terrain	Residents, authorized contractors and visitors, agriculture or construction workers, recreational users or trespassers	Potentially Complete	Minimize direct contact with potential MEC.

*Includes results from previous investigations, NTCRA (i.e., MEC subsurface removal) and RI.

1.4 RESULTS OF COMPARATIVE ANALYSIS OF ALTERNATIVES

1.4.1 Based on the results and conclusions of the RI, this FS was conducted for the WTA MRA. The FS developed and assessed five different alternatives for managing risk associated with potential MEC. A summary of the Feasibility Study analysis is presented in Table 1-2.

1.4.2 Risk-reduction alternatives were identified for assessment at each MRS. The first step was to evaluate technologies and methodologies for use based on the nature, extent, and potential for MEC occurrence, and suitability for physical site conditions. Remedial alternatives, ranging from no action to a comprehensive MEC removal, were then evaluated for each MRS based on current and anticipated future land use, protectiveness and effectiveness, cost and ability to achieve risk-reduction goals. These alternatives are:

- Alternative 1 - No Action: No further action is conducted under this alternative.
- Alternative 2 - Land Use Controls (LUCs): LUCs will include signage warning visitors of potential hazards, a community MEC educational awareness program, and safety training. Educational awareness is an effective means of influencing behavior to reduce interaction with MEC.
- Alternative 3 - Surface MEC Removal and Implementation of LUCs: This alternative includes a visual inspection, aided by hand-held instruments, with removal of MEC exposed at ground surface. LUCs will be used in conjunction with surface MEC removal and implemented as described in Alternative 2.
- Alternative 4 - Surface and Subsurface MEC Removal and Implementation of LUCs: This alternative includes removal of surface and subsurface MEC, to a detectable depth that is protective of current and anticipated future land use. LUCs will be used in conjunction with surface and subsurface MEC removal and implemented as described in Alternative 2.
- Alternative 5 – Subsurface Removal to Support Unlimited Use: This alternative includes a response action that allows unlimited use.

1.4.3 Five year reviews are a requirement for all alternatives not allowing for unrestricted exposure/unlimited use in accordance with 40 CFR 300.430(f)(4)(ii) and would be conducted to monitor the effectiveness of a selected remedy.

1.4.4 Alternative 5 was eliminated from further evaluation during the initial screening of the alternatives (Section 4.0). The remaining four alternatives were analyzed against the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) nine criteria. The alternatives were then compared against each other.

TABLE 1-2 FEASIBILITY STUDY ALTERNATIVES SUMMARY

MRS	Alternative	Cost (30-year Present Worth)	Rationale
Western/Mountainous Region MRS	1 – No Action	$0	No risk reduction.
	2 - LUCs	$1,156,170	Reduce potential risk by providing signage and community MEC educational awareness program with safety training.
	3 - Surface MEC Removal and Implementation of LUCs	--	Not considered based on lack of MEC found on the surface during the EE/CA and RI.
	4 - Surface and Subsurface MEC Removal and Implementation of LUCs	--	Not considered based on lack of MEC found on the subsurface during the EE/CA and RI. Limited intrusive activity anticipated for future land use.
	5 – Subsurface Removal to Support Unlimited Use	--	Not considered because it is not technically feasible, does not comply with ARARs and is cost prohibitive compared to the other alternatives.
Southern Impact Region MRS	1 – No Action	$0	No risk reduction.
	2 - LUCs	$1,156,170	Reduce potential risk by providing signage and community MEC educational awareness program with safety training.
	3 - Surface MEC Removal and Implementation of LUCs	$3,648,890	Reduce risk for potential receptors which activities involve surface use. Receptors may still encounter subsurface MEC.
	4 - Surface and Subsurface MEC Removal and Implementation of LUCs	$5,327,930	High level of protectiveness for proposed future activities.
	5 – Subsurface Removal to Support Unlimited Use	--	Not considered because it is not technically feasible, does not comply with ARARs and is cost prohibitive compared to the other alternatives.
Southeastern Region MRS	1 – No Action	$0	No risk reduction.
	2 - LUCs	$1,156,170	Reduce potential risk by providing signage and community MEC educational awareness program with safety training.
	3 - Surface MEC Removal and Implementation of LUCs	$2,437,030	Reduce risk for potential receptors which activities involve surface use. Receptors may still encounter subsurface MEC.
	4 - Surface and Subsurface MEC Removal and Implementation of LUCs	$3,255,940	High level of protectiveness for proposed future activities.
	5 – Subsurface Removal to Support Unlimited Use	--	Not considered because it is not technically feasible, does not comply with ARARs and is cost prohibitive compared to the other alternatives.

Notes: Cost associated with LUCs and long-term management is included in cost estimates for Alternatives 3 and 4. See Appendix C for detailed cost information.

2.0 INTRODUCTION

2.1 PURPOSE

2.1.1 The purpose of the FS is to ensure appropriate remedial alternatives are developed and evaluated and an appropriate remedy selected [NCP, 40 CFR 300.430(e)]. A specific remedy is not selected during the FS process. Once potential alternatives have been developed, it may be necessary to screen out certain options to reduce the number of alternatives that will be analyzed. The screening process involves evaluating alternatives with respect to their effectiveness, implementability, and cost. The remaining alternatives were evaluated against the nine NCP criteria and then compared against each other. The nine NCP criteria include:

Threshold Criteria

- Overall protection of human health and the environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Balancing Criteria

- Long-term effectiveness
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria

- State acceptance
- Community acceptance

2.1.2 The first two criteria, categorized as "Threshold Criteria," are those that each alternative must meet to be eligible for further comparative analysis. The third through seventh criteria represent the "Balancing," or primary criteria upon which the analysis is based. The last two criteria are categorized as "Modifying Criteria," and are discussed with respect to each individual alternative; however, comparative analysis will be further addressed following comments on the FS by the public and government agencies. Evaluation and comparative analysis of alternatives are intended to provide the rationale for selection of the preferred remedial alternative.

2.2 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

The RI was conducted in 2011 to determine the nature and extent of MEC and MC contamination at the WTA MRA in order to adequately characterize each MRS to support the development and evaluation of effective remedial alternatives. The WTA MRA consists of three MRSs (Figure B-1, Appendix B):

- **Southeastern Region MRS** (RMIS ID: H09HI035401R01-1);
- **Southern Impact Region MRS** (RMIS ID: H09HI035402R02-2); and
- **Western/Mountainous Region MRS** (RMIS ID: H09HI035402R03-3).

2.2.1 Munitions and Explosives of Concern

2.2.1.1 The analog-and-dig intrusive investigation along transects and within grids served to characterize the nature and extent of munitions-related contamination within WTA MRA. During the RI, 5,341 anomalies were intrusively investigated (Table 2-1). Approximately 1,100 anomalies resulted in MD indicative of practice and high explosive (HE) items.

2.2.1.2 Western Mountainous Region MRS – This area is approximately 692 acres with an unimproved dirt access road; however, it is impossible to travel off the road due to cliffs rising up on one side and sheer drop offs on the other. Due to the rugged terrain and dense vegetation, the site is relatively inaccessible to the public with limited potential for future development. During the TPP process, it was determined that a complete MEC exposure pathway (i.e., lack of MEC source, receptor, and receptor acting upon MEC item) was unlikely in the Western/Mountainous Region MRS. MC sampling was performed in the Western/Mountainous Region MRS; however, geophysical data was not collected due to inaccessibility of the site and the lack of a complete exposure pathway. Based on the results of the EE/CA and RI, no MEC and only very limited MD, other than that related to small arms ammunition, have been found within the Western/Mountainous Region MRS. Although this area does not appear to have been affected by concentrated munitions use, and exposure to explosive hazards in these areas is unlikely, the potential for explosive hazards cannot be completely dismissed.

2.2.1.3 Southern Impact Region MRS – Two MEC items (37 mm HE) were discovered to a maximum depth of eight inches in the Southern Impact Region MRS during the EE/CA. Based on the discovery of MEC during the EE/CA, a NTCRA was conducted in 2011 over 7.3 acres in the central portion of the MRS (AOC#1) which was a surface and subsurface MEC removal. No MEC items were recovered in the Southern Impact region MRS during the NTCRA or within the areas investigated during RI. The EE/CA, NTCRA and RI identified MD including remnants of various munitions including projectiles (i.e., 37mm and 75mm); mortars (60mm and 81mm HE); 3.5-inch rockets; hand grenades; rifle grenades; trip flares; expended fuzes; hundreds of pieces of unidentifiable munitions fragmentation, and small arms ammunition to a maximum depth of 16 inches; therefore, it is assumed that MEC could potentially be found at this depth as well.

2.2.1.4 Southeastern Region MRS - Five MEC items (two 81mm HE mortars and three 60mm HE mortars) were discovered to a maximum depth of 16 inches in the Southeastern Region MRS during the EE/CA. Based on the discovery of MEC during the EE/CA, an NTCRA was conducted in 2011 over approximately 32.6 acres in the central and southeastern portion of the MRS (AOC#2). The NTCRA recovered 42 MEC items including Hand Grenades, HE, MKII; 2.36-inch HEAT Rockets M6A1; 50mm HE Japanese Knee Mortar, Type 89; 2-inch Smoke Mortar M3; Grenade, Hand, Smoke AN-M8; 76mm HE Projectile M42A1; Simulator, Projectile, Air Burst, M27A1B1; and Simulator, Flash, Artillery, M110, both on the surface and in the subsurface to a maximum depth of 24 inches; therefore, it is assumed that MEC could potentially be found at this depth as well. No MEC items were recovered in the areas investigated during the RI.

TABLE 2-1 RI MEC INTRUSIVE INVESTIGATION SUMMARY

Total Anomalies	MEC Quantity	MD Quantity	Non-MD Quantity	Geological
5,341	0	3,405	1,808	128

Notes: 2,291 of the 3,405 MD anomalies were small arms ammunition less than 0.50 caliber.

2.2.2 Munitions Constituents Sampling Summary

2.2.2.1 During the RI, lead concentrations above the HDOH EAL of 200 milligrams per kilogram (mg/kg) were detected in two discrete subsurface soil samples collected from the Southeastern Region MRS: WTA-SE-ZSB-016 (1,830 mg/kg) and WTA-SE-ZSB-028 (223 mg/kg). The lead concentration measured in sample WTA-SE-ZSB-028 was not considered to be a significant exceedance (defined as an order of magnitude) above the HDOH EAL. The highest lead concentration was measured at sample location WTA-SE-ZSB-016 within the removal action area AOC #2.

2.2.2.2 The HDOH requested that confirmation samples be collected at WTA-SE-ZSB-016 where the highest lead concentration was detected. Samples were collected post-RI and the results are presented in Appendix E. The confirmation subsurface soil sample lead concentrations were below the HDOH EAL. The extent of variability between the original and confirmation sample results was considered high (relative percent difference greater than 50%). Further, the maximum lead concentration of 1,830 mg/kg fell outside of the 99th percentile value (1,300 mg/kg) of the data set for subsurface soil concentrations in the Southeastern Region MRS. For these reasons, there is evidence to suggest that widespread lead contamination in soil is unlikely.

2.2.3 Baseline MC Risk Assessment Summary

Based on the laboratory analytical results of MC in soil and sediment samples, the risk assessment concluded that the potential for adverse risks to human health or ecological receptors from exposure to MC in these media is negligible at the WTA MRA.

2.2.4 Baseline MEC Hazard Assessment Summary

2.2.4.1 The United States Environmental Protection Agency's (USEPA) MEC HA program was used to determine the baseline MEC risk hazards. The MEC HA allows a project team to evaluate the potential explosive hazard associated with an MRS, given site conditions and under various cleanup, land use scenarios, and land use control alternatives.

2.2.4.2 Table 2-2 lists the MEC HA scores (minimum possible score of 125 and maximum possible score of 1,000) and MEC HA hazard levels, which range from 1 (highest hazard) to 4 (lowest hazard) for the Southeastern Region MRS and Southern Impact Region MRS. As previously discussed, the potential for MEC is considered to be minimal in the Western/ Mountainous MRS; therefore a qualitative MEC HA was not conducted for this MRS.

2.2.4.3 Previous investigations have revealed that the Southern Impact Region and Southeastern Region MRSs contained MEC items. These findings resulted in a subsurface removal action (NTCRA) in focused areas of these two MRSs (AOC #1 and AOC #2, respectively, Figure B-2). A MEC HA was prepared following the NTCRA for the Southeastern Region MRS and Southern Impact Region MRS. The MEC HA Category 4 reflects a "low"

Hazard Level since a subsurface removal action was conducted within the MRSs. Although a MEC removal action was conducted within these MRSs, previous MEC presence at an MRS means that a potential explosive hazard may exist and cannot be completely dismissed. As such, MEC may still pose a hazard at a Hazard Level 4 MRS (i.e., low hazard level). Some typical characteristics of a Hazard Level 4 MRS include the following:

- A MEC cleanup was performed
- Accessibility is limited or very limited
- Potential receptor contact hours are few or very few

TABLE 2-2 MEC HA HAZARD LEVEL DETERMINATION SUMMARY

	Current	Future (with LUCs)
Southern Impact Region MRS		
MEC HA Scoring Summary	380	370
Corresponding Hazard Level Category	**4**	**4**
Southeastern Region MRS		
MEC HA Scoring Summary	420	380
Corresponding Hazard Level Category	**4**	**4**

2.2.5 Remedial Investigation Conclusions

2.2.5.1 No MEC was discovered within the Western/Mountainous Region MRS. Although the presence of a receptor exists and there is a possibility of receptor interaction with a MEC hazard, a complete MEC exposure pathway (i.e., lack of MEC source, receptor, and receptor acting upon MEC item) is unlikely in the Western/Mountainous Region MRS. The RI concluded the Western/Mountainous Region MRS should be included in the FS to evaluate potential response alternatives

2.2.5.2 Based on the results of the NTCRA and RI, which found no evidence of MEC or concentrated munitions use (other than small arms ammunition), it is considered unlikely that MEC will be encountered within the Southern Impact Region MRS. However, the possibility that an isolated explosive hazard exists within the MRS cannot be completely dismissed. The RI concluded the Southern Impact Region MRS be included in the FS to evaluate potential response alternatives.

2.2.5.3 During the NTCRA, MEC were found in grids located in close proximity (less than 25 feet) to the perimeter of the NTCRA area (AOC #2) in the Southeastern Region MRS. The EE/CA, NTCRA and RI identified MD including remnants of various munitions including projectiles (i.e., 37mm and 75mm); mortars (60mm and 81mm HE); 3.5-inch rockets; hand grenades; rifle grenades; trip flares; expended fuzes; hundreds of pieces of unidentifiable munitions fragmentation, and small arms ammunition to a maximum depth of 24 inches. The RI concluded the Southeastern Region MRS should be included in the FS to evaluate potential response alternatives.

3.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

3.0.1 The objective of the FS is the analysis and design of potential response actions by assessing the following factors [40 CFR 300.430(d)(2)]:

- Physical characteristics of the property;
- Characteristics/classification of soil, sediment, surface water, and groundwater;
- Characteristics of the waste or military munitions (e.g., quantities, concentration, toxicity, persistence, mobility, depth, nature and extent, etc.);
- The extent to which the source can be characterized;
- Actual and potential exposure pathways through environmental media;
- Actual and potential exposure routes (e.g., inhalation and ingestion); and
- Other factors such as sensitive populations that pertain to the characterization of the site or support the analysis of potential remedial action alternatives.

3.0.2 These considerations, in addition to the previous investigations, subsurface removal action findings, RI data and RAOs were used to screen various technologies for the development of remedial alternatives.

3.1 REMEDIAL ACTION OBJECTIVES

RAOs address specific goals for reducing the explosives safety hazards for individual MRSs to ensure protection of human health, safety, and the environment. The RAOs are intended to be as specific as possible but not so specific that the range of alternatives that can be developed is excessively limited. Due to variations among the three MRSs with regard to MEC risk, site conditions, and current/future use, specific remediation goals have been developed for each MRS individually. Detailed information is provided in the following sections.

3.1.1 Current and Future Land Use

The majority of the area within Waikane Valley consists of inaccessible terrain that limits development options, especially in the Western/Mountainous Region MRS. Current land use patterns for each MRS are likely to continue in the future and are summarized in Table 3-1.

Ohulehule Forest Conservancy, LLC, owner of the majority of the land, has publically presented future land use plans that include restoring/preserving the native forest; protecting the only known elepaio (*Chasiempis ibidis*, listed as endangered) nesting grounds on the windward side of Oahu; growing high-quality organic cacao; and building a single-home residence for owner personal use. It is expected that current land use patterns (i.e., unauthorized recreational hiking, hunting, motocross, etc.) will likely continue.

TABLE 3-1 CURRENT AND PROPOSED FUTURE LAND USE FOR WTA MRA

Waikane MRS	Current Land Use	Proposed Future Land Use
Southeastern Region MRS	**Residential, Agricultural, Recreational** One residential area. Light agricultural. Unauthorized recreational activities include hunting, motocross, and all-terrain vehicle (ATV) riding.	**Residential, Agricultural, Recreational** Residential, agricultural (taro and cacao farming) and recreational (unauthorized hunting and motocross/ATV). The City and County of Honolulu plans to establish the Waikane Valley Nature Park on approximately 40 acres of the site.
Southern Impact Region MRS	**Recreational** Unauthorized recreational activities including hunting, motocross, and ATV riding.	**Agricultural, Recreational** Agricultural (taro and cacao farming), and recreational (unauthorized hunting and motocross/ATV).
Western/Mountainous Region MRS	**Recreational** Unauthorized recreational activities including hunting, motocross, and ATV riding.	**Agricultural, Recreational** Agricultural (forest restoration and taro farming) and recreational (unauthorized hunting and motocross/ATV).

3.1.2 Explosives Safety Hazards and Contaminants of Concern

3.1.2.1 The purpose of the RAOs is to reduce the explosive safety hazards from MEC.

3.1.2.2 Based on the MC analytical results and ecological and human health risk assessments, there are no contaminants of concern at any of the MRSs. MC does not present a risk to human health or the environment, and as such, MC RAOs have not been developed.

3.1.3 Applicable or Relevant and Appropriate Requirements

3.1.3.1 The RAO will comply with site-specific ARARs for each selected remedial action alternative. With the exception of the No Action alternative, all potential alternatives must meet threshold compliance criteria with ARARs. ARARs are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a Comprehensive Environmental Compensation, Response, and Liability Act (CERCLA) site" as defined in 40 CFR 300.5. ARARs relevant to the WTA MRSs are listed in Appendix A and in the RI report.

3.1.3.3 Chemical-specific ARARs are promulgated, health-based or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged into, the ambient environment. Because the risk assessment for chemicals of potential concern (COPCs) concluded that the potential for adverse risks to human health or ecological receptors is negligible, no chemical-specific ARARs have been identified for WTA MRA.

3.1.3.4 Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to remedial/removal actions, or requirements to conduct certain actions to address particular circumstances at a site.

3.1.3.5 Location-specific ARARs generally are restrictions placed on the concentration of a hazardous substance or the conduct of activities solely because they are in special locations. An

action in these special locations may cause irreparable harm, loss, or destruction of ecological resources. Some examples of special locations include flood plains, wetlands, and sensitive ecosystems or habitats. Because species listed as threatened or endangered under the Endangered Species Act (ESA) could occur within the WTA MRA, a location-specific ARAR has been identified (Appendix A).

3.1.3.6 When ARARs do not exist for a particular chemical or remedial activity, other criteria, advisories, and guidance referred to as To Be Considered (TBC) are useful in designing and selecting a remedial alternative. No TBC information was identified for WTA MRA.

3.1.4 Exposure Pathways

The reduction or elimination of exposure pathways to MEC is incorporated into the RAOs. Exposure pathways of MEC include direct contact with MEC at the ground surface and through intrusive activities.

3.1.5 Receptors and Potential Receptors

The RAOs are based on the determination and consideration of all human and ecological receptors available for exposure. Potential receptors that may encounter MEC include:

- Residents;
- Authorized contractors and visitors such as wildlife management workers, research scientists, City and County employees;
- Agricultural or construction workers; and
- Recreational users or trespassers such as hunters, hikers, motocross and ATV enthusiasts.

3.1.6 Remediation Goals

Remediation goals are both site- and contaminant-specific and provide goals to protect human health and the environment. As stated in the RI, the remediation goal for MEC at each MRS is to mitigate human exposure to and interaction with MEC safety hazards, which can be accomplished through remedial activities, limiting access, education programs, or a combination of the aforementioned actions.

3.1.6.1 Southeastern Region MRS

3.1.6.1.1 The Southeastern Region MRS is bordered by the Southern Impact Region to the west, the USMC parcel to the north and City and County of Honolulu property to the south and east. A portion of the MRS was likely used as an impact area. The terrain in the Southeastern Region is mostly rolling hills with areas of steep slopes in excess of 58 percent grade. An unimproved dirt road off of Waikane Valley Road is the main route leading into and through the area. The entrance to the access road is gated and locked. Although site access is limited by dense vegetation, terrain and a gated access road, the site remains relatively accessible to the public.

3.1.6.1.2 The MRS contains residential, private, and publicly (i.e., City and County of Honolulu) owned land parcels and is comprised of mostly undeveloped open areas and densely forested lands. Most site activities are unauthorized and do not involve disturbance of the subsurface (hiking and hunting); however, activities related to motocross or ATV riding could result in intrusive activities in the shallow subsurface (up to one foot). Most residential activities involve only localized subsurface disturbance (i.e., installing fence posts and gardening, etc.) to

depths up to approximately three feet; however, future land development could result in more extensive intrusive activity to depths of three feet or more.

3.1.6.1.3 Five MEC items (two 81mm HE mortars and three 60mm HE mortars) were discovered to a maximum depth of 16 inches in the Southeastern Region MRS during the EE/CA. Based on the discovery of MEC during the EE/CA, an NTCRA was conducted in 2011 over approximately 32.6 acres in the central and southeastern portion of the MRS (AOC#2, Figure B-2). The NTCRA recovered 42 MEC items including Hand Grenades, HE, MKII; 2.36-inch high explosive anti-tank (HEAT) Rockets M6A1; 50mm HE Japanese Knee Mortar, Type 89; 2-inch Smoke Mortar M3; Grenade, Hand, Smoke AN-M8; 76mm HE Projectile M42A1; Simulator, Projectile, Air Burst, M27A1B1; and Simulator, Flash, Artillery, M110, both on the surface and in the subsurface to a maximum depth of 24 inches.

3.1.6.1.4 No MEC items were recovered in the areas investigated during the RI. During the NTCRA, MEC was found in grids located in close proximity (less than 25 feet) to the perimeter of the investigation area (AOC #2), suggesting that a remedial action may need to be expanded beyond the original acreage identified during the EE/CA.

3.1.6.1.5 The EE/CA, NTCRA, and RI identified MD including remnants of various munitions including projectiles (i.e., 37mm and 75mm); mortars (60mm and 81mm HE); 3.5-inch rockets; hand grenades; rifle grenades; trip flares; expended fuzes; hundreds of pieces of unidentifiable munitions fragmentation, and small arms ammunition to a maximum depth of 24 inches; therefore, it is assumed that MEC could potentially be found at this depth as well.

3.1.6.1.6 The RAO at the Southeastern Region MRS is to reduce potential explosive safety hazards by preventing interaction between receptors (future residents, unauthorized recreational users such as hiking, hunting, motocross, etc.) and intact MEC on the surface and in the subsurface, especially during potential future residential development or agricultural activities. As shown in Figure B-2, MEC/MD density varies across the MRS; therefore, it is appropriate to consider various remedial actions within the MRS. For example, in the area with evidence of concentrated munitions use (AOC #2), remedial actions which directly address the exposure pathway by removing MEC and physically limiting a potential receptor's exposure risk to MEC may be appropriate. Similarly, in the remaining areas which do not exhibit high MEC density, indirect, education-based actions may be appropriate to reduce the MEC exposure risk in those areas by informing the landowners of the potential existence of MEC and educating them with regard to proper safety and reporting procedures in the unlikely event that MEC is encountered.

3.1.6.2 Southern Impact Region MRS

3.1.6.2.1 The Southern Impact Region MRS is bordered by the Western/Mountainous Region MRS to the west and by the Southeastern Region MRS to the east and south. The USMC parcel fence-line shares the northern boundary of Southern Impact Region. A locked access gate is present at the primary entrance point into the WTA MRA; however, the gate does not provide an effective barrier to access. Dirt access roads are present within the MRS. Aside from the access roads, the treacherous, rugged terrain and dense vegetation create inaccessible barriers within the MRS with slope grade in excess of 58 percent in several locations.

3.1.6.2.2 The Southern Impact Region MRS is privately owned land and is comprised of secluded open areas and mostly undeveloped densely forested lands. The dense vegetation stabilizes the soil and minimizes the potential for erosion in the MRS. Most site activities are unauthorized and do not involve disturbance of the subsurface (hiking and hunting); however, activities related to motocross or ATV riding could result in intrusive activities in the shallow subsurface (up to one foot). Future land development could result in more extensive intrusive activity to depths of three feet or more.

3.1.6.2.3 Two MEC items (37 mm HE) were discovered to a maximum depth of 8 inches in the Southern Impact Region MRS during the EE/CA. Based on the discovery of MEC during the EE/CA, a NTCRA was conducted in 2011 over 7.3 acres in the central portion of the MRS (AOC#1, Figure B-2). No MEC items were recovered during the NTCRA or within the areas investigated during RI. The EE/CA, NTCRA, and RI identified MD including remnants of various munitions including projectiles (i.e., 37mm and 75mm); mortars (60mm and 81mm HE); 3.5-inch rockets; hand grenades; rifle grenades; trip flares; expended fuzes; hundreds of pieces of unidentifiable munitions fragmentation, and small arms ammunition to a maximum depth of 16 inches; therefore, it is assumed that MEC could potentially be found at this depth as well.

3.1.6.2.4 Based on the results of the NTCRA and RI, which found no MEC items, it is considered unlikely that MEC will be encountered within the Southern Impact Region MRS. However, the possibility that an isolated explosive hazard exists within the MRS cannot be completely dismissed. Therefore, the RAO at the Southern Impact Region MRS is to reduce potential explosive safety hazards by preventing interaction between receptors (future residents, unauthorized recreational users such as hiking, hunting, motocross, etc.) and intact MEC on the surface and in the subsurface, especially during potential future development or agricultural activities. As shown in Figure B-2, MEC/MD density varies across the MRS; therefore, it is appropriate to consider various remedial actions within the MRS. A combination of response actions which directly address the exposure pathway by removing MEC and physically limiting a potential receptor's exposure risk to MEC and indirect, education-based actions may be appropriate to reduce the MEC exposure risk and provide reporting procedures in the unlikely event that MEC are encountered

3.1.6.3 Western/Mountainous Region MRS

3.1.6.3.1 The Western/Mountainous Region MRS is privately owned land and is comprised of undeveloped densely forested lands. The majority of the area consists of extremely rugged terrain that limits accessibility and future development activities due to steep gulches, canyons, rocky outcrops, and mountains rising over 2,200 feet above sea level. The majority of the MRS is heavily wooded. Heavy vegetation stabilizes the soil and minimizes the potential for erosion in the MRS. A locked access gate is present at the primary entrance point into the WTA MRA; however, the gate does not provide an effective barrier to access. Most site activities are unauthorized and do not involve disturbance of the subsurface (hiking and hunting); however, activities related to motocross or ATV riding could result in intrusive activities in the shallow subsurface (up to one foot).

3.1.6.3.2 Based on the results of the EE/CA and RI, which discovered only small arms ammunition, it is considered unlikely that MEC will be encountered within the

Western/Mountainous Region MRS. However, the possibility that an isolated explosive hazard exists within the MRS cannot be completely dismissed. Therefore, the RAO at the Western/Mountainous Region MRS is to reduce potential explosive safety hazards by informing the landowner of the potential existence of MEC and educating them with regard to proper safety and reporting procedures in the unlikely event that MEC is encountered.

3.2 GENERAL RESPONSE ACTIONS

General response actions are those actions that will achieve the RAOs and may include treatment, containment, excavation, extraction, disposal, land use control, or combinations of these options. Table 3-2 provides a description of general MEC response actions and the rationale for consideration. The general response actions may be combined in developing remedial action alternatives. The Southeastern Region MRS, for example, exhibits a greater exposure risk due to the potential development/residential land usage and may require a different remedy than the Western/Mountainous Region MRS, which is primarily inaccessible with limited future land development potential. A general description of each response action is presented below.

3.2.1 No Action (Baseline Condition)

The No Action alternative is included to provide a baseline for comparison of other risk-reduction alternatives. No alternative technology is associated with this alternative, and no risk-reduction measure resulting in the treatment, containment, removal of, or limited exposure to MEC will take place. No action would be taken to address MEC potentially present at the MRSs and no restriction will be placed on access to the site. This alternative is appropriate for sites where 1) no MEC has been found, or 2) where there is no documented evidence of military munitions usage.

3.2.2 Land Use Controls

LUCs are physical, legal, or administrative mechanisms that restrict the use of, or limit access to, real property to prevent or reduce risks to human health, safety and the environment. LUCs are considered response actions under the CERCLA and, as such, must be coordinated with the current landowner, regulatory agencies, and appropriate local authorities. In order to assess alternatives that include LUCs, U.S. Army Corps of Engineers, Honolulu District (CEPOH) performed an Institutional Analysis to determine landowner/agency acceptance and willingness towards implementing any of these (or other) options, as well the capability to execute a Land Use Controls Alternative (Appendix D).

LUCs considered potentially appropriate for the WTA MRA include:

- Installation and maintenance of signs warning individuals of potential risk and response actions if they were to encounter a suspected MEC item;
- Informational and safety fact sheets/notices attached to construction permits;
- Issuance and enforcement of zoning laws for land use permits;
- Issuance and enforcement of land use permits; and
- MEC recognition and safety training involving educating landowners and workers conducting intrusive activities within the WTA MRA.

3.2.2.1 Signs

Signs describing former military use and MEC safety information, including appropriate actions if suspected MEC is encountered, may be installed at site access points.

3.2.2.2 Informational Brochures and Fact Sheets

Brochures and/or Fact Sheets describing former military use and MEC safety information, including appropriate actions if suspected MEC is encountered, may be distributed to any person, company, or agency planning to work within the WTA MRA. In addition, the brochures would be available to anyone upon request.

3.2.2.3 Zoning Restrictions

Zoning restrictions are a subset of LUCs and are primarily legal mechanisms imposed to ensure the continued effectiveness of land use restrictions imposed as part of a remedial decision. Legal mechanisms may include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that may be used to ensure compliance with use restrictions. All of these measures would require the cooperation of, and coordination with the landowner.

3.2.2.4 MEC Recognition and Safety Training

MEC recognition and safety training involves educating landowners and workers conducting intrusive activities within the WTA MRA. Training may include such topics as recognition and avoidance of MEC, precautions to take if a suspected MEC item is encountered, and the proper procedures for contacting authorities if a suspected MEC item is found.

3.2.3 Surface MEC Removal

Surface removal involves the identification, removal, and disposal of MEC located on the ground surface or partially buried. This response action requires teams of unexploded ordnance (UXO)-qualified personnel to use visual identification, aided by hand-held instruments, to search for MEC. Potential MEC would be inspected and disposed of accordingly; MD would be removed and turned in to a scrap-metal smelter. Minimal brush clearing may be required to support a surface removal alternative.

3.2.4 Subsurface MEC Removal

This alternative involves all activities necessary to locate, excavate, and remove potential MEC to a depth conducive to the future land use and overall health and safety of the affected community, as dictated by the depth of MEC detection that is technically feasible at the time of removal. Detection technologies that may be used for this alternative include magnetic and/or electromagnetic geophysical sensors. Selected technologies will consider the munitions of concern, vegetation, and terrain/topography. Removal depth may be modified based on actual depths at which MEC is consistently found.

3.2.5 Long-term Management/Five Year Reviews

Five year reviews are a requirement for all alternatives not allowing for unrestricted exposure/unlimited use in accordance with 40 CFR 300.430(f)(4)(ii). A Recurring Review Report will document the information collected and evaluated, and present the findings of the

evaluation of the continued protectiveness of the military munitions response actions. The report will document whether the response action that was implemented continues to minimize explosive safety risks and is still protective of human health, safety, and the environment and/or recommend follow-up actions that may be warranted.

TABLE 3-2 GENERAL RESPONSE ACTIONS FOR MEC

Response Action	Description	Rationale for Consideration
No Action	This is the baseline alternative required for use as a measure against the other alternatives. Under this alternative, no further action would be taken to reduce potential MEC risks to a potential receptor.	Current land use Future land use If no evidence of MEC/MD
Land Use Controls (LUCs)	LUCs are physical or legal controls that limit or prohibit access to an MRS, warn people of the potential dangers, impose a use restriction, or prevent potential migration of MEC. LUCs can be a component of other remedial actions.	Current land use Future land use If MD/Potential MEC
Surface MEC Removal	This alternative involves surface MEC removal. This may be combined with controls to educate land users of the past military use and appropriate response actions if suspected MEC are encountered.	Current land use Future land use If documented MEC and MD on the surface
Surface and Subsurface MEC Removal	This alternative involves a combination of surface and subsurface MEC removal. This may be combined with controls to educate land users of the past military use and appropriate response actions if suspected MEC are encountered.	Current land use Future land use If documented MEC and MD on surface MEC/MD subsurface density
Subsurface MEC Removal to Support Unlimited Use	This alternative involves a combination of surface and subsurface MEC removal to a depth which allows for unlimited use and no LUCs.	Current land use Future land use If documented MEC and MD on surface MEC/MD subsurface density

3.3 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

Remedial alternatives presented in this document are screened initially for effectiveness, cost, and implementability. When evaluating the remedial alternatives, implementability is carefully considered, including the effectiveness of the technology/methodology, and availability of qualified personnel and materials (equipment). The following discussion focuses on the evaluation of technologies that may be considered for use when implementing a given remedial alternative at an MRS. The list of available MEC remedial technologies is exhaustive, including robotic technologies and those suited for aquatic environments, which are not suited for any of the three MRSs and warrant no further mention. Potential applicable technologies, and those considered ineffective for the WTA MRA are presented in Table 3-3; technologies considered ineffective based on site conditions have been eliminated from further evaluation. The controlling site conditions considered for technology effectiveness are dense vegetation, steep terrain, accessibility, soil type, and anomaly density.

3.3.1 Evaluation of Technologies

Each of the technologies in Table 3-3 was further evaluated based on implementability, effectiveness, and cost. Technologies considered for the WTA MRSs are described in detail and, if eliminated from consideration, the rationale behind this decision is explained in Section 4.0.

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TABLE 3-3 POTENTIALLY APPLICABLE REMEDIAL TECHNOLOGIES

APPROPRIATE FOR CONSIDERATION			NOT APPROPRIATE FOR CONSIDERATION		
DESCRIPTION		**RATIONALE**	**DESCRIPTION**		**RATIONALE**
Detection Technologies					
Time Domain EM Induction Metal Detectors	Induces a pulsed magnetic field into the earth using a transmitter coil, which causes a secondary magnetic field to emanate from nearby objects that have conductive properties.	MEC industry familiarity. Developed to detect small metal objects. Detects both ferrous and nonferrous metal objects.	Flux Gate Magnetometers	Most flux-gate magnetometers measure the vertical component of the geomagnetic field along the axis of the sensor and not the total of the geomagnetic field.	High industry familiarity. Detects ferrous objects only. Due to gradiometer design, is most adept at detecting smaller shallow items as opposed to relatively large, deeper items.
Frequency Domain EM Induction Metal Detectors	Generates one or more defined frequencies in a continuous mode of operation. Demonstrated capability of detecting small items using a handheld unit.	MEC industry familiarity. Detection of shallow ferrous and nonferrous objects.	Atomic Vapor Magnetometers (G-858)	Based on the theory of optical pumping and operates at the atomic level as opposed to nuclear state.	Industry familiarity. Detects ferrous objects only.
Magnetometer-EMI Dual Sensor Systems	Integrates magnetic and electromagnetic technologies. Detects ferrous and nonferrous metallic objects.	Medium industry familiarity. Higher potential for discrimination of MEC-like items.	Ground Penetrating Radar	Propagates electromagnetic waves into the ground via an antenna. Transmitted signals are reflected by objects and features that possess contrasts in electrical properties with the surrounding medium.	Extremely sensitive and responds to changes in the magnetic, conductive, and dielectric properties of the subsurface. Low success rate as a stand-alone detector for MEC. Detects both metallic and nonmetallic objects but is susceptible to numerous environmental/geological conditions.
			Proton Precession Magnetometers	Measures the total intensity of the geomagnetic field. Multiple sensors may be arranged in proximity to measure horizontal and vertical gradients of the geomagnetic field.	Similar sensitivities as the flux-gate magnetometer, but with a relatively low sampling rate. Detects ferrous objects only.
Detection/Sensor Platforms					
Hand-held	The detection sensor is held or carried by the operator.	Deployable in most site conditions and often the most suitable in areas with steep or uneven terrain.	Airborne	The detection sensor is affixed to either a helicopter or fixed-wing aircraft.	Lower detection capabilities than ground-based systems for smaller, single anomalies.
Skirt-mode	The detection sensor is suspended from the operator's shoulders.	Deployable in most site conditions and often the most suitable in areas with steep or uneven terrain.	Towed Arrays	Use of a vehicle to tow a cart-mounted detection sensor.	Limited by topography and vegetation.
Cart-mounted (man-portable)	The detection sensor is mounted on a wheeled cart, which is pushed or pulled across the survey area by a person.	Limited by topography and vegetation, and requires significant operator stamina and strength to operate.			

TABLE 3-3 (CONTINUED)

APPROPRIATE FOR CONSIDERATION			NOT APPROPRIATE FOR CONSIDERATION		
DESCRIPTION		**RATIONALE**	**DESCRIPTION**		**RATIONALE**
Positioning Technologies					
Robotic Total Station (RTS)	Laser-based survey station that derives it position from survey methodology and includes a servo-operated mechanism that tracks a prism mounted on the geophysical sensor.	Very effective in open areas and near buildings. Achieves centimeter (cm) accuracy.	Ranger	Radio frequency system that uses four to eight fixed radio transponders and a mobile radio integrated with the geophysical detection system.	Limited by terrain.
Differential Global Positioning System (GPS) (open areas only)	Worldwide positioning and navigation system using a constellation of satellites orbiting the earth. GPS uses the satellites as reference points to calculate positions on the earth's surface. Advanced GPS can provide cm accuracy	Very effective in open area; very accurate when differentially corrected. Not as effective in wooded areas or near large buildings. Accuracy degrades when minimum satellites are available. Easy to set up and operate, available from multiple vendors, and systems are often ruggedized and very durable. Some work time may be lost when insufficient satellites are available.	Odometer	Physically measures distance traveled. Similar to fiducial method.	Medium effectiveness when performed by experienced personnel; low when performed by inexperienced personnel. Affected by terrain/environment.
Fiducial Method	Digital marking of a data string (data set) with an indicator of a known position. Typically, lines or markers are placed on the ground at known positions (e.g., 25feet).	Medium effectiveness when performed by experienced personnel; low when performed by inexperienced personnel. Generally achieves accuracy of 15-30 centimeters (cm).	Inertial Navigation	Measures the acceleration of an object in all three directions and calculates the location relative to the starting point. The starting point is input and periodically refreshed, typically via Differential GPS (DGPS).	Time consuming with below average accuracy. Required refreshing of baseline/starting point significantly reduces productivity. Difficult to operate.
			Acoustic	Uses ultrasonic techniques to determine location. Consists of a data pack, up to 15 receivers, and a master control center.	Not very efficient in open areas due to substantial calibration time. Reasonably effective in wooded areas, achieving an accuracy of 15-30 cm. Difficult to set up, minimal technical support, affected by terrain.
			Laser	Calculates locations by triangulating signals from stationary lasers placed on the edge of a grid.	Effective in wooded areas. Time consuming to setup. Not ruggedized for field use.
Recovery/Removal Technologies					
Manual excavation of individual anomalies	Excavation of individual anomalies using hand-tools.	Thorough. Can be accomplished in most terrain and climate.	Mechanized soil processing	Excavated soil is processed through a series of screening devised and conveyors, resulting in segregated soils of different grain sizes.	Most effective in areas saturated with anomalies.
Mechanical excavation of individual anomalies	Uses backhoe or excavator to excavate anomalies.	Used in conjunction with hand excavation when soil is hard. Works well when excavating large and/or deep anomalies.			

4.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

4.1 DEVELOPMENT OF ALTERNATIVES

4.1.1 The FS presents five general response actions (Section 3.2) for assessment, based on the nature, extent, and analysis of potential MEC occurrence, intended future land uses, and ultimately, risk-reduction goals. In this section, each alternative is discussed in detail and evaluated with respect to the requisite evaluation criteria. Alternatives to address MEC occurrence may be categorized as either non-removal or removal alternatives. Non-removal alternatives include No Action and LUCs, while removal alternatives include surface or subsurface removal of MEC. Although five alternatives have been developed for initial screening, not all will be screened for implementation at each MRS because the characteristics of each MRS vary due to factors such as MEC density, presence of MEC, and land use. Table 4-1 presents a comparison of alternatives generally considered to mitigate risk at a MEC site; these alternatives are not specific to the WTA MRA. A summary of the screening, including initial screening, of individual alternatives is presented in Table 4-2.

4.1.2 Per ER 200-3-1, evaluation of alternatives should consider, at a minimum, the following:

- A no-action alternative.
- An alternative that reduces or eliminates the toxicity, mobility, or volume of waste.
- An alternative that considers land use controls.
- Unrestricted Use.
- Consideration of innovative technologies.
- Consideration of monitored natural attenuation.
- Alternatives that provide various levels of protection from explosives safety hazards for projects involving munitions and explosives of concern MEC (not applicable for this site).
- Consideration of Presumptive Remedies.

4.2 SCREENING OF INDIVIDUAL ALTERNATIVES

4.2.1 Introduction

Potentially effective technologies for detection, removal and disposal of MEC were screened for implementability. Information on the capabilities of existing technologies was balanced against site-specific conditions to eliminate technologies that are not suitable for the MRSs at the WTA MRA. This section provides an analysis of risk-reduction alternatives for areas potentially containing MEC, which may include the use of effective technologies, as previously discussed. Each criterion is divided into specific factors for a complete analysis of the alternatives, as discussed in the following paragraphs. For the evaluation of remedial alternatives, munitions response-action alternatives are evaluated in terms of their effectiveness, implementability, and cost. The exception is the No Action alternative, which has no associated cost.

4.2.2 Effectiveness

4.2.2.1 Long-Term Effectiveness

This evaluation criterion addresses the effectiveness of an alternative in terms of the risk remaining at the site after the response objectives have been met.

4.2.2.2 Short-Term Effectiveness

This evaluation criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation of a remedy until response objectives have been met.

4.2.3 Implementability

This criterion refers to the technical and administrative feasibility of implementing the alternative and the availability of goods and services required for implementation. Stakeholder acceptance must be considered during the implementation analysis.

4.2.3.1 Technical Feasibility

The ability to execute the alternative, the reliability or ability of a technology to meet specified performance goals, the ability to undertake possible future risk-reduction actions and the ability to monitor the effectiveness of the alternative should be considered relative to the practicality of completing the alternative considering physical constraints and the previous use of established technologies.

4.2.3.2 Administrative Feasibility

This factor evaluates the activities required to coordinate with multiple offices and agencies (e.g., obtaining permits, right-of-way or alignment agreements, compliance with statutory limits) and property owners.

4.2.3.3 Availability of Services and Materials

This factor evaluates the availability of technologies (materials and services) required to implement the alternative. The availability of personnel and technology to implement the alternative, the availability of prospective technologies, and the availability of services and materials are considered.

4.2.4 Cost

4.2.4.1 The cost evaluation consists of estimated cost, investment, and benefit. Investment evaluates each alternative in terms of monetary investment required. The benefit of an alternative considers the most effective means of risk reduction for the cost required to perform this action. A complete cost estimate, per MRS, is included in Appendix C.

4.2.4.2 Each remedial alternative is evaluated with respect to these criteria, as described below. Table 4-1 presents a comparison of alternatives generally considered to mitigate risk at a MEC site; these alternatives are not specific to the WTA MRA.

4.2.5 Alternative 1 – No Action

4.2.5.1 Description of Alternative 1 – No Action

This alternative is carried forward to represent the current existing condition at the site. Under CERCLA, the No Action alternative is required for use as a baseline measure against the other alternatives. Under this alternative, no action would be taken at the site to reduce potential MEC risk to a potential receptor.

4.2.5.2 Evaluation of Alternative 1 – No Action

This alternative may be considered at an MRS where there is no documented MD or MEC. This alternative, if selected, would involve continued use of the MRS in its current condition.

4.2.5.3 Effectiveness

This alternative has neither short-term nor long-term effectiveness in protecting human health or the environment at sites which MEC present risks to a potential receptor.

4.2.5.4 Implementability

There are no implementability concerns posed by this remedy, since no action would be taken.

4.2.5.5 Cost

There is no cost associated with this alternative.

4.2.5.6 Alternative 1 Screening Evaluation Summary

This alternative is carried forward for further analysis at each MRS to provide a baseline for comparison (Table 4-2).

4.2.6 Alternative 2 – Land Use Controls

4.2.6.1 Description of Alternative 2 – Land Use Controls

Alternative 2 - Land Use Controls (LUCs): LUCs are physical, legal, or administrative mechanisms that restrict the use of, or limit access to, real property to prevent or reduce risks to human health, safety and the environment (ER 200-3-1). LUCs will include a Community Relations Plan, signage warning visitors of potential hazards, community MEC educational awareness programs, and safety training. Educational awareness is an effective means of influencing behavior to reduce interaction with MEC.

4.2.6.2 Evaluation of Alternative 2 – Land Use Controls

Use of this alternative alone assumes that no physical MEC remediation would take place. Based on site-specific conditions, the nature and use of the MRS, and the willingness of the landowners to implement LUCs, this alternative would likely include signage, distribution of MEC awareness material, and/or MEC safety training.

4.2.6.3 Effectiveness

Although LUCs are an effective means of reducing the risk of incident and exposure when encountering potential MEC, they do not remove MEC.

4.2.6.4 Implementability

Preparation of a Community Relations Plan, installation of signage, development and printing of MEC awareness materials, and conducting MEC safety training are readily implementable. The use of deed or other land-use restrictions are implementable, however they are not presently in place and would require acceptance by landowners prior to implementation or a jurisdictional authority willing to implement LUCs.

4.2.6.5 Cost

The relative cost of preparation of a Community Relations Plan, signs, conducting training, and printing MEC awareness and safety material, as identified in the Institutional Analysis, is low

compared to MEC removal alternatives. Refer to Appendix C for a detailed cost analysis for each MRS.

4.2.6.6 Alternative 2 Screening Evaluation Summary

This alternative is carried forward for further analysis at each MRS (Table 4-2).

4.2.7 Alternative 3 – Surface Removal of MEC and Implementation of LUCs

4.2.7.1 Description of Alternative 3 – Surface Removal of MEC and Implementation of LUCs

This alternative involves removal of MEC that are exposed on the ground surface. This will be combined with controls to educate land users of the past military use and appropriate response actions if suspected MEC are encountered. Surface clearance of MEC is appropriate in MRSs where MEC has been documented on the ground surface and there are no current or planned future intrusive activities. Alternative 3 remediates potential MEC items at the ground surface and is appropriate when land use allows for unrestricted public access with no intrusive use that exceeds the depth of the soil cover (i.e., County Park or public golf course).

4.2.7.2 Evaluation of Alternative 3 – Surface Removal of MEC and Implementation of LUCs

4.2.7.3 Effectiveness

Surface removal is a reliable means of reducing exposure to individuals who are engaged in non-intrusive activities and will reduce direct contact with MEC at the surface, if present. The possibility of exposure during intrusive activities remains; therefore, reduction of risk associated with MEC (subsurface) will not be fully achieved. Land use controls, as described under Alternative 2, are effective means of reducing the risk of incident and exposure when encountering potential MEC are effective means of influencing behavior to reduce interaction with MEC.

4.2.7.4 Implementability

Surface removal is technically feasible. Efforts associated with implementing this alternative will vary based on accessibility, vegetation, and terrain. Surface MEC removal must be performed by UXO-qualified personnel. Restrictions on vegetation clearance will need to be considered to minimize impacts in accordance with ARARs.

4.2.7.5 Cost

The cost of surface MEC removal is significantly higher than the cost for Alternatives 1 and 2. Refer to Appendix C for a detailed cost analysis for each MRS.

4.2.7.6 Alternative 3 Screening Evaluation Summary

4.2.7.6.1 Western Mountainous Region MRS

Based on the results of the EE/CA and RI, no MEC items have been observed on the surface in the Western/Mountainous Region MRS nor was there evidence of concentrated munitions use within the MRS. Considering the very limited site accessibility (i.e., steep slopes and heavy vegetation) and proposed future land use activities, a complete MEC exposure pathway is unlikely in this MRS. Alternative 3 would likely achieve limited risk reduction at a significant cost above Alternatives 1 and 2. This Alternative is an effective response action to remediate potential explosive hazards at the ground surface, however, would not provide for unlimited use

at the site. As such, the initial screening eliminated Alternative 3 from further evaluation at the Western/Mountainous Region MRS.

4.2.7.6.2 Southern Impact Region MRS

4.2.7.6.2.1 In the Southern Impact Region MRS, two MEC items (37 mm HE) were discovered during the EE/CA. Based on the discovery of MEC items during the EE/CA, a NTCRA was conducted in 2011 over 7.3 acres in the central portion of the MRS (AOC#1). No MEC items were recovered during the NTCRA or during the RI.

4.2.7.6.2.2 Based on the results of the RI, high MEC density target areas are not likely in the Southern Impact Region MRS. Although the MRS does not appear to have been affected by concentrated munitions use, the potential to encounter an explosive hazard cannot be completely dismissed.

4.2.7.6.2.4 Known MEC hazards were remediated during the NTCRA and is reflected in the "low" MEC HA hazard level score. No MEC items were recovered during the NTCRA. Proposed future land use activities within the MRS include re-establishing taro farming along the lower portions of the Waikeekee stream. In summary, this alternative is carried forward for further analysis for the Southern Impact Region MRS (Table 4-2).

4.2.7.6.3 Southeastern Region MRS

4.2.7.6.3.1 Five MEC items (two 81mm HE mortars and three 60mm HE mortars) were discovered in the Southeastern Region MRS during the EE/CA. Based on the discovery of MEC during the EE/CA, an NTCRA was conducted in 2011 over approximately 32.6 acres in the central and southeastern portion of the MRS (AOC#2). The NTCRA recovered 42 individual MEC items from the Southeastern Region MRS. No MEC items were recovered in the areas investigated during the RI.

4.2.7.6.3.2 Based on the results of the RI, high MEC density target areas are not likely in the Southeastern Region MRS. Although the most areas of MRS do not appear to have been affected by concentrated munitions use, the potential to encounter an explosive hazard cannot be completely dismissed.

4.2.7.6.3.4 Known MEC hazards were remediated during the NTCRA and is reflected in the "low" MEC HA hazard level score. During the NTCRA, MEC items were found in grids located in close proximity (less than 25 feet) to the perimeter of the investigation area (AOC #2), suggesting a potential for higher MEC densities to exist beyond the AOC#2 boundary. Proposed future land use activities within an area of this MRS will likely increase public accessibility (Waikane Valley Nature Park). In summary, this alternative is carried forward for further analysis for the Southeastern Region MRS (Table 4-2).

4.2.8 Alternative 4 – Subsurface MEC Removal and Implementation of LUCs

4.2.8.1 Description of Alternative 4 – Subsurface MEC Removal and Implementation of LUCs

This alternative involves a combination of surface and subsurface MEC removal within a given MRS. This Alternative will be combined with land use controls as discussed in Alternative 2. Subsurface clearance of MEC should be considered in areas with documented MEC and significant MD where people have full to moderate accessibility to engage in intrusive events such as gardening, landscape maintenance, construction, etc. Subsurface MEC removal may also be prudent when there is a potential for buried MEC to migrate to the surface in publicly accessible areas.

4.2.8.2 Evaluation of Alternative 4- Subsurface Removal of MEC and Implementation of LUCs

4.2.8.3 Effectiveness

Subsurface removal of MEC is the most comprehensive means of reducing exposure to individuals who are engaged in intrusive activities and will reduce direct contact with subsurface MEC, if present. The effectiveness of subsurface removal is limited to the technology available at the time of removal. Land use controls, as described under Alternative 2, are effective means of influencing behavior to reduce interaction with MEC.

4.2.8.4 Implementability

This alternative is technically feasible when MEC is present. Efforts associated with implementing this alternative will vary based on terrain, ground cover, and access to the area. UXO-qualified personnel must be involved during implementation of all aspects of this alternative. Restrictions on vegetation clearance will need to be considered to minimize impacts in accordance with ARARs.

4.2.8.5 Cost

The cost of subsurface removal is dependent upon anomaly and MEC density, but is significantly higher than No Action and LUCs. Refer to Appendix C for a detailed cost analysis for each MRS.

4.2.8.6 Alternative 4 Screening Evaluation Summary

4.2.8.6.1 Western Mountainous Region MRS

Based on the results of the EE/CA and RI, no MEC items have been observed in the subsurface in the Western/Mountainous Region MRS nor was there evidence of concentrated munitions use within the MRS. Considering the very limited site accessibility and proposed future land use activities, a complete MEC exposure pathway is unlikely in this MRS. As such, the initial screening eliminated Alternative 4 from further evaluation at the Western/Mountainous Region MRS.

4.2.8.6.2 Southern Impact Region MRS

4.2.8.6.2.1 As discussed in Alternative 3 (above), the NTCRA was conducted in the areas where known MEC hazards were identified during the EE/CA and contributes to the “low” MEC HA hazard level score.

4.2.8.6.2.2 Based on the results of the RI, high MEC density target areas are not likely in the Southern Impact Region MRS. A complete MEC exposure pathway is unlikely in this MRS. Although the MRS does not appear to have been affected by concentrated munitions use, the potential to encounter an explosive hazard cannot be completely dismissed. Proposed future land use includes intrusive activities (i.e., re-establish taro farming along the lower portions of the Waikeekee stream). As such, this alternative is carried forward for further analysis for the Southern Impact Region MRS (Table 4-2).

4.2.8.6.3 Southeastern Region MRS

4.2.8.6.3.1 As discussed under Alternative 3 (above), MEC items were recovered from the Southeastern Region MRS during the NTCRA performed in 2011. Known MEC hazards were remediated during the NTCRA and is reflected in the "low" MEC HA hazard level score.

4.2.8.6.3.2 During the NTCRA, MEC items were found in grids located in close proximity (less than 25 feet) to the perimeter of the investigation area (AOC #2), suggesting a potential for higher MEC densities to exist beyond the AOC#2 boundary. Proposed future land use activities within an area of this MRS will likely increase public accessibility (Waikane Valley Nature Park). In summary, this alternative is carried forward for further analysis for the Southeastern Region MRS (Table 4-2).

4.2.9 Alternative 5 – Subsurface Removal to Support Unlimited Use

4.2.9.1 Description of Alternative 5 – Subsurface Removal to Support Unlimited Use

This alternative involves vegetation removal and excavation of the soil to depth of 10ft bgs over the entire MRS. Excavated soil would be sifted and backfilled. Site wide soil revitalization and revegetation would occur to return the MRS to pre-existing site conditions and allow for unlimited use.

4.2.9.2 Evaluation of Alternative 5 - Subsurface Removal to Support Unlimited Use

Subsurface clearance of MEC should be considered in areas with documented MEC and/or significant MD indicative of HE munitions use, such as a ground target area, and current or future intrusive activities, such as construction. Subsurface MEC removal may also be prudent when there is a potential for buried MEC to migrate to the surface in publicly accessible areas.

4.2.9.3 Effectiveness

Subsurface removal of MEC is the most comprehensive means of reducing exposure to individuals who are engaged in intrusive activities and will reduce direct contact with subsurface MEC, if present. The effectiveness of subsurface removal is limited to the technology available at the time of removal.

4.2.9.4 Implementability

This alternative is not technically feasible. Current technology has not advanced enough to quantitatively demonstrate that residual risk from MEC hazards no longer exists. This alternative is not compatible with the current and proposed future land use. Efforts associated with implementing this alternative will be excessive and likely impractical. UXO-qualified personnel must be involved during implementation of all aspects of this alternative. This alternative will not comply with ARARs.

4.2.9.5 Cost

The cost would be prohibitively expensive in addition to not attaining ARARs and likely unacceptable to regulators, landowners, and community members.

4.2.9.6 Alternative 5 Screening Evaluation Summary

This alternative is not technically feasible, does not comply with ARARs and is cost prohibitive compared to the other alternatives. Therefore, Alternative 5 is not carried forward for further analysis for the three MRSs (Table 4-2).

TABLE 4-1 GENERAL COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

Remedial Alternative	Description of Alternative	Effectiveness		Implementability			Cost
		Protectiveness	Achieve Remedial Objectives	Technical Feasibility	Administrative Feasibility	Availability	
Alternative 1 **No Action**	No action would be taken to reduce potential MEC risks to a potential receptor.	X - Public health and community N/A - Workers during implementation X - Environment N/A - Complies with ARARs	X - No residual affect concerns X - Maintains control until long-term solution is implemented	N/A - Construction considerations N/A - Demonstrated performance N/A - Adaptable to environmental conditions N/A - Contributes to remedial performance N/A - Can be implemented in one year	N/A - Permits required N/A - Easements/Rights-of-Entry required N/A - Ability to impose LUC	N/A - Equipment N/A - Personnel and services N/A - Off-site disposal capacity N/A - Post removal site control	$0
Alternative 2 **Land Use Controls (LUCs)**	Physical or legal controls that limit or prohibit access to an MRS, warn people of the potential dangers, impose a use restriction, or prevent potential migration of MEC.	≈ - Public health and community ✓ - Workers during implementation ≈ - Environment N/A - Complies with ARARs	X - No residual affect concerns ≈ - Maintains control until long-term solution is implemented	✓ - Construction/implementation considerations ✓ - Demonstrated performance ✓ - Adaptable to environmental conditions ≈ - Contributes to remedial performance ✓ - Can be implemented in one year	N/A - Permits required ✓ - Easements/Rights-of-Entry required	✓ - Equipment ✓ - Personnel and services N/A - Off-site disposal capacity ✓ - Post removal site control	$
Alternative 3 **Surface MEC Removal and Implementation of LUCs**	Removal of surface or partially buried MEC. May include use of LUCs.	✓ - Public health and community ✓ - Workers during implementation ≈ - Environment ✓ - Complies with ARARs	≈ - No residual affect concerns ✓ - Maintains control until long-term solution is implemented	✓ - Construction/implementation considerations ✓ - Demonstrated performance ✓ - Adaptable to environmental conditions ✓ - Contributes to remedial performance ✓ - Can be implemented in one year	N/A - Permits required ✓ - Easements/Rights-of-Entry required ✓ - Ability to impose LUC	✓ - Equipment ✓ - Personnel and services ✓ - Off-site disposal capacity ✓ - Post removal site control	$$
Alternative 4 **Surface and Subsurface MEC Removal and Implementation of LUCs**	Removal of MEC to a depth to support current and/or future land development. May include use of LUCs.	✓ - Public health and community ✓ - Workers during implementation ≈ - Environment ✓ - Complies with ARARs	≈ - No residual affect concerns ✓ - Maintains control until long-term solution is implemented	✓ - Construction/implementation considerations ✓ - Demonstrated performance ✓ - Adaptable to environmental conditions ✓ - Contributes to remedial performance ✓ - Can be implemented in one year	N/A - Permits required ✓ - Easements/Rights-of-Entry required ✓ - Ability to impose LUC	✓ - Equipment ✓ - Personnel and services ✓ - Off-site disposal capacity ✓ - Post removal site control	$$$
Alternative 5 **Subsurface Removal to Support Unlimited Use**	Removal of MEC to a depth to support unlimited land use.	✓ - Public health and community ✓ - Workers during implementation ≈ - Environment X - Complies with ARARs	✓ - No residual affect concerns ✓ - Long-term solution	✓ - Construction/implementation considerations X - Demonstrated performance X - Adaptable to environmental conditions ✓ - Contributes to remedial performance X - Can be implemented in one year	✓ - Permits required ✓ - Easements/Rights-of-Entry required N/A -Ability to impose LUC	✓ - Equipment ✓ - Personnel and services ✓ - Off-site disposal capacity ✓ - Post removal site control	$$$$$

NOTE: Table is a general comparison of alternatives and is not specific to WTA MRA.
X - Does not meet objectives
≈ - May or may not meet objectives
✓ - Meets objectives
N/A - Not applicable

TABLE 4-2 SUMMARY OF SCREENING OF REMEDIAL ALTERNATIVES

Remedial Alternative	Threshold Criteria		Balancing Criteria					Modifying Criteria
	Protectiveness	**Achieve Remedial Objectives**	**Implementability**	**Cost**	**Long-term Effectiveness**	**Reduction of Toxicity, Mobility, or Volume Through Treatment**	**Short-term Effectiveness**	**State Acceptance**
Alternative 1 **No Action** No action would be taken to reduce potential MEC risks to a potential receptor. *Western Mountainous Region MRS:* **Evaluated** *Southern Impact Region MRS:* **Evaluated** *Southeastern Region MRS:* **Evaluated**	No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce potential MEC risks to a potential receptor.	No cost associated with this alternative.	No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce toxicity, mobility, or volume of MEC.	No action would be taken to reduce potential MEC risks to a potential receptor.	TBD
Alternative 2 **Land Use Controls (LUCs)** Physical or legal controls that limit or prohibit access to an MRS, warn people of the potential dangers, impose a use restriction, or prevent potential migration of MEC. *Western Mountainous Region MRS:* **Evaluated** *Southern Impact Region MRS:* **Evaluated** *Southeastern Region MRS:* **Evaluated**	No action would be taken to reduce potential MEC in an MRS. Relies on behavior modification of individuals when accessing MRS as to appropriate actions (do not handle suspected item and contact appropriate authorities).	No action would be taken to reduce potential MEC in an MRS. Risk of encountering potential MEC may be somewhat managed by signage restricting access and/or certain activities (i.e., no digging). Behavior modification of appropriate actions if suspected MEC is encountered will reduce potential risk of an explosive incident.	Controls such as installation of signs and production/distribution of MEC awareness and safety material are technically feasible. Materials and personnel are readily available for implementation. Property rights-of-entry would be required. Implementation of LUC can occur within three to six months. Distribution of materials should be ongoing.	Minimal cost (as low as $500/acre depending upon size of the site) for such controls as development and distribution of brochures, purchasing and installing signs, and implementing an educational awareness program.	Since MEC is not removed from the MRS, the long-term effectiveness/permanence is questionable. Signs would need to be replaced when damaged and illegible. Distribution of MEC awareness and safety material would need to occur continually to ensure availability to recreational users and construction personnel.	This alternative does not reduce the toxicity, mobility, or volume of MEC.	UXO-qualified personnel would provide safety escort during sign installation. Individuals familiar with formerly used military sites, munitions types, and safety would be involved with the development of MEC awareness and safety materials.	TBD Requires reaching agreement on responsible entity for implementing and maintaining LUC.

Table 4-2 Summary of Screening of Remedial Alternatives Continued

Remedial Alternatives	Threshold Criteria		Balancing Criteria					Modifying Criteria	
	Protectiveness	Achieve Remedial Objectives	Implementability	Cost	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume Through Treatments	Short-term Effectiveness	State Acceptance	Community Acceptance
Alternative 3 **Surface MEC Removal and Implementation of LUCs** Removal of surface or partially buried MEC. Includes use of LUCs. *Western Mountainous Region MRS:* **Not Evaluated Further** *Southern Impact Region MRS:* **Evaluated** *Southeastern Region MRS:* **Evaluated**	Surface clearance of MEC is protective for non-intrusive activities, such as hiking, ATV use, motocross, and hunting. UXO-qualified personnel are exposed to MEC, but follow stringent protocol to ensure their safety and the safety of surrounding population.	Effective in managing risk in areas identified for surface use only. Effective as an interim measure until a long-term solution is implemented.	Surface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. UXO-qualified personnel would visually inspect the ground surface of the MRS and use hand-held sensors to detect items partially buried or under dense vegetation. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly. Vegetation clearance may be required depending upon the density, and would be conducted in accordance with TBC. Rights-of-entry would be required. Can be implemented within four to six months, and is dependent upon the areal extent to be cleared, vegetation, terrain/topography, and number of MEC items.	Significantly more costly than Alternatives 1 and 2	The long-term effectiveness/permanence of surface removal is dependent upon the presence of subsurface MEC and potential for those items to migrate to the surface via erosion, etc.	All surface and partially buried MEC would be removed, resulting in the reduction of mobility and volume.	The removal of surface and partially buried MEC is extremely effective in mitigating immediate risk in areas identified for surface activities.	TBD Requires reaching agreement on responsible entity for implementing and maintaining any associated LUC.	TBD

Table 4-2 Summary of Screening of Remedial Alternatives Continued

Remedial Alternatives	Threshold Criteria		Balancing Criteria					Modifying Criteria	
	Protectiveness	Achieve Remedial Objectives	Implementability	Cost	Long-Term Effectiveness	**Reduction of Toxicity, Mobility, or Volume Through Treatment**	Short-Term Effectiveness	State-Acceptance	Community Acceptance
Alternative 4 **Surface and Subsurface MEC Removal and Implementation of LUCs** Combination of surface and subsurface MEC removal. Includes use of LUCs. Although no MEC was encountered in the areas investigated during the RI, there is the potential for a residual MEC hazard within the MRSs based on the confirmed presence of MEC on the surface and subsurface, historic land use as an artillery training impact area, and/or high MD density within the MRSs (ZAPATA, 2012). *Western Mountainous Region MRS:* **Not Evaluated Further** *Southern Impact Region MRS:* **Evaluated** *Southeastern Region MRS:* **Evaluated**	Surface and subsurface clearance of MEC is the most protective alternative (other than prohibiting site access) for recreational and construction-related activities. UXO-qualified personnel are exposed to MEC, but follow stringent protocol to ensure their safety and the safety of surrounding population.	Achieves the remedial objectives in areas where there is evidence of MEC, including significant fragmentation indicative of the use of HE munitions. Would be considered a long-term solution.	Surface and subsurface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. UXO-qualified personnel would visually inspect, aided by hand-held instruments, the ground surface of the MRS and use hand-held sensors to detect items under dense vegetation. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly. Depending upon terrain, digital geophysical mapping of subsurface anomalies may be performed to identify specific subsurface items, most likely to be potential MEC. These items would be manually excavated by UXO-qualified personnel. Another methodology is for UXO-qualified personnel to manually excavate all subsurface metallic items within a given area, as identified by an analog sensor emitting an audible signal. All excavated items are inspected for explosive hazards and disposed of accordingly. Vegetation clearance may be required depending upon the density, and would be conducted in accordance with TBC. Rights-of-entry would be required. Can be implemented within four to eight months, and is dependent upon areal extent to be cleared, vegetation, terrain/topography, and number of MEC items.	Significantly more costly than Alternatives 1 and 2; more costly than Alternative 3	This alternative is extremely effective as a long-term remedy. It should be noted that with any removal action, there is no assurance that 100% of MEC has been removed.	Surface and subsurface MEC would be removed using the most effective technology available, resulting in the reduction of mobility and volume.	The removal of surface and subsurface MEC is extremely effective in mitigating immediate risk in areas identified for surface and subsurface activities.	TBD Requires reaching agreement on responsible entity for implementing and maintaining LUC.	TBD

NOTES:

Table 4-2 Summary of Screening of Remedial Alternatives Continued

Remedial Alternatives	Threshold Criteria		Balancing Criteria					Modifying Criteria	
	Protectiveness	**Achieve Remedial Objectives**	**Implementability**	**Cost**	**Long-Term Effectiveness**	**Reduction of Toxicity, Mobility, or Volume Through Treatment**	**Short-Term Effectiveness**	**State-Acceptance**	**Community Acceptance**
Alternative 5* **Subsurface Removal to Support Unlimited Use** Combination of surface and subsurface MEC removal. *Western Mountainous Region MRS:* **Not Evaluated Further** *Southern Impact Region MRS:* **Not Evaluated Further** *Southeastern Region MRS:* **Not Evaluated Further**	Surface and subsurface clearance of MEC is the most protective alternative (other than prohibiting site access) for recreational and construction-related activities. UXO-qualified personnel are exposed to MEC, but follow stringent protocol to ensure their safety and the safety of surrounding population.	Achieves the remedial objectives in areas where there is evidence of MEC, including significant fragmentation indicative of the use of HE munitions. Would be considered a long-term solution.	This alternative is not technically feasible. Current technology has not advanced enough to quantitatively demonstrate residual risk from MEC hazards no longer exist. This alternative is not compatible with the current and proposed future land use. Efforts associated with implementing this alternative will be excessive and likely impractical regardless of terrain, ground cover, and access to the area. UXO-qualified personnel must be involved during implementation of all aspects of this alternative. This alternative will not comply with ARARs.	Extremely more costly than all other Alternatives.	This alternative is extremely effective as a long-term remedy.	Surface and subsurface MEC would be removed using the most effective technology available, resulting in the reduction of mobility and volume.	The removal of surface and subsurface MEC is extremely effective in mitigating immediate risk in areas identified for surface and subsurface activities.	No	No

NOTES:
*This alternative is not technically feasible, does not comply with ARARs and is cost prohibitive compared to the other alternatives. Therefore, Alternative 5 will not be evaluated further during the Feasibility Study.

5.0 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

5.1 INTRODUCTION

5.1.1 The FS developed and evaluated the following four remedial alternatives for the Southeastern Region MRS:

- Alternative 1 – No Action;
- Alternative 2 –LUCs;
- Alternative 3 – Surface MEC Removal and Implementation of LUCs; and,
- Alternative 4 – Surface and Subsurface MEC Removal and Implementation of LUCs.

5.1.2 Four remedial alternatives were evaluated for the Southern Impact Region MRS:

- Alternative 1 –No Action; and
- Alternative 2 –LUCs.
- Alternative 3 – Surface MEC Removal and Implementation of LUCs; and,
- Alternative 4 – Surface and Subsurface MEC Removal and Implementation of LUCs.

5.1.2 Two remedial alternatives were evaluated for the Western/Mountainous Region MRS:

- Alternative 1 –No Action; and
- Alternative 2 –LUCs.

5.1.3 As discussed in Section 4.0, Alternative 5 (Subsurface Removal to Support Unlimited Use) was eliminated from further consideration for each MRS because it is not technically feasible, does not comply with ARARs and is cost prohibitive. Alternatives 3 and 4 were eliminated from consideration for the Western/Mountainous Region MRS. Considering the very limited site accessibility and proposed future land use activities, a complete MEC exposure pathway is unlikely in this MRS. Therefore, these two alternatives would likely achieve limited added protection of human health and safety at a significant cost above Alternatives 1 and 2.

5.1.4 The purpose of the detailed analysis of remedial action alternatives is to provide the project decision makers the necessary information to select a response alternative for each MRS at the WTA MRA, and develop a proposed plan that would be acceptable to regulatory agencies and the public. The potential response alternatives to manage MEC-related hazards and risks are analyzed against seven of the nine NCP criteria (Section 300.430). The nine criteria include:

Threshold Criteria

1. Overall protection of human health and the environment
2. Compliance with ARARs

Balancing Criteria

3. Long-term effectiveness
4. Reduction of toxicity, mobility, or volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost

Modifying Criteria

8. State acceptance
9. Community acceptance

5.1.5 State and community acceptance are considered "Modifying Factors," and cannot be fully evaluated until receipt and consideration of comments on the RI, FS, and Proposed Plan. The remaining seven criteria are categorized as either "Threshold Factors" or "Balancing Factors." Criteria #1 and #2 are considered Threshold Factors in response to the NCP requirement that all project sites have protective remedies and meet ARARs. A determination of what is protective at a given MRS must be made on a case-by-case basis, taking into consideration the likelihood of MEC and reasonably anticipated future land use and exposure pathways. Criteria #3 through #7 are categorized as Balancing Factors, which are weighed against each other to determine which remedies are cost effective and "permanent," to the maximum extent possible.

5.2 INDIVIDUAL ANALYSIS OF ALTERNATIVES

5.2.1 Alternative 1 – No Action

5.2.1.1 Description

The No Action, which presents a baseline for comparing other alternatives, does not implement a response or remedy. Because no remedial activities would be implemented, long-term human health risks are unaffected.

5.2.1.2 Assessment

The following discussion evaluates Alternative 1 against seven of the nine NCP criteria.

Threshold Criteria

Overall Protection of Human Health and the Environment

5.2.1.2.1 Alternative 1 provides no reduction in potential MEC risks to receptors. No action would be taken to address MRSs with potential MEC hazards to provide any protectiveness for human health and the environment. Existing and future pathways will be unchanged and the RAO would not be met for the three MRSs.

Compliance with ARARs or To Be Considered Requirements

5.2.1.2.2 There are no ARARs associated with Alternative 1 that would restrict its implementation.

Balancing Criteria

Long-term Effectiveness and Permanence

5.2.1.2.3 This alternative includes no controls for exposure and no long-term management measures. All current and potential future risks would continue under this alternative.

Reduction of Toxicity, Mobility, or Volume through Treatment

5.2.1.2.4 This alternative provides no reduction in toxicity, mobility, or volume of MEC.

Short-Term Effectiveness

5.2.1.2.5 This alternative includes no controls to limit potential exposure to current receptors. There would be no additional risks posed to current receptors as a result of this alternative being implemented, since no action is taken.

Technical and Administrative Implementability
5.2.1.2.6 There are no implementability concerns posed by this remedy, since no action would be taken.

Cost
5.2.1.2.7 The present worth cost and capital cost of Alternative 1 are estimated to be $0, since there would be no action.

5.2.1.3 Summary

Alternative 1 does not reduce current and potential future exposure hazard. There would be no additional protection to human health in the Southeastern Region MRS, Southern Impact Region MRS, or Western/Mountainous Region MRS, where limited MD was encountered, as Alternative 1 does not implement a remedy to reduce potential future MEC exposure. In addition, there is no reduction of toxicity, mobility, or volume. Uncertainty exists about the long-term effectiveness of this approach for risk management. No costs are associated with this alternative.

5.2.2 Alternative 2 - LUCs

5.2.2.1 Description

This Alternative is comprised of an educational awareness program, preparation of a Community Relations Plan, installation of signs, and performance of five-year reviews. An educational awareness program would educate the public and land users about the potential hazards (i.e., MEC) associated with the MRSs and the appropriate response if MEC is encountered. Signs describing former military use and MEC safety information, including appropriate actions if suspected MEC is encountered, may be installed at site access points. MEC recognition and safety training involves educating landowners and workers conducting intrusive activities on the WTA MRA. Training may include such topics as recognition of MEC and MEC avoidance, precautions to take if a suspected MEC item is encountered, and the proper procedures for contacting authorities if a suspected MEC item is found. A five-year review would be required for Alternative 2 to monitor and review the effectiveness of this alternative.

5.2.2.2 Assessment

Threshold Criteria

Overall Protection to Human Health and the Environment
5.2.2.2.1 Under Alternative 2, risk would not be managed by source removal but through measures implemented to modify behavior. An appropriate response to encountering potential MEC (e.g., recognize, retreat, report) can be an effective means for managing risk.

5.2.2.2.2 Educational awareness may address the appropriate response to finding MEC; however, Alternative 2 cannot be expected to completely control the behavior of all individuals who may become potential receptors. There is also residual, long-term risk associated with the possibility that an individual may encounter MEC who has not been exposed to the educational awareness program or seen the signs. Implementation of this alternative will meet the RAO at the Western/Mountainous Region MRS since no MEC have been found. Five-year reviews will

provide monitoring, which will ensure that the educational awareness program is reaching land users.

Compliance with ARARs or To Be Considered Requirements

5.2.2.2.3 Alternative 2 would comply with ARARs as listed in Appendix A.

Balancing Criteria

Long-term Effectiveness and Permanence

5.2.2.2.4 Controls for exposure would include long-term management measures such as reassessment of the effectiveness of the remedy during five-year reviews.

Reduction of Toxicity, Mobility, or Volume through Treatment

5.2.2.2.5 This alternative provides no reduction in toxicity, mobility, or volume of MEC.

Short-Term Effectiveness

5.2.2.2.6 There would be no additional risks posed to the land users or site workers a result of this alternative being implemented. UXO-qualified personnel would provide a safety escort during sign installation.

Technical and Administrative Implementability

5.2.2.2.7 There are no implementability concerns posed by this remedy; educational awareness has been implemented, to some extent, by the City and County of Honolulu. Installation of signs is technically feasible; materials and personnel are readily available for implementation. Property rights-of-entry will be required. Implementation of LUCs can occur within three to six months. Distribution of educational materials should be ongoing.

Cost

5.2.2.2.8 The estimated cost of Alternative 2 is $1,156,170. This cost includes the preparation of educational material, a Community Relations Plan, and MEC training material for MEC safety presentations. In addition, installation of signs at each MRS plus annual sign maintenance has been included in the cost. The estimated cumulative cost for five-year reviews over a 30-year period is $606,720; this cost is also included in the total of $1,156,170. Appendix C contains the cost details.

5.2.2.3 Summary

Alternative 2 will achieve the RAO at the MRSs based on findings of the RI. Five-year reviews will provide monitoring to ensure educational information is being distributed effectively. Alternative 2 would comply with ARARs; therefore, Alternative 2 meets the threshold criteria. Educational awareness may help modify behavior to reduce the risk of exposure and long-term effectiveness will be monitored through five-year reviews. There is no source reduction of potential MEC associated with this alternative. The cost associated with implementing this alternative is relatively low when compared to other alternatives.

5.2.3 Alternative 3 – Surface MEC Removal and Implementation of LUCs

5.2.3.1 Description

5.2.3.1.1 Alternative 3 is comprised of the removal of surface or partially buried MEC combined with LUCs. An instrument aided surface clearance would be conducted by UXO-qualified personnel over accessible areas (less than 30 degree slope). The objective of the surface clearance is to identify and remove MEC on the ground surface. It is anticipated that the field team would be comprised of seven persons (one UXO Technician III, four UXO Technician II's, one senior UXO supervisor and one UXO safety officer/quality control specialist). The field team would walk approximately 5-foot wide transects across the MRS until all accessible area (less than 30 degree slope) of the MRS has been covered. Brush cutting, which may be extensive in some areas of the MRSs, is anticipated for the surface clearance. While a team may be able to make their way through some of the wooded areas without brush clearing, it is unlikely that an effective sweep of the surface would be conducted without the removal of existing dense underbrush within portions of the MRSs.

5.2.3.1.2 Surface MEC removal includes TPP, preparation of a Community Relations Plan and Community Relations Support, preparation of a Work Plan, Mobilization and Demobilization, field work (including collection of confirmation samples if consolidation shots are performed), MEC and MD disposal, and preparation of a Site Specific Final Report. LUCs are included in the remedy as described in Alternative 2, including the five-year reviews.

5.2.3.2 Assessment

Threshold Criteria

Overall Protection of Human Health and the Environment
5.2.3.2.1 Surface clearance of MEC is protective of human health and the environment for non-intrusive activities, such as hiking and hunting. UXO-qualified personnel performing the work may be exposed to MEC, but follow stringent protocol to ensure their safety and the safety of surrounding populations.

Compliance with ARARs or To Be Considered Requirements
5.2.3.2.2 Alternative 3 would comply with ARARs shown in Appendix A, including the Endangered Species Act and RCRA Disposal Requirements (40 CFR 264, Subpart X).

Balancing Criteria

Long-term Effectiveness and Permanence
5.2.3.2.3 The long-term effectiveness/permanence of surface removal is dependent upon the presence of subsurface MEC and potential for those items to migrate to the surface via erosion.

Reduction of Toxicity, Mobility, or Volume through Treatment
5.2.3.2.4 All surface and partially buried MEC would be removed, resulting in the reduction of mobility and volume. However, reduction of MEC volume is limited, as the subsurface MEC (i.e., deeper than six inches) will remain.

Short-Term Effectiveness

5.2.3.2.5 Implementation of a surface MEC removal is effective in the short-term. The removal of surface and partially buried MEC is extremely effective in mitigating immediate risk in areas identified for surface activities. There is potential for exposure of MEC to UXO workers during implementation. Risk to the public resulting from implementation is considered minimal.

Technical and Administrative Implementability

5.2.3.2.6 Surface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. Moderate technical effort is required for implementation. UXO-qualified personnel would visually inspect, aided by hand-held instruments, the ground surface of the MRS and use hand-held sensors to detect items under dense vegetation. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly.

Cost

5.2.3.2.7 The estimated cost for Surface Removal with Implementation of LUCs at the Southern Impact Region MRS is $3,648,890. The estimated cost for Surface Removal with Implementation of LUCs at the Southeastern Region MRS is $2,437,030. Both of these estimates include the cumulative cost for five-year reviews over a 30-year period at $606,720. This cost includes TPP, preparation of a Community Relations Plan and Community Relations Support, preparation of a Work Plan, Mobilization and Demobilization, field work (including collection of soil samples if consolidation shots are performed), MEC and MD disposal, and preparation of a Site Specific Final Report. See Appendix C for cost details.

5.2.3.3 Summary

5.2.3.3.1 Alternative 3 provides protectiveness to recreation users (e.g., hikers and hunters) through surface removal. Alternative 3 would reduce the risk associated with potential interaction with MEC for potential receptors, but it would not completely eliminate risk since MEC would only be removed from the surface and only in accessible areas (less than 30 degree slope) during brush clearance and surface sweep operations. There would still be risk in MRSs associated with residential and agricultural land use, since landowners owners may encounter MEC while conducting intrusive activities (i.e., construction, farming, gardening, fence installation, etc.). There is some reduction of toxicity, mobility, or volume through removal of MEC on the surface. Educational awareness will be implemented to reduce the risk of exposure and long-term effectiveness will be monitored through five-year reviews.

5.2.3.3.2 Alternative 3 is readily implementable, but there would be some additional risks posed to the field crew associated with its implementation. Also, the likelihood of encountering MEC items on the surface is low across much of the Southern Impact Region MRS and Southeastern Region MRS, thus reducing the overall effectiveness of the alternative. The cost associated with implementing this alternative is relatively high.

5.2.4 Alternative 4 – Surface and Subsurface MEC Removal and Implementation of LUCs

5.2.4.1 Description

5.2.4.1.1 Alternative 4 includes the removal of MEC from below the surface, to a depth compatible with land use or actual known depths of the ordnance. The MEC removal would be conducted by trained UXO-qualified personnel. The objective of the MEC removal is to identify and remove MEC on the ground surface and in the shallow subsurface. Surface and Subsurface MEC removal includes TPP, preparation of a Community Relations Plan and Community Relations Support, preparation of a Work Plan, Mobilization and Demobilization, field work (including collection of confirmation samples if consolidation shots are performed), MEC and MD disposal, and preparation of a Site Specific Final Report. LUCs are included in the remedy as described in Alternative 2, including the five-year reviews.

5.2.4.1.2 Similar to Alternative 3, extensive brush cutting is anticipated for the subsurface clearance within the MRSs. Within the Southern Impact Region MRS, only accessible areas with slopes less than 30 degrees located outside of the AOC#1 were evaluated during the FS. Subsurface removal was evaluated for the Southeastern Region MRS within an approximate 21.1 acre area. The proposed removal action area (Figure B-2) was designed by applying a 250 ft buffer around MEC items recovered during the NTCRA. The resulting buffer boundary incorporates an area which falls outside of the previously cleared NTCRA area perimeter (AOC#2).

5.2.4.2 Assessment

Threshold Criteria

Overall Protection of Human Health and the Environment
5.2.4.2.1 This alternative is the most protective of the considered alternatives.

Compliance with ARARs or To Be Considered Requirements
5.2.4.2.2 Alternative 4 would fully comply with ARARs shown in Appendix A, including the Endangered Species Act and RCRA Disposal Requirements (40 CFR 264, Subpart X).

Balancing Criteria
Long-term Effectiveness and Permanence
5.2.4.2.3 This alternative is extremely effective as a long-term remedy. It should be noted that, as with any removal action, there is no assurance that 100% of MEC will be removed.

Reduction of Toxicity, Mobility, or Volume through Treatment
5.2.4.2.4 This alternative has the greatest reduction of MEC volume. Surface and subsurface MEC would be removed using the most effective technology available, resulting in the reduction of mobility and volume.

Short-Term Effectiveness
5.2.4.2.5 Implementation of a surface and subsurface MEC removal is effective in short-term. The removal of surface and subsurface MEC is extremely effective. There is potential for exposure of MEC to UXO workers during implementation. Risk to the public resulting from implementation is considered minimal.

Technical and Administrative Implementability

5.2.4.2.6 Surface and subsurface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. UXO-qualified personnel would visually inspect the ground surface of the MRS and use hand-held sensors to detect items under dense vegetation. UXO-qualified personnel would also identify subsurface anomalies, using either digital geophysical mapping or analog sensors, and manually excavate suspected MEC items. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly.

Cost

5.2.4.2.7 The estimated cost for Alternative 4 at the Southern Impact Region MRS is $5,327,930. The estimated cost for Alternative 4 at the Southeastern Region MRS is $2,437,030. Both of these estimates include the cumulative cost for five-year reviews over a 30-year period at $606,720. This cost includes TPP, preparation of a Community Relations Plan and Community Relations Support, preparation of a Work Plan, Mobilization and Demobilization, field work (including collection of soil samples if consolidation shots are performed), MEC and MD disposal, and preparation of a Site Specific Final Report. See Appendix C for cost details.

5.2.4.3 Summary

5.2.4.3.1 Alternative 4 will achieve the RAO at the Southern Impact Region MRS and Southeastern Region MRS. Alternative 4 would be required to meet to the ARARs listed in Appendix A; the Endangered Species Act and RCRA Disposal Requirements (40 CFR 264, Subpart X) if consolidation shots are performed. Surface and subsurface MEC would be removed using the most effective technology available, resulting in the reduction of mobility and volume, mitigating immediate risk in remediation areas.

5.2.4.3.2 Alternative 4 would reduce the risk associated with potential interaction with MEC for potential receptors, but it would not completely eliminate risk since MEC would only be removed from the accessible areas (less than 30 degree slope) of the MRSs. Educational awareness will be implemented to reduce the risk of exposure and long-term effectiveness will be monitored through five-year reviews.

5.2.4.3.3 Alternative 4 would be readily implemented from a technical perspective; however, extensive brush removal may interfere with ARARs and may prove time consuming. There would also be some risks posed to the field crew through the implementation of this alternative. Also, the likelihood of encountering MEC items is low across much of the Southern Impact Region MRS and Southeastern Region MRS, thus reducing the overall effectiveness of the alternative.

5.2.4.3.4 The cost associated with implementing this alternative is the highest of all of the alternatives.

5.3 COMPARATIVE ANALYSIS OF ALTERNATIVES

In the following analysis, the alternatives are evaluated in relation to one another for each of the evaluation criteria to identify the relative advantages and disadvantages of each alternative in terms of the threshold and balancing criteria. Tables 5-1 through 5-3 summarize the evaluation

of alternatives for all three MRSs. Details regarding the comparative analysis are provided in the following sections.

5.3.1 Overall Protection of Human Health and the Environment

5.3.1.1 The protectiveness criterion was evaluated in terms of possible future human interaction with MEC. Although the MRSs have limited MEC-related risk, none of the alternatives can eliminate the risk of MEC exposure entirely. When considering all alternatives, Alternatives 1 and 2 provide the least overall protection of human health because they do not remove potential MEC. Alternative 3 is viewed as providing little additional protection because it is unlikely that MEC remains on the surface in any of the MRSs. Alternative 4 provides the greatest overall protection if subsurface MEC is present; MEC has been found in close proximity to prior removal action boundary in the Southeastern region MRS. Alternatives 3 and 4 have the potential for accidental detonation as part of the investigative or removal process, if MEC were encountered.

5.3.1.2 Environmental protectiveness was assessed for the possible detrimental impact an alternative would have on the existing environment and ecology. Implementation of Alternatives 1 and 2 have no detrimental effect on the environment. Alternatives 3 and 4 may potentially have a negative impact on the environment and cultural resources due to extensive vegetation removal necessary to conduct the response action and intrusive nature of the alternatives.

5.3.2 Compliance with ARARs and To Be Considered Requirements

No ARARs are associated with Alternative 1; Alternatives 2, 3, and 4 would need to comply with ARARs outlined in Appendix A.

5.3.3 Long-Term Effectiveness and Permanence

The permanence criterion evaluates the degree to which an alternative permanently reduces or eliminates the potential for MEC exposure hazard. Alternative 4 provides the best long-term effectiveness and permanence, assuming MEC is still present. All alternatives except Alternative 1 require five-year reviews to verify that the remedies remain effective.

5.3.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives 1 and 2 offer no reduction of toxicity, mobility, or volume; they provide no reduction of the MEC source. However, implementation of Alternative 2 is anticipated to reduce the impact of potential exposure to MEC through education. Alternatives 3 and 4 would provide a reduction of risk to MEC by removing the MEC source hazard, if present.

5.3.5 Short -term Effectiveness

Alternatives 3 and 4 are determined to have the greatest and least short-term effectiveness due to the risk to workers conducting the removal. Alternatives 1 and 2 present no short-term or adverse impacts on workers and land users.

5.3.6 Implementability

Alternatives 1 and 2 are the easiest to implement. Alternative 1 is both technically and administratively feasible, and no services or materials are necessary for implementation. Alternative 2 is also both technically and administratively feasible. Alternatives 3 and 4 are

technically and administratively feasible but require specialized personnel and equipment to implement, and require the development of detailed work plans.

5.3.7 Cost

The cost criterion evaluates the cost to implement the alternative, and includes direct, indirect, and long-term operation and maintenance costs. Direct costs are those costs associated with the implementation of the alternative; indirect costs are those associated with administration, oversight, and contingencies. The actual costs will depend on true labor rates, actual site conditions, final project scope, and other variable factors. Alternative 1, which requires no action, has no incurred cost. Alternative 2 requires relatively low costs in comparison to Alternatives 3 and 4. Cost detail for individual elements of Alternatives 2, 3, and 4 are included in Appendix C.

5.3.8 State Acceptance

State acceptance cannot be evaluated and assessed until comments on the FS and Proposed Plan are received. Modifying criteria (i.e., state and community acceptance), however, will be considered in remedy selection.

5.3.9 Community Acceptance

Community acceptance cannot be evaluated and assessed until comments on the FS and Proposed Plan are received. Community acceptance will be considered in remedy selection.

5.3.10 Summary of Comparative Analysis

The four alternatives were evaluated in terms of seven criteria. Tables 5-4 through 5-6 provide a comparative analysis of each alternative for the respective MRSs.

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TABLE 5-1 ASSESSMENT OF REMEDIAL ALTERNATIVES – SOUTHEASTERN REGION MRS

Remedial Alternative	EPA's CERCLA Nine Evaluation Criteria								
	Threshold Criteria		Balancing Criteria					Modifying Criteria	
	Overall Protectiveness of Human Health and the Environment	Compliance with ARARs	Short-Term Effectiveness	Long-Term Effectiveness & Permanence	Reduction of Toxicity, Mobility, and Volume Through Treatment	Implementability	Cost	State Acceptance	Community Acceptance
Alternative 1 **No Action** No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce potential MEC risks to a potential receptor.	N/A	No action would be taken to reduce potential MEC risks to a potential receptor	No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce mobility or volume of MEC.	Not administratively feasible, otherwise easy to implement.	No cost associated with this alternative.	TBD	TBD
Alternative 2 **Land Use Controls (LUCs)** Physical or legal controls that limit or prohibit access to an MRS, warn people of the potential dangers, impose a use restriction, or prevent potential migration of MEC.	No action would be taken to reduce potential MEC in an MRS. Relies on behavior modification of individuals when accessing MRS as to appropriate actions (do not handle suspected item and contact appropriate authorities).	ARARs will be complied with, identified in Appendix A	UXO-qualified personnel would provide safety escort during sign installation. Individuals familiar with formerly used military sites, munitions types, and safety would be involved with the development of MEC awareness and safety materials.	Since MEC is not removed from the MRS, the long-term effectiveness/ permanence is questionable. Signs would need to be replaced when damaged and illegible. Distribution of MEC awareness and safety material would need to occur continually to ensure availability to recreational users and construction personnel.	No reduction in volume as no MEC removal would take place.	Controls such as installation of signs and production/ distribution of MEC awareness and safety material are technically feasible. Materials and personnel are readily available for implementation. Property rights-of-entry would be required. Implementation of LUCs can occur within three to six months. Distribution of materials should be ongoing.	$1,156,170	TBD	TBD
Alternative 3 **Surface MEC Removal and Implementation of LUCs** Removal of surface or partially buried MEC. May include use of LUCs.	Surface clearance (i.e., less than six inches bgs) of MEC is protective for non-intrusive activities, such as hiking and hunting. Provides only limited protection for intrusive activities UXO-qualified personnel are exposed to MEC, but follow stringent protocol to ensure their safety and the safety of surrounding population.	ARARs will be complied with, identified in Appendix A.	Implementation of LUCs effective in short-term. The removal of surface and partially buried MEC is extremely effective in mitigating immediate risk in areas identified for surface activities.	The long-term effectiveness/ permanence of surface removal is dependent upon the presence of subsurface MEC and potential for those items to migrate to the surface via erosion.	All surface and partially buried MEC would be removed, resulting in the reduction of mobility and volume. However, reduction of MEC volume is limited, as the subsurface MEC (i.e., deeper than six inches) will remain.	Surface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. Moderate technical effort required for implementation. UXO-qualified personnel would visually inspect, aided by hand-held instruments, the ground surface of the MRS and use hand-held sensors to detect items under dense vegetation. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly.	$2,437,030	TBD	TBD
Alternative 4 **Surface and Subsurface MEC Removal and Implementation of LUCs** This alternative includes removal of surface MEC and MEC from below the surface, to a depth compatible with land use or actual known depths of the ordnance.	Surface and subsurface MEC removal is the most protective (other than prohibiting site access) for recreational, agricultural, and construction-related activities.	ARARs will be complied with, identified in Appendix A.	Implementation of LUCs effective in short-term. The removal of surface and subsurface MEC is extremely effective. Potential significant exposure to UXO workers during implementation. Risk to the public resulting from implementation is considered minimal.	This alternative is extremely effective as a long-term remedy. It should be noted that with any removal action, there is no assurance that 100% of MEC has been removed.	Greatest reduction of MEC volume. Surface and subsurface MEC would be removed using the most effective technology available, resulting in the reduction of mobility and volume.	Surface and subsurface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. UXO-qualified personnel would visually inspect, aided by hand-held instruments, the ground surface of the MRS and use hand-held sensors to detect items under dense vegetation. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly.	$3,255,940	TBD	TBD

Notes:
ARARs Applicable or Relevant and Appropriate Requirements
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
MEC munitions and explosives of concern
LUCs Land Use Controls
TBD To be determined

TABLE 5-2 ASSESSMENT OF REMEDIAL ALTERNATIVES – SOUTHERN IMPACT REGION MRS

Remedial Alternative	EPA's CERCLA Nine Evaluation Criteria								
	Threshold Criteria		Balancing Criteria					Modifying Criteria	
	Overall Protectiveness of Human Health and the Environment	Compliance with ARARs	Short-Term Effectiveness	Long-Term Effectiveness & Permanence	Reduction of Toxicity, Mobility, and Volume Through Treatment	Implementability	Cost	State Acceptance	Community Acceptance
Alternative 1 **No Action** No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce potential MEC risks to a potential receptor.	N/A	No action would be taken to reduce potential MEC risks to a potential receptor	No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce mobility or volume of MEC.	Not administratively feasible, otherwise easy to implement.	No cost associated with this alternative.	TBD	TBD
Alternative 2 **Land Use Controls (LUCs)** Physical or legal controls that limit or prohibit access to an MRS, warn people of the potential dangers, impose a use restriction, or prevent potential migration of MEC.	No action would be taken to reduce potential MEC in an MRS. Relies on behavior modification of individuals when accessing MRS as to appropriate actions (do not handle suspected item and contact appropriate authorities).	ARARs will be complied with, identified in Appendix A	UXO-qualified personnel would provide safety escort during sign installation. Individuals familiar with formerly used military sites, munitions types, and safety would be involved with the development of MEC awareness and safety materials.	Since MEC is not removed from the MRS, the long-term effectiveness/ permanence is questionable. Signs would need to be replaced when damaged and illegible. Distribution of MEC awareness and safety material would need to occur continually to ensure availability to recreational users and construction personnel.	No reduction in volume as no MEC removal would take place.	Controls such as installation of signs and production/ distribution of MEC awareness and safety material are technically feasible. Materials and personnel are readily available for implementation. Property rights-of-entry would be required. Implementation of LUCs can occur within three to six months. Distribution of materials should be ongoing.	$1,156,170	TBD	TBD
Alternative 3 **Surface MEC Removal and Implementation of LUCs** Removal of surface or partially buried MEC. May include use of LUCs.	Surface clearance (i.e., less than six inches bgs) of MEC is protective for non-intrusive activities, such as hiking and hunting. Provides only limited protection for intrusive activities UXO-qualified personnel are exposed to MEC, but follow stringent protocol to ensure their safety and the safety of surrounding population.	ARARs will be complied with, identified in Appendix A.	Implementation of LUCs effective in short-term. The removal of surface and partially buried MEC is extremely effective in mitigating immediate risk in areas identified for surface activities.	The long-term effectiveness/ permanence of surface removal is dependent upon the presence of subsurface MEC and potential for those items to migrate to the surface via erosion.	All surface and partially buried MEC would be removed, resulting in the reduction of mobility and volume. However, reduction of MEC volume is limited, as the subsurface MEC (i.e., deeper than six inches) will remain.	Surface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. Moderate technical effort required for implementation. UXO-qualified personnel would visually inspect, aided by hand-held instruments, the ground surface of the MRS and use hand-held sensors to detect items under dense vegetation. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly.	$3,648,890	TBD	TBD
Alternative 4 **Surface and Subsurface MEC Removal and Implementation of LUCs** This alternative includes removal of surface MEC and MEC from below the surface, to a depth compatible with land use or actual known depths of the ordnance.	Surface and subsurface MEC removal is the most protective (other than prohibiting site access) for recreational, agricultural, and construction-related activities.	ARARs will be complied with, identified in Appendix A.	Implementation of LUCs effective in short-term. The removal of surface and subsurface MEC is extremely effective. Potential significant exposure to UXO workers during implementation. Risk to the public resulting from implementation is considered minimal.	This alternative is extremely effective as a long-term remedy. It should be noted that with any removal action, there is no assurance that 100% of MEC has been removed.	Greatest reduction of MEC volume. Surface and subsurface MEC would be removed using the most effective technology available, resulting in the reduction of mobility and volume.	Surface and subsurface removal of MEC is technically feasible for an entire MRS or a smaller footprint within an MRS, based on accessibility and land use. UXO-qualified personnel would visually inspect, aided by hand-held instruments, the ground surface of the MRS and use hand-held sensors to detect items under dense vegetation. Suspected MEC items would be inspected for explosive hazards and disposed of accordingly.	$5,327,930	TBD	TBD

Notes:
ARARs Applicable or Relevant and Appropriate Requirements
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
LUCs Land Use Controls
TBD To be determined
MEC munitions and explosives of concern

TABLE 5-3 ASSESSMENT OF REMEDIAL ALTERNATIVES – WESTERN/MOUNTAINOUS REGION MRS

Remedial Alternative	EPA's CERCLA Nine Evaluation Criteria								
	Threshold Criteria		Balancing Criteria					Modifying Criteria	
	Overall Protectiveness of Human Health and the Environment	Compliance with ARARs	Short-Term Effectiveness	Long-Term Effectiveness & Permanence	Reduction of Toxicity, Mobility, and Volume Through Treatment	Implementability	Cost	State Acceptance	Community Acceptance
Alternative 1 **No Action** No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce potential MEC risks to a potential receptor.	N/A	No action would be taken to reduce potential MEC risks to a potential receptor	No action would be taken to reduce potential MEC risks to a potential receptor.	No action would be taken to reduce mobility or volume of MEC.	Not administratively feasible, otherwise easy to implement.	No cost associated with this alternative.	TBD	TBD
Alternative 2 **Land Use Controls (LUCs)** Physical or legal controls that limit or prohibit access to an MRS, warn people of the potential dangers, impose a use restriction, or prevent potential migration of MEC.	No action would be taken to reduce potential MEC in an MRS. Relies on behavior modification of individuals when accessing MRS as to appropriate actions (do not handle suspected item and contact appropriate authorities).	ARARs will be complied with, identified in Appendix A	UXO-qualified personnel would provide safety escort during sign installation. Individuals familiar with formerly used military sites, munitions types, and safety would be involved with the development of MEC awareness and safety materials.	Since MEC is not removed from the MRS, the long-term effectiveness/ permanence is questionable. Signs would need to be replaced when damaged and illegible. Distribution of MEC awareness and safety material would need to occur continually to ensure availability to recreational users and construction personnel.	No reduction in volume as no MEC removal would take place.	Controls such as installation of signs and production/ distribution of MEC awareness and safety material are technically feasible. Materials and personnel are readily available for implementation. Property rights-of-entry would be required. Implementation of LUC can occur within three to six months. Distribution of materials should be ongoing.	$1,156,170	TBD	TBD

Notes:
ARARs Applicable or Relevant and Appropriate Requirements
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
MEC munitions and explosives of concern
LUCs Land Use Controls
TBD To be determined

TABLE 5-4 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES – SOUTHEASTERN REGION MRS

		Remedial Alternative			
	EPA's Nine CERCLA Evaluation Criteria	**Alternative 1** **No Action (Baseline Condition)**	**Alternative 2** **Land Use Controls (LUCs)**	**Alternative 3** **Surface MEC Removal and Implementation of LUCs**	**Alternative 4** **MEC Surface and Subsurface Removal and Implementation of LUCs**
Threshold Criteria	Overall Protectiveness of Human Health and the Environment	○	◉	◉	●
	Compliance with ARARs	N/A	●	●	●
Balancing Criteria	Short-Term Effectiveness	○	●	●	●
	Long-Term Effectiveness	○	◉	◉	●
	Reduction of Toxicity, Mobility, and Volume Through Treatment	○	○	◉	●
	Implementability	○	●	●	●
	Cost (2)	N/A	$	$$	$$$
Modifying Criteria (1)	State Acceptance	TBD	TBD	TBD	TBD
	Community Acceptance	TBD	TBD	TBD	TBD

Notes:

ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
MEC	munitions and explosives of concern
N/A	not applicable
●	Alternative has high ability to meet the specified comparative analysis criteria relative to baseline condition
◉	Alternative has moderate ability to meet the specified comparative analysis criteria relative to baseline condition
○	Alternative does not impact baseline condition
$	Low or minimal costs to implement relative to other alternatives evaluated
$$	Moderate costs to implement relative to other alternatives evaluated
$$$	High costs to implement relative to other alternatives evaluated
(1)	Modifying criteria (state and community acceptance) will be factored in at a later point
(2)	Based on overall cost (not cost-per-acre)
TBD	To be determined

TABLE 5-5 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES – SOUTHERN IMPACT REGION MRS

		Remedial Alternative			
	EPA's Nine CERCLA Evaluation Criteria	**Alternative 1** **No Action (Baseline Condition)**	**Alternative 2** **Land Use Controls (LUCs)**	**Alternative 3** **Surface MEC Removal and Implementation of LUCs**	**Alternative 4** **MEC Surface and Subsurface Removal and Implementation of LUCs**
Threshold Criteria	Overall Protectiveness of Human Health and the Environment	○	◉	◉	●
	Compliance with ARARs	N/A	●	●	●
Balancing Criteria	Short-Term Effectiveness	○	●	●	●
	Long-Term Effectiveness	○	◉	◉	●
	Reduction of Toxicity, Mobility, and Volume Through Treatment	○	○	◉	●
	Implementability	○	●	●	●
	Cost (2)	N/A	$	$$	$$$
Modifying Criteria (1)	State Acceptance	TBD	TBD	TBD	TBD
	Community Acceptance	TBD	TBD	TBD	TBD

Notes:

ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
MEC	munitions and explosives of concern
N/A	not applicable
●	Alternative has high ability to meet the specified comparative analysis criteria relative to baseline condition
◉	Alternative has moderate ability to meet the specified comparative analysis criteria relative to baseline condition
○	Alternative does not impact baseline condition
$	Low or minimal costs to implement relative to other alternatives evaluated
$$	Moderate costs to implement relative to other alternatives evaluated
$$$	High costs to implement relative to other alternatives evaluated
(1)	Modifying criteria (state and community acceptance) will be factored in at a later point
(2)	Based on overall cost (not cost-per-acre)
TBD	To be determined

TABLE 5-6 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES – WESTERN/MOUNTAINOUS REGION MRS

		Remedial Alternative	
	EPA's Nine CERCLA Evaluation Criteria	**Alternative 1** **No Action (Baseline Condition)**	**Alternative 2** **Land Use Controls (LUCs)**
Threshold Criteria	Overall Protectiveness of Human Health and the Environment	○	◉
	Compliance with ARARs	N/A	●
Balancing Criteria	Short-Term Effectiveness	○	●
	Long-Term Effectiveness	○	◉
	Reduction of Toxicity, Mobility, and Volume Through Treatment	○	○
	Implementability	○	●
	Cost (2)	N/A	$
Modifying Criteria (1)	State Acceptance	TBD	TBD
	Community Acceptance	TBD	TBD

Notes:

ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
MEC	munitions and explosives of concern
N/A	not applicable
●	Alternative has high ability to meet the specified comparative analysis criteria relative to baseline condition
◉	Alternative has moderate ability to meet the specified comparative analysis criteria relative to baseline condition
○	Alternative does not impact baseline condition
$	Low or minimal costs to implement relative to other alternatives evaluated
$$	Moderate costs to implement relative to other alternatives evaluated
$$$	High costs to implement relative to other alternatives evaluated
(1)	Modifying criteria (state and community acceptance) will be factored in at a later point
(2)	Based on overall cost (not cost-per-acre)
TBD	To be determined

6.0 REFERENCES

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APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Regulatory Authority	Law/Regulation	Requirement	Comment
Federal	*Endangered Species Act of 1973* 16 U.S.C. §1536(a)(2).	Action must not jeopardize the continued existence of any listed endangered or threatened species or result in the destruction or adverse modification of designated critical habitat of such species.	The WTA MRA is in a region that is known to have a high probability for containing endangered and threatened species. However, none were identified within the WTA MRA during the RI investigation.
Federal	*40 CFR 264, subpart X*	The requirements in subpart X apply to owners and operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units.	Prevent any releases that may have adverse effects on human health or the environment due to migration of waste constituents in ground water, subsurface soil, surface water, wetlands, surface soil and/or air.

APPENDIX B
SITE FIGURES

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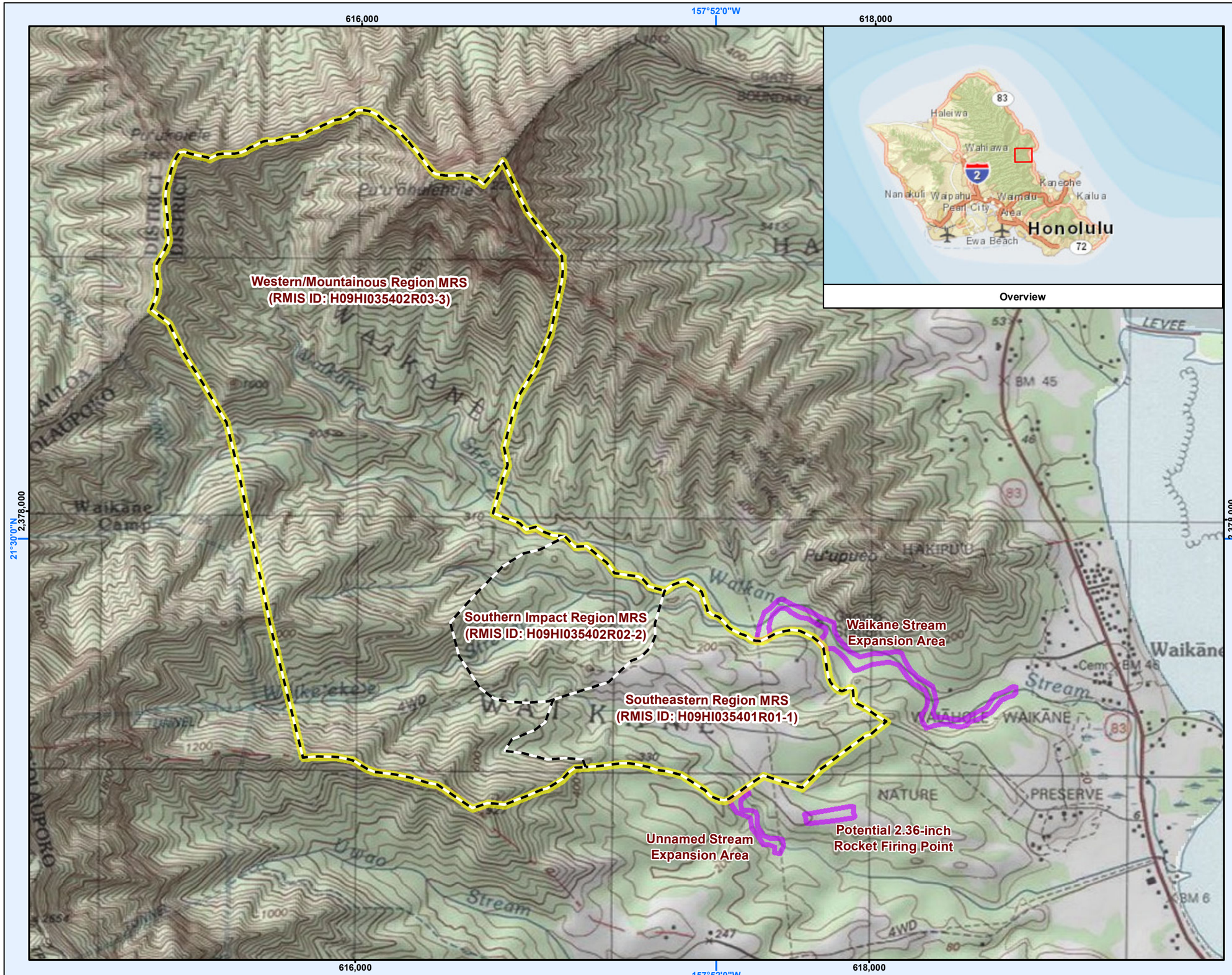


Site Location
Former Waikane Training Area
Oahu, HI

Project Number	Date	Figure
00008	OCT 2012	B-1

KEY

- MRS Boundary
- WTA MRA
- General Locations of RI Expansion Areas

GN
0° 25'
9° 46'
MN

0 600 1,200 Feet

Source(s)
ZAPATA, USAESCH, USGS, ESRI, NOAA

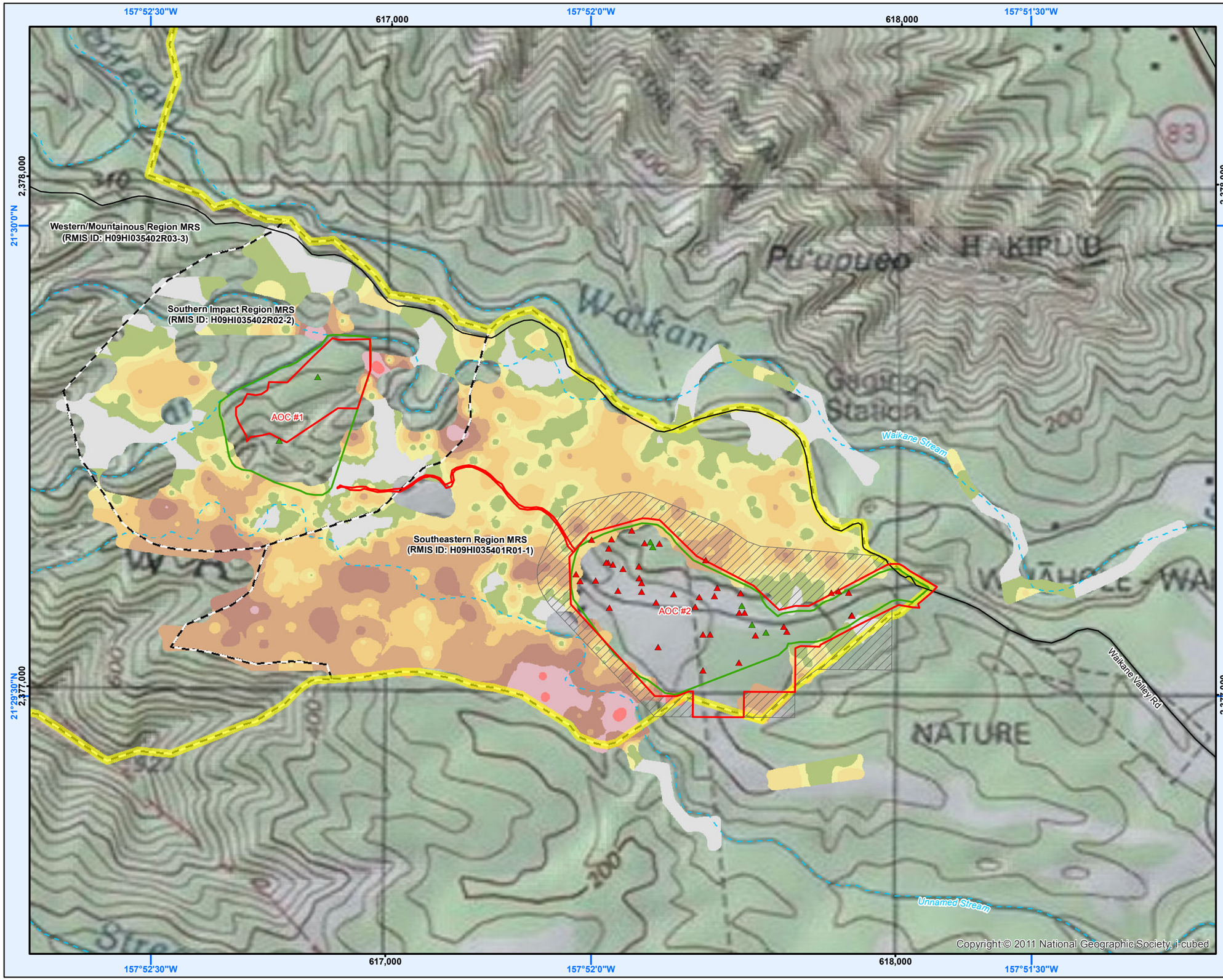
Projection
WGS 1984 UTM Zone 4N
Note: Main Data Frame Rotated to True North

Note(s)
Engineering scale may only be accurate on a map size of 11 x 17

Magnetic Declination Date: 5/23/2011
Magnetic Declination Shifting by 0° 2' W per year

Checked By	Engineering Scale	Drawn By
DSW	1 " = 1,200 '	EAA

U.S. Army Corps of Engineers
Engineering and
Support Center Huntsville
4820 University Square
Huntsville, AL 35816



MEC/MD Density and Proposed Alternative 4 - Surface/Subsurface Removal Action Area
Former Waikane Valley Training Area
Oahu, HI

Project Number	Date	Figure
00008	NOV 2012	B-2

KEY

- MEC From EE/CA, 2008
- MEC From Removal Action²
- Removal Action Area²
- Roads
- Action Memo Random Removal Action Area¹
- FS Alternative 4 - Proposed Removal Action Area (21.1 Acres)
- WTA MRA
- Area Boundary
- Stream

MD/Acre (Without SA)

<VALUE>

- 0
- 0 - 25
- 25.1 - 50
- 50.1 - 100
- 100.1 - 200
- 200.1 - 400
- 400.1 - 800
- 800.1 - 1,600
- 1,600.1 - 2,384

0º 25' GN
9º 46' MN
0 300 600 Feet

Source(s)
ZAPATA, USAESCH, USGS, NOAA

Projection
WGS 1984 UTM Zone 4N
Note: Main Data Frame Rotated to True North

Note(s)
Engineering scale may only be accurate on a map size of 11 x 17

Magnetic Declination Date: 5/23/2011
Magnetic Declination Shifting by 0º 2' W per year

¹ NTCRA Action Memorandum (UASCE-POH, 2009)
² Removal Action was conducted on a separate contract (Environet 2011)

Checked By	Engineering Scale	Drawn By
DSW	1 " = 600 '	EAA

U.S. Army Corps of Engineers
Engineering and
Support Center Huntsville
4820 University Square
Huntsville, AL 35816

APPENDIX C
COST SUMMARY

COST BREAKDOWN

This appendix contains the cost breakdown for the alternatives carried forward in the Feasibility Study for the three Munitions Response Sites (MRSs) at the former Waikane Training Area. The costs provided herein represent budgetary cost estimates using best professional judgment.

Although not an alternative, Recurring Reviews are a required component in the USACE process for addressing CERCLA sites. As such, the cost to conduct Recurring Reviews over a 30-year period has been estimated and is included under Alternative 2 – Land Use Controls as a separate line item.

COST ASSUMPTIONS

1.0 ALTERNATIVE 2: LAND USE CONTROLS

1.1 WESTERN/MOUNTAINOUS REGION MRS, SOUTHERN IMPACT REGION MRS, AND SOUTHEASTERN REGION MRS

- Educational materials include developing draft, draft final, and final versions of the educational materials for distribution as well as presenting awareness training.
- Draft, draft final, and final versions of the Community Relations Plan (CRP) will be developed.
- MEC Awareness Training includes development of training materials, conducting the training, and travel costs.
- Cost for signage includes design of signs, four signs per MRS (total of 12), two local laborers for installation (assumed duration of five days), and oversight of installation of by a UXO Tech III.

2.0 SOUTHEASTERN REGION MRS - ALTERNATIVE 3: SURFACE REMOVAL

- Technical Project Planning (TPP) includes preparation, travel, and Project Manager attendance at three meetings.
- Public Involvement Plan (PIP) and Community Relations Support include preparation of the PIP, Project Manager and a Project Scientist travel and attendance at three Restoration Advisory Board (RAB) meetings, and project website development.
- Work Plan, Site, Safety and Health Plan, Explosive Safety Submission development.
- One mobilization/demobilization is included for the surface MEC removal for the Project Manager, SUXOS, UXOSO/QC, one UXO Tech III, and four UXO Tech IIs.
- The surface removal fieldwork assumes an instrument-aided surface removal of approximately 22 acres at a production rate of two acres per day using a hand-held all-metals detector. Fieldwork assumes five days of setup and training, 11 days of surface removal, and three days of site breakdown and material documented as safe (MDAS) certification and scrap disposition. Assume three soil samples are collected for metals and explosives analysis to comply with 40 CFR 264, Subpart X (if necessary).
- The Site Specific Final Report will be prepared in draft, draft final, and final versions.

3.0 SOUTHERN IMPACT REGION MRS - ALTERNATIVE 3: SURFACE REMOVAL

- Technical Project Planning (TPP) includes preparation, travel, and Project Manager attendance at three meetings.
- Public Involvement Plan (PIP) and Community Relations Support include preparation of the PIP, Project Manager and a Project Scientist travel and attendance at three Restoration Advisory Board (RAB) meetings, and project website development.
- Work Plan, Site, Safety and Health Plan, Explosive Safety Submission development.
- One mobilization/demobilization is included for the surface MEC removal for the Project Manager, SUXOS, UXOSO/QC, one UXO Tech III, and four UXO Tech IIs.

- The surface removal fieldwork assumes an instrument-aided surface removal of approximately 44 acres at a production rate of two acres per day using a hand-held all-metals detector. Assumes approximately 54% of the MRS is accessible (i.e., <30 degree slope) and does not include AOC#1 where previous removal action was conducted.
- Fieldwork assumes five days of setup and training, 22 days of surface removal, and three days of site breakdown and material documented as safe (MDAS) certification and scrap disposition. Assume three soil samples are collected for metals and explosives analysis to comply with 40 CFR 264, Subpart X (if necessary).
- The Site Specific Final Report will be prepared in draft, draft final, and final versions.

4.0 SOUTHEASTERN REGION MRS - ALTERNATIVE 4: SURFACE AND SUBSURFACE REMOVAL

- The TPP process would include preparation, travel, and Project Manager attendance at three meetings.
- PIP and Community Relations Support include preparation of the PIP, Project Manager and a Project Scientist travel and attendance at three RAB meetings, and project website development.
- Work Plan, Site, Safety and Health Plan, Explosive Safety Submission development.
- One mobilization/demobilization is included for the surface and subsurface MEC removal for the Project Manager, SUXOS, UXOSO/QC, one UXO Tech III, and four UXO Tech IIs.
- Assumes subsurface removal of approximately 22 acres (300 anomalies per acre) using a hand-held all-metals detector (mag-and-dig). Fieldwork is assumed to consist of five days setup and training, 40 days brush cutting, 48 days subsurface removal, and three days of site breakdown and MDAS certification and scrap disposition. Assume a production rate of 140 anomalies per day by a seven person UXO team. Assume three samples for explosive and metals analysis to comply with 40 CFR 264, Subpart X (if necessary).
- The Site Specific Final Report will be prepared in draft, draft final, and final versions.

5.0 SOUTHERN IMPACT REGION MRS - ALTERNATIVE 4: SURFACE AND SUBSURFACE REMOVAL

- The TPP process would include preparation, travel, and Project Manager attendance at three meetings.
- PIP and Community Relations Support include preparation of the PIP, Project Manager and a Project Scientist travel and attendance at three RAB meetings, and project website development.
- Work Plan, Site, Safety and Health Plan, Explosive Safety Submission development.
- One mobilization/demobilization is included for the surface and subsurface MEC removal for the Project Manager, SUXOS, UXOSO/QC, one UXO Tech III, and four UXO Tech IIs.
- Assumes subsurface removal of approximately 44 acres (300 anomalies per acre) using a hand-held all-metals detector (mag-and-dig). Assumes approximately 54% of the MRS is accessible (i.e., <30 degree slope) and does not include AOC#1 where previous removal action was conducted.

- Fieldwork is assumed to consist of five days setup and training, 80 days brush cutting, 96 days subsurface removal, and three days of site breakdown and MDAS certification and scrap disposition. Assume a production rate of 140 anomalies per day by a seven person UXO team. Assume three samples for explosive and metals analysis to comply with 40 CFR 264, Subpart X (if necessary).
- The Site Specific Final Report will be prepared in draft, draft final, and final versions.

6.0 LONG TERM MANAGEMENT

- Long Term Management includes six, Five-year Reviews for WTA MRA. A Five-year Review includes a site visit by the Project Manager and SUXOS and preparation of a Five-year Review Report.

Alternative 2: Land Use Controls (all MRSs)

Project Name:	FS - Former Waikane Training Area	
Location:	Oahu, HI (Western/Mountainous Region MRS/Southern Impact Region MRS/Southeastern Region MRS	
Task	**DESCRIPTION**	**Total***
Alt 2	**Alt 2 - Land Use Controls: Educational Material**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 36,200.00
	Government Cost (30% of Contractor Cost)	$ 10,860.00
	Subtotal	$ 47,060.00
	Contingency (20% of Subtotal)	$ 9,420.00
	Total	**$ 56,480.00**
Alt 2	**Alt 2 - Land Use Controls: Community Relations Plan**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 18,440.00
	Government Cost (30% of Contractor Cost)	$ 5,540.00
	Subtotal	$ 23,980.00
	Contingency (20% of Subtotal)	$ 4,800.00
	Total	**$ 28,780.00**
Alt 2	**Alt 2 - Land Use Controls: MEC Awareness Training**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 35,370.00
	Government Cost (30% of Contractor Cost)	$ 10,620.00
	Subtotal	$ 45,990.00
	Contingency (20% of Subtotal)	$ 9,200.00
	Total	**$ 55,190.00**
Alt 2	**Alt 2 - Land Use Controls: Signage**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 26,210.00
	Government Cost (30% of Contractor Cost)	$ 7,870.00
	Subtotal	$ 34,080.00
	Contingency (20% of Subtotal)	$ 6,820.00
	Total (Initial Signage Install)	$ 40,900.00
	Annual Sign Maintenance (30% of Initial Signage Install)	$ 12,270.00
	Annual Sign Maintenance Present Worth Over 30 years	$ 368,100.00
	Total (Initial Signage Install and Annual Sign Maintenance)	**$ 409,000.00**
	GRAND TOTAL:	**$ 549,450.00**
Alt 2	**Long Term Management (5-yr reviews)**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 42,130.00
	Government Cost (100% of Contractor Cost)	$ 42,130.00
	Subtotal	$ 84,260.00
	Contingency (20% of Subtotal)	$ 16,860.00
	Subtotal	$ 101,120.00
	6 Reviews Present Worth	**$ 606,720.00**
Cost Assumptions:		
* See individual cost sheets for detailed cost breakdown.		

Alternative 3: Surface Removal at Southeastern Region MRS

Project Name:	FS - Former Waikane Training Area		
Location:	Oahu, HI (Southeastern Region MRS)		
Task	**DESCRIPTION**	**Total***	
Alt 3	**Alt 3 - Surface MEC Removal: TPP**		
	Contractor Cost (Labor, Supplies, and Travel)	$	58,160.00
	Government Cost (30% of Contractor Cost)	$	17,450.00
	Subtotal	$	75,610.00
	Contingency (20% of Subtotal)	$	15,130.00
	Total	**$**	**90,740.00**
Alt 3	**Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support**		
	Contractor Cost (Labor, Supplies, and Travel)	$	109,950.00
	Government Cost (30% of Contractor Cost)	$	32,990.00
	Subtotal	$	142,940.00
	Contingency (20% of Subtotal)	$	28,590.00
	Total	**$**	**171,530.00**
Alt 3	**Alt 3 - Surface MEC Removal: Work Plan**		
	Contractor Cost (Labor, Supplies, and Travel)	$	48,800.00
	Government Cost (30% of Contractor Cost)	$	14,640.00
	Subtotal	$	63,440.00
	Contingency (20% of Subtotal)	$	12,690.00
	Total	**$**	**76,130.00**
Alt 3	**Alt 3 - Surface MEC Removal Mobilization/Demobilization**		
	Contractor Cost (Labor, Supplies, and Travel)	$	31,530.00
	Government Cost (5% of Contractor Cost)	$	1,580.00
	Subtotal	$	33,110.00
	Contingency (20% of Subtotal)	$	6,630.00
	Total	**$**	**39,740.00**
Alt 3	**Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)**		
	Contractor Cost (Labor, Supplies, and Travel)	$	660,020.00
	Government Cost (30% of Contractor Cost)	$	198,010.00
	Subtotal	$	858,030.00
	Contingency (20% of Subtotal)	$	171,610.00
	Total	**$**	**1,029,640.00**
Alt 3	**Alt 3 - Surface MEC Removal: Site Specific Final Report**		
	Contractor Cost (Labor, Supplies, and Travel)	$	54,750.00
	Government Cost (30% of Contractor Cost)	$	16,430.00
	Subtotal	$	71,180.00
	Contingency (20% of Subtotal)	$	14,240.00
	Total	**$**	**85,420.00**
	GRAND TOTAL:	**$**	**1,493,200.00**
Cost Assumptions:			
* See individual cost sheets for detailed cost breakdown.			

Alternative 3: Surface Removal at Southern Impact Region MRS

Project Name:	FS - Former Waikane Training Area		
Location:	Oahu, HI (Southern Impact Region MRS)		
Task	**DESCRIPTION**		**Total***
Alt 3	**Alt 3 - Surface MEC Removal: TPP**		
	Contractor Cost (Labor, Supplies, and Travel)	$	58,160.00
	Government Cost (30% of Contractor Cost)	$	17,450.00
	Subtotal	$	75,610.00
	Contingency (20% of Subtotal)	$	15,130.00
	Total	**$**	**90,740.00**
Alt 3	**Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support**		
	Contractor Cost (Labor, Supplies, and Travel)	$	109,950.00
	Government Cost (30% of Contractor Cost)	$	32,990.00
	Subtotal	$	142,940.00
	Contingency (20% of Subtotal)	$	28,590.00
	Total	**$**	**171,530.00**
Alt 3	**Alt 3 - Surface MEC Removal: Work Plan**		
	Contractor Cost (Labor, Supplies, and Travel)	$	48,800.00
	Government Cost (30% of Contractor Cost)	$	14,640.00
	Subtotal	$	63,440.00
	Contingency (20% of Subtotal)	$	12,690.00
	Total	**$**	**76,130.00**
Alt 3	**Alt 3 - Surface MEC Removal Mobilization/Demobilization**		
	Contractor Cost (Labor, Supplies, and Travel)	$	31,530.00
	Government Cost (5% of Contractor Cost)	$	1,580.00
	Subtotal	$	33,110.00
	Contingency (20% of Subtotal)	$	6,630.00
	Total	**$**	**39,740.00**
Alt 3	**Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)**		
	Contractor Cost (Labor, Supplies, and Travel)	$	1,250,360.00
	Government Cost (30% of Contractor Cost)	$	375,110.00
	Subtotal	$	1,625,470.00
	Contingency (20% of Subtotal)	$	325,100.00
	Total	**$**	**1,950,570.00**
Alt 3	**Alt 3 - Surface MEC Removal: Site Specific Final Report**		
	Contractor Cost (Labor, Supplies, and Travel)	$	105,130.00
	Government Cost (30% of Contractor Cost)	$	31,540.00
	Subtotal	$	136,670.00
	Contingency (20% of Subtotal)	$	27,340.00
	Total	**$**	**164,010.00**
	GRAND TOTAL:	**$**	**2,492,720.00**
Cost Assumptions:			
* See individual cost sheets for detailed cost breakdown.			

Alternative 4: Surface and Subsurface Removal at Southeastern Region MRS

Project Name:	FS - Former Waikane Training Area	
Location:	Oahu, HI (Southeastern Region MRS)	
Task	**DESCRIPTION**	**Total***
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: TPP**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 58,160.00
	Government Cost (30% of Contractor Cost)	$ 17,450.00
	Subtotal	$ 75,610.00
	Contingency (20% of Subtotal)	$ 15,130.00
	Total	**$ 90,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 111,210.00
	Government Cost (30% of Contractor Cost)	$ 33,370.00
	Subtotal	$ 144,580.00
	Contingency (20% of Subtotal)	$ 28,920.00
	Total	**$ 173,500.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Work Plan**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 48,800.00
	Government Cost (30% of Contractor Cost)	$ 14,640.00
	Subtotal	$ 63,440.00
	Contingency (20% of Subtotal)	$ 12,690.00
	Total	**$ 76,130.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 31,530.00
	Government Cost (5% of Contractor Cost)	$ 1,580.00
	Subtotal	$ 33,110.00
	Contingency (20% of Subtotal)	$ 6,630.00
	Total	**$ 39,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 1,183,700.00
	Government Cost (30% of Contractor Cost)	$ 355,110.00
	Subtotal	$ 1,538,810.00
	Contingency (20% of Subtotal)	$ 307,770.00
	Total	**$ 1,846,580.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 54,750.00
	Government Cost (30% of Contractor Cost)	$ 16,430.00
	Subtotal	$ 71,180.00
	Contingency (20% of Subtotal)	$ 14,240.00
	Total	**$ 85,420.00**
	GRAND TOTAL:	**$ 2,312,110.00**
Cost Assumptions:		
* See individual cost sheets for detailed cost breakdown.		

Alternative 4: Surface and Subsurface Removal at Southern Impact Region MRS

Project Name:	FS - Former Waikane Training Area	
Location:	Oahu, HI (Southern Impact Region MRS)	
Task	**DESCRIPTION**	**Total***
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: TPP**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 58,160.00
	Government Cost (30% of Contractor Cost)	$ 17,450.00
	Subtotal	$ 75,610.00
	Contingency (20% of Subtotal)	$ 15,130.00
	Total	**$ 90,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 111,210.00
	Government Cost (30% of Contractor Cost)	$ 33,370.00
	Subtotal	$ 144,580.00
	Contingency (20% of Subtotal)	$ 28,920.00
	Total	**$ 173,500.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Work Plan**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 48,800.00
	Government Cost (30% of Contractor Cost)	$ 14,640.00
	Subtotal	$ 63,440.00
	Contingency (20% of Subtotal)	$ 12,690.00
	Total	**$ 76,130.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 31,530.00
	Government Cost (5% of Contractor Cost)	$ 1,580.00
	Subtotal	$ 33,110.00
	Contingency (20% of Subtotal)	$ 6,630.00
	Total	**$ 39,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 2,327,250.00
	Government Cost (30% of Contractor Cost)	$ 698,180.00
	Subtotal	$ 3,025,430.00
	Contingency (20% of Subtotal)	$ 605,090.00
	Total	**$ 3,630,520.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 103,280.00
	Government Cost (30% of Contractor Cost)	$ 30,990.00
	Subtotal	$ 134,270.00
	Contingency (20% of Subtotal)	$ 26,860.00
	Total	**$ 161,130.00**
	GRAND TOTAL:	**$ 4,171,760.00**
Cost Assumptions:		
* See individual cost sheets for detailed cost breakdown.		

ALTERNATIVE 2-LAND USE CONTROLS-WAIKANE FS COST ESTIMATE

Project Name: FS - Former Waikane Training Area

Location: Oahu, HI (Western/Mountainous Region MRS/Southern Impact Region MRS/Southeastern Region MRS

Task	DESCRIPTION	Total*
Alt 2	**Alt 2 - Land Use Controls: Educational Material**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 36,200.00
	Government Cost (30% of Contractor Cost)	$ 10,860.00
	Subtotal	$ 47,060.00
	Contingency (20% of Subtotal)	$ 9,420.00
	Total	**$ 56,480.00**
Alt 2	**Alt 2 - Land Use Controls: Community Relations Plan**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 18,440.00
	Government Cost (30% of Contractor Cost)	$ 5,540.00
	Subtotal	$ 23,980.00
	Contingency (20% of Subtotal)	$ 4,800.00
	Total	**$ 28,780.00**
Alt 2	**Alt 2 - Land Use Controls: MEC Awareness Training**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 35,370.00
	Government Cost (30% of Contractor Cost)	$ 10,620.00
	Subtotal	$ 45,990.00
	Contingency (20% of Subtotal)	$ 9,200.00
	Total	**$ 55,190.00**
Alt 2	**Alt 2 - Land Use Controls: Signage**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 26,210.00
	Government Cost (30% of Contractor Cost)	$ 7,870.00
	Subtotal	$ 34,080.00
	Contingency (20% of Subtotal)	$ 6,820.00
	Total (Initial Signage Install)	$ 40,900.00
	Annual Sign Maintenance (30% of Initial Signage Install)	$ 12,270.00
	Annual Sign Maintenance Present Worth Over 30 years	$ 368,100.00
	Total (Initial Signage Install and Annual Sign Maintenance)	**$ 409,000.00**
	GRAND TOTAL:	**$ 549,450.00**
Alt 2	**Long Term Management (5-yr reviews)**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 42,130.00
	Government Cost (100% of Contractor Cost)	$ 42,130.00
	Subtotal	$ 84,260.00
	Contingency (20% of Subtotal)	$ 16,860.00
	Subtotal	$ 101,120.00
	6 Reviews Present Worth	**$ 606,720.00**

Cost Assumptions:

* See individual cost sheets for detailed cost breakdown.

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Western/Mountainous Region MRS/Southern Impact Region MRS/Southeastern Region MRS

Alt 2	Alt 2 - Land Use Controls: Educational Material			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	148	$ 19,240.00
SUXOS	Hour	$ 70.00	12	$ 840.00
Scientist II	Hour	$ 80.00	80	$ 6,400.00
Administrative (Home Office)	Hour	$ 70.00	40	$ 2,800.00
Corp Quality Manager	Hour	$ 140.00	4	$ 560.00
	Subtotal Labor:		*284*	*$ 29,840.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
		Subtotal Subcontractor Costs:		*$ -*
		G&A:	*15.96%*	*$ -*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		250	$ 25.00
11 x 17 Drawings Copies	$ 0.66		50	$ 33.00
Color Copies	$ 1.25		1000	$ 1,250.00
Notebooks/Binders	$ 9.00		0	$ -
Shipping	$ 30.00		2	$ 60.00
		Subtotal Miscellaneous ODCs:		$ 1,368.00
		G&A:	*15.96%*	*$ 218.33*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 1,586.33

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1		$ -
		G&A:	*15.96%*	*$ -*
		TOTAL TRAVEL COSTS + G&A:		*$ -*

Labor Total:			$ 29,840.00
Subcontractor(s) Total:			$ -
Miscellaneous ODCs Total:			$ 1,586.33
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:		10.00%	$ 3,142.63
Travel Total:			$ -
Subtotal - Estimated Cost:			$ 34,568.97
Applicable State Taxes:		4.71%	$ 1,628.89
Alt 2 - Land Use Controls: Educational Material	*Alt 2*	*Grand Total:*	*$ 36,200.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Western/Mountainous Region MRS/Southern Impact Region MRS/Southeastern Region MRS

Alt 2	Alt 2 - Land Use Controls: Community Relations Plan			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	40	$ 5,200.00
Program Quality Control Manager	Hour	$ 100.00	8	$ 800.00
Scientist II	Hour	$ 80.00	80	$ 6,400.00
Administrative (Home Office)	Hour	$ 70.00	40	$ 2,800.00
	Subtotal Labor:		*168*	*$ 15,200.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
		Subtotal Subcontractor Costs:		*$ -*
		G&A:	*15.96%*	*$ -*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		2400	$ 240.00
11 x 17 Drawings Copies	$ 0.66			$ -
Color Copies	$ 1.25		120	$ 150.00
Notebooks/Binders	$ 9.00		24	$ 216.00
Shipping	$ 30.00		3	$ 90.00
		Subtotal Miscellaneous ODCs:		$ 696.00
		G&A:	*15.96%*	*$ 111.08*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 807.08

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1		$ -
		G&A:	*15.96%*	*$ -*
		TOTAL TRAVEL COSTS + G&A:		*$ -*

Labor Total:		$ 15,200.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 807.08
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 1,600.71
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 17,607.79
Applicable State Taxes:	4.71%	$ 829.68
Alt 2 - Land Use Controls: Community Relations Plan	*Alt 2*	*Grand Total:* *$ 18,440.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Western/Mountainous Region MRS/Southern Impact Region MRS/Southeastern Region MRS

Alt 2	Alt 2 - Land Use Controls: MEC Awareness Training			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 128.76	80	$ 10,300.80
Corp Quality Manager	Hour	$ 137.41	8	$ 1,099.28
Scientist II	Hour	$ 77.97	60	$ 4,678.20
SUXOS	Hour	$ 65.06	66	$ 4,293.73
Administrative (Home Office)	Hour	$ 64.13	40	$ 2,565.20
Subtotal Labor:			*254*	*$ 22,937.21*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		2500	$ 250.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		1000	$ 1,250.00
Notebooks/Binders	$ 9.00			$ -
Shipping	$ 30.00		2	$ 60.00
Subtotal Miscellaneous ODCs:				$ 1,890.00
G&A:			*15.96%*	*$ 301.64*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 2,191.64

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 5,285.00	1		$ 5,285.00
G&A:			*15.96%*	*$ 843.49*
TOTAL TRAVEL COSTS + G&A:				*$ 6,128.49*

Labor Total:			$ 22,937.21
Subcontractor(s) Total:			$ -
Miscellaneous ODCs Total:			$ 2,191.64
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:		10.00%	$ 2,512.89
Travel Total:			$ 6,128.49
Subtotal - Estimated Cost:			$ 33,770.23
Applicable State Taxes:		4.71%	$ 1,591.25
Alt 2 - Land Use Controls: MEC Awareness Training	*Alt 2*	*Grand Total:*	*$ 35,370.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Western/Mountainous Region MRS/Southern Impact Region MRS/Southeastern Region MRS

Alt 2	Alt 2 - Land Use Controls: Signage			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	60	$ 7,800.00
Corp Quality Manager	Hour	$ 140.00	4	$ 560.00
Administrative (Home Office)	Hour	$ 70.00	16	$ 1,120.00
UXO Tech III 4%	Hour	$ 70.00	66	$ 4,620.00
Laborer	Hour	$ 30.00	100	$ 3,000.00
Subtotal Labor:			*246*	*$ 17,100.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	RATE	QTY 1	QTY 2	COSTS
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	RATE	QTY 1	QTY 2	COSTS
Field Equipment - See Attached Worksheet	$ 530.59	1		$ 530.59
Custom Signs	$ 100.00	12		$ 1,200.00
Black & White Copies	$ 0.10	50		$ 5.00
11 x 17 Drawings Copies	$ 0.66			$ -
Color Copies	$ 1.25			$ -
Notebooks/Binders	$ 9.00			$ -
Shipping	$ 30.00			$ -
Subtotal Miscellaneous ODCs:				$ 1,735.59
G&A:			*15.96%*	*$ 277.00*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 2,012.59

TRAVEL / PER DIEM / RENTAL CAR	RATE	QTY 1	QTY 2	COSTS
Travel Cost - See Attached Worksheet	$ 3,454.50	1		$ 3,454.50
G&A:			*15.96%*	*$ 551.34*
TOTAL TRAVEL COSTS + G&A:				*$ 4,005.84*

Labor Total:			$ 17,100.00
Subcontractor(s) Total:			$ -
Miscellaneous ODCs Total:			$ 2,012.59
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:		10.00%	$ 1,911.26
Travel Total:			$ 4,005.84
Subtotal - Estimated Cost:			$ 25,029.69
Applicable State Taxes:		4.71%	$ 1,179.40
Alt 2 - Land Use Controls: Signage	*Alt 2*	*Grand Total:*	*$ 26,210.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Western/Mountainous Region MRS/Southern Impact Region MRS/Southeastern Region MRS

Alt 2	Long Term Management (5-yr reviews)			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	120	$ 15,600.00
Scientist II	Hour	$ 80.00	80	$ 6,400.00
SUXOS	Hour	$ 70.00	50	$ 3,500.00
Corp Quality Manager	Hour	$ 140.00	8	$ 1,120.00
Administrative (Home Office)	Hour	$ 70.00	40	$ 2,800.00
Subtotal Labor:			*298*	*$ 29,420.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	RATE	QTY 1	QTY 2	COSTS
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	RATE	QTY 1	QTY 2	COSTS
Field Equipment - See Attached Worksheet	$ 530.59	1	1	$ 1,061.18
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		300	$ 30.00
11 x 17 Drawings Copies	$ 0.66		30	$ 19.80
Color Copies	$ 1.25		60	$ 75.00
Notebooks/Binders	$ 9.00		9	$ 81.00
Shipping	$ 30.00		3	$ 90.00
Subtotal Miscellaneous ODCs:				$ 1,356.98
G&A:			*15.96%*	*$ 216.57*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,573.55

TRAVEL / PER DIEM / RENTAL CAR	RATE	QTY 1	QTY 2	COSTS
Travel Cost - See Attached Worksheet	$ 5,291.00	1		$ 5,291.00
G&A:			*15.96%*	*$ 844.44*
TOTAL TRAVEL COSTS + G&A:				*$ 6,135.44*

Labor Total:		$ 29,420.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 1,573.55
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 3,099.36
Travel Total:		$ 6,135.44
Subtotal - Estimated Cost:		$ 40,228.35
Applicable State Taxes:	4.71%	$ 1,895.56
Long Term Management (5-yr reviews) *Alt 2*	*Grand Total:*	*$ 42,130.00*

TRAVEL COST

Alt 2	Alt 2 - Land Use Controls: Educational Material				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	0.0	**$ 1,200.00**	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)	0.0	**$ 109.00**	=	$ -	
Lodging (Days)	0.0	**$ 170.00**	=	$ -	
Rental Car (Days)	0.0	$ 65.00	=	$ -	
Other (Parking, Fuel, Tolls, ATM, etc.)	0.0	$ 25.00	=	$ -	
Mileage (Per Mile)	0.0	$ 0.55	=	$ -	
			TOTAL:	***$ -***	**Alt 2**

Alt 2	Alt 2 - Land Use Controls: Community Relations Plan				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	0.0	$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)	0.0	$ 109.00	=	$ -	
Lodging (Days)	0.0	$ 170.00	=	$ -	
Rental Truck (Days)	0.0	$ 65.00	=	$ -	
Fuel (Per Day)	0.0	$ 25.00	=	$ -	
Mileage (Per Mile)	0.0	$ 0.55	=	$ -	
			TOTAL:	***$ -***	**Alt 2**

Alt 2	Alt 2 - Land Use Controls: MEC Awareness Training				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	2.0	$ 1,200.00	=	$ 2,400.00	3 FLIGHTS/AVG
Per Diem (Days)	9.0	$ 109.00	=	$ 981.00	
Lodging (Days)	8.0	$ 179.00	=	$ 1,432.00	
Rental Truck (Days)	5.0	$ 65.00	=	$ 325.00	
Fuel (Per Day)	5.0	$ 25.00	=	$ 125.00	
Mileage (Per Mile)	40.0	$ 0.55	=	$ 22.00	
			TOTAL:	***$ 5,285.00***	**Alt 2**

Alt 2	Alt 2 - Land Use Controls: Signage				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	1.0	$ 1,200.00	=	$ 1,200.00	3 FLIGHTS/AVG
Per Diem (Days)	6.5	$ 109.00	=	$ 708.50	
Lodging (Days)	6.0	$ 170.00	=	$ 1,020.00	
Rental Truck (Days)	6.0	$ 65.00	=	$ 390.00	
Fuel (Per Day)	5.0	$ 25.00	=	$ 125.00	
Mileage (Per Mile)	20.0	$ 0.55	=	$ 11.00	
			TOTAL:	***$ 3,454.50***	**Alt 2**

Alt 2	Long Term Management (5-yr reviews)				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	2.0	$ 1,200.00	=	$ 2,400.00	3 FLIGHTS/AVG
Per Diem (Days)	6.0	$ 109.00	=	$ 654.00	
Lodging (Days)	10.0	$ 170.00	=	$ 1,700.00	
Rental Truck (Days)	6.0	$ 65.00	=	$ 390.00	
Fuel (Per Day)	5.0	$ 25.00	=	$ 125.00	
Mileage (Per Mile)	40.0	$ 0.55	=	$ 22.00	
			TOTAL:	***$ 5,291.00***	**Alt 2**

TOTAL TRAVEL: $ 14,030.50

ALTERNATIVE 3-SURFACE REMOVAL (SOUTHEASTERN REGION MRS)-WAIKANE FS COST ESTIMATE

Project Name: FS - Former Waikane Training Area

Location: Oahu, HI (Southeastern Region MRS)

Task	DESCRIPTION	Total*	
Alt 3	**Alt 3 - Surface MEC Removal: TPP**		
	Contractor Cost (Labor, Supplies, and Travel)	$	58,160.00
	Government Cost (30% of Contractor Cost)	$	17,450.00
	Subtotal	$	75,610.00
	Contingency (20% of Subtotal)	$	15,130.00
	Total	**$**	**90,740.00**
Alt 3	**Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support**		
	Contractor Cost (Labor, Supplies, and Travel)	$	109,950.00
	Government Cost (30% of Contractor Cost)	$	32,990.00
	Subtotal	$	142,940.00
	Contingency (20% of Subtotal)	$	28,590.00
	Total	**$**	**171,530.00**
Alt 3	**Alt 3 - Surface MEC Removal: Work Plan**		
	Contractor Cost (Labor, Supplies, and Travel)	$	48,800.00
	Government Cost (30% of Contractor Cost)	$	14,640.00
	Subtotal	$	63,440.00
	Contingency (20% of Subtotal)	$	12,690.00
	Total	**$**	**76,130.00**
Alt 3	**Alt 3 - Surface MEC Removal Mobilization/Demobilization**		
	Contractor Cost (Labor, Supplies, and Travel)	$	31,530.00
	Government Cost (5% of Contractor Cost)	$	1,580.00
	Subtotal	$	33,110.00
	Contingency (20% of Subtotal)	$	6,630.00
	Total	**$**	**39,740.00**
Alt 3	**Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)**		
	Contractor Cost (Labor, Supplies, and Travel)	$	660,020.00
	Government Cost (30% of Contractor Cost)	$	198,010.00
	Subtotal	$	858,030.00
	Contingency (20% of Subtotal)	$	171,610.00
	Total	**$**	**1,029,640.00**
Alt 3	**Alt 3 - Surface MEC Removal: Site Specific Final Report**		
	Contractor Cost (Labor, Supplies, and Travel)	$	54,750.00
	Government Cost (30% of Contractor Cost)	$	16,430.00
	Subtotal	$	71,180.00
	Contingency (20% of Subtotal)	$	14,240.00
	Total	**$**	**85,420.00**
	GRAND TOTAL:	**$**	**1,493,200.00**

Cost Assumptions:

* See individual cost sheets for detailed cost breakdown.

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: TPP			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	90	$ 11,700.00
SUXOS	Hour	$ 70.00	12	$ 840.00
Scientist II	Hour	$ 80.00	56	$ 4,480.00
Administrative (Home Office)	Hour	$ 70.00	60	$ 4,200.00
Corp Quality Manager	Hour	$ 140.00	1	$ 140.00
Senior Geophysicist	Hour	$ 130.00	8	$ 1,040.00
Geographic Information Systems Man	Hour	$ 110.00	6	$ 660.00
Engineer III	Hour	$ 130.00	20	$ 2,600.00
	Subtotal Labor:		*253*	*$ 25,660.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Meeting Room Rental, Facilitation, Parking	$ 9,950.00		1	$ 9,950.00
Data Validator	$ 4,610.00		1	$ 4,610.00
				$ -
		Subtotal Subcontractor Costs:		*$ 14,560.00*
		G&A:	*15.96%*	*$ 2,323.78*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ 16,883.78*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		250	$ 25.00
11 x 17 Drawings Copies	$ 0.66		50	$ 33.00
Color Copies	$ 1.25		50	$ 62.50
Notebooks/Binders	$ 9.00		0	$ -
Shipping	$ 30.00		2	$ 60.00
		Subtotal Miscellaneous ODCs:		$ 180.50
		G&A:	*15.96%*	*$ 28.81*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 209.31

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 7,342.50	1		$ 7,342.50
		G&A:	*15.96%*	*$ 1,171.86*
		TOTAL TRAVEL COSTS + G&A:		*$ 8,514.36*

Labor Total:		$ 25,660.00
Subcontractor(s) Total:		$ 16,883.78
Miscellaneous ODCs Total:		$ 209.31
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,275.31
Travel Total:		$ 8,514.36
Subtotal - Estimated Cost:		$ 55,542.76
Applicable State Taxes:	4.71%	$ 2,617.17
Alt 3 - Surface MEC Removal: TPP	*Alt 3* *Grand Total:*	*$ 58,160.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	180	$ 23,400.00
Program Quality Control Manager	Hour	$ 92.27	3	$ 276.81
Scientist II	Hour	$ 77.97	204	$ 15,905.88
Administrative (Home Office)	Hour	$ 64.13	24	$ 1,539.12
Administrative (Home Office)	Hour	$ 64.13	88	$ 5,643.44
Subtotal Labor:			*499*	*$ 46,765.25*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Community relations support labor	$ 2,120.00		3	$ 6,360.00
Materials (Newspaper notice, meeting room rental, meeting facilitation, stenography)	$ 7,440.00		3	$ 22,320.00
				$ -
Subtotal Subcontractor Costs:				*$ 28,680.00*
G&A:			*15.96%*	*$ 4,577.33*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 33,257.33*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		750	$ 75.00
11 x 17 Drawings Copies	$ 0.66			$ -
Color Copies	$ 1.25		84	$ 105.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
Subtotal Miscellaneous ODCs:				$ 1,104.00
G&A:			*15.96%*	*$ 176.20*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,280.20

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 13,425.00	1		$ 13,425.00
G&A:			*15.96%*	*$ 2,142.63*
TOTAL TRAVEL COSTS + G&A:				*$ 15,567.63*

Labor Total:		$ 46,765.25
Subcontractor(s) Total:		$ 33,257.33
Miscellaneous ODCs Total:		$ 1,280.20
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 8,130.28
Travel Total:		$ 15,567.63
Subtotal - Estimated Cost:		$ 105,000.68
Applicable State Taxes:	4.71%	$ 4,947.63
Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support	*Alt 3*	*Grand Total:* *$ 109,950.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: Work Plan			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	68	$ 8,840.00
Corp Quality Manager	Hour	$ 140.00	12	$ 1,680.00
Scientist II	Hour	$ 80.00	83	$ 6,640.00
SUXOS	Hour	$ 70.00	28	$ 1,960.00
Administrative (Home Office)	Hour	$ 70.00	100	$ 7,000.00
Engineer I	Hour	$ 80.00	52	$ 4,160.00
Engineer III	Hour	$ 130.00	13	$ 1,690.00
Senior Geophysicist	Hour	$ 130.00	16	$ 2,080.00
	Subtotal Labor:		*372*	*$ 34,050.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Laboratory Data Validator (UFP-QAPP)	$ 4,020.00		1	$ 4,020.00
				$ -
				$ -
		Subtotal Subcontractor Costs:		*$ 4,020.00*
		G&A:	*15.96%*	*$ 641.59*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ 4,661.59*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		12700	$ 1,270.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		500	$ 625.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
		Subtotal Miscellaneous ODCs:		$ 3,149.00
		G&A:	*15.96%*	*$ 502.58*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 3,651.58

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1		$ -
		G&A:	*15.96%*	*$ -*
		TOTAL TRAVEL COSTS + G&A:		*$ -*

Labor Total:		$ 34,050.00
Subcontractor(s) Total:		$ 4,661.59
Miscellaneous ODCs Total:		$ 3,651.58
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,236.32
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 46,599.49
Applicable State Taxes:	4.71%	$ 2,195.77
Alt 3 - Surface MEC Removal: Work Plan *Alt 3*	*Grand Total:*	*$ 48,800.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 3	Alt 3 - Surface MEC Removal Mobilization/Demobilization			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	16	$ 2,080.00
SUXOS	Hour	$ 70.00	16	$ 1,120.00
UXO Safety Officer	Hour	$ 70.00	16	$ 1,120.00
UXO Tech III	Hour	$ 60.00	16	$ 960.00
UXO Tech II	Hour	$ 50.00	64	$ 3,200.00
Administrative (Home Office)	Hour	$ 70.00	32	$ 2,240.00
Subtotal Labor:			*160*	*$ 10,720.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -			$ -
Miscellaneous				$ -
Black & White Copies	$ 0.10		500	$ 50.00
11 x 17 Drawings Copies	$ 0.66		25	$ 16.50
Color Copies	$ 1.25			$ -
Notebooks/Binders	$ 9.00		4	$ 36.00
Shipping	$ 30.00		35	$ 1,050.00
Subtotal Miscellaneous ODCs:				$ 1,152.50
G&A:			*15.96%*	*$ 183.94*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,336.44

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 14,524.00	1		$ 14,524.00
G&A:			*15.96%*	*$ 2,318.03*
TOTAL TRAVEL COSTS + G&A:				*$ 16,842.03*

Labor Total:		$ 10,720.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 1,336.44
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 1,205.64
Travel Total:		$ 16,842.03
Subtotal - Estimated Cost:		$ 30,104.11
Applicable State Taxes:	4.71%	$ 1,418.51
Alt 3 - Surface MEC Removal Mobilization/Demobilization	*Alt 3*	*Grand Total:* *$ 31,530.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 3	Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	102	$ 13,260.00
SUXOS	Hour	$ 70.00	152	$ 10,640.00
SUXOS 4%	Hour	$ 70.00	38	$ 2,660.00
UXO Safety Officer 4%	Hour	$ 70.00	152	$ 10,640.00
UXO Safety Officer 4% OT	Hour	$ 90.00	38	$ 3,420.00
UXO Tech III 4%	Hour	$ 70.00	152	$ 10,640.00
UXO Tech III 4% OT	Hour	$ 90.00	38	$ 3,420.00
UXO Tech II 4%	Hour	$ 60.00	608	$ 36,480.00
UXO Tech II 4% OT	Hour	$ 70.00	152	$ 10,640.00
Administrative (Home Office)	Hour	$ 70.00	50	$ 3,500.00
	Subtotal Labor:		*1482*	*$ 105,300.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
MDAS shipment and disposition (100 lbs)	$ 2,500.00		3	$ 7,500.00
Soil Sample Collection (labor and materials)	$ 6,500.00		3	$ 19,500.00
Analytical Laboratory	$ 15,000.00		3	$ 45,000.00
Data Validation	$ 9,600.00		3	$ 28,800.00
Brush Cutting (per acre)	$ 8,900.00		22	$ 195,800.00
		Subtotal Subcontractor Costs:		*$ 296,600.00*
		G&A:	*15.96%*	*$ 47,337.36*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ 343,937.36*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ 23,081.64	1	1	$ 46,163.28
Miscellaneous	$ 4,000.00		1	$ 4,000.00
Black & White Copies	$ 0.10		450	$ 45.00
11 x 17 Drawings Copies	$ 0.66		45	$ 29.70
Color Copies	$ 1.25		75	$ 93.75
Notebooks/Binders	$ 9.00		9	$ 81.00
Shipping	$ 30.00		5	$ 150.00
		Subtotal Miscellaneous ODCs:		$ 50,562.73
		G&A:	*15.96%*	*$ 8,069.81*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 58,632.54

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 61,793.50	1		$ 61,793.50
		G&A:	*15.96%*	*$ 9,862.24*
		TOTAL TRAVEL COSTS + G&A:		*$ 71,655.74*

Labor Total:		$ 105,300.00
Subcontractor(s) Total:		$ 343,937.36
Miscellaneous ODCs Total:		$ 58,632.54
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 50,786.99
Travel Total:		$ 71,655.74
Subtotal - Estimated Cost:		$ 630,312.63
Applicable State Taxes:	4.71%	$ 29,700.33
Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)	*Alt 3*	*Grand Total:* *$ 660,020.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: Site Specific Final Report			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Program Manager	Hour	$ 140.00	12	$ 1,680.00
Project Manager	Hour	$ 130.00	80	$ 10,400.00
Corp Quality Manager	Hour	$ 140.00	18	$ 2,520.00
Senior Geophysicist	Hour	$ 130.00	32	$ 4,160.00
Site Geophysicist	Hour	$ 90.00	18	$ 1,620.00
Scientist I	Hour	$ 60.00	128	$ 7,680.00
Scientist II	Hour	$ 80.00	90	$ 7,200.00
Geographic Information Systems Manager	Hour	$ 110.00	50	$ 5,500.00
Administrative (Home Office)	Hour	$ 70.00	40	$ 2,800.00
SUXOS	Hour	$ 70.00	8	$ 560.00
Subtotal Labor:			*476*	*$ 44,120.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		20000	$ 2,000.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		1500	$ 1,875.00
Notebooks/Binders	$ 9.00		24	$ 216.00
Shipping	$ 30.00		15	$ 450.00
Subtotal Miscellaneous ODCs:				$ 4,871.00
G&A:			*15.96%*	*$ 777.41*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 5,648.41

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1		$ -
G&A:			*15.96%*	*$ -*
TOTAL TRAVEL COSTS + G&A:				*$ -*

Labor Total:		$ 44,120.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 5,648.41
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,976.84
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 54,745.25
Applicable State Taxes:	0.00%	$ -
Alt 3 - Surface MEC Removal: Site Specific Final Report	*Alt 3*	*Grand Total:* *$ 54,750.00*

TRAVEL COST

Alt 3	Alt 3 - Surface MEC Removal: TPP				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	3.0	**$ 1,200.00**	=	$ 3,600.00	3 FLIGHTS/AVG
Per Diem (Days)	10.5	**$ 109.00**	=	$ 1,144.50	
Lodging (Days)	9.0	**$ 170.00**	=	$ 1,530.00	
Rental Car (Days)	9.0	$ 65.00	=	$ 585.00	
Other (Parking, Fuel, Tolls, ATM, etc.)	18.0	$ 25.00	=	$ 450.00	
Mileage (Per Mile)	60.0	$ 0.55	=	$ 33.00	
			TOTAL:	***$ 7,342.50***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	6.0	$ 1,200.00	=	$ 7,200.00	3 FLIGHTS/AVG
Per Diem (Days)	21.0	$ 109.00	=	$ 2,289.00	
Lodging (Days)	18.0	$ 170.00	=	$ 3,060.00	
Rental Truck (Days)	9.0	$ 65.00	=	$ 585.00	
Fuel (Per Day)	9.0	$ 25.00	=	$ 225.00	
Mileage (Per Mile)	120.0	$ 0.55	=	$ 66.00	
			TOTAL:	***$ 13,425.00***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal: Work Plan				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)		$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)		$ 109.00	=	$ -	
Lodging (Days)		$ 179.00	=	$ -	
Rental Truck (Days)		$ 65.00	=	$ -	
Fuel (Per Day)		$ 25.00	=	$ -	
Mileage (Per Mile)		$ 0.55	=	$ -	
			TOTAL:	***$ -***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal Mobilization/Demobilization				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	8.0	$ 1,200.00	=	$ 9,600.00	3 FLIGHTS/AVG
Per Diem (Days)	12.0	$ 109.00	=	$ 1,308.00	8 men for 2 days mob/demob @ 0.75 JTR
Lodging (Days)	16.0	$ 170.00	=	$ 2,720.00	8 men x 2 days
Rental Truck (Days)	8.0	$ 65.00	=	$ 520.00	4-trucks for 2 days
Fuel (Per Day)	8.0	$ 25.00	=	$ 200.00	4-trucks for 2 days
Mileage (Per Mile)	320.0	$ 0.55	=	$ 176.00	8-men, 40 miles RT
			TOTAL:	***$ 14,524.00***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE (19 Work Days)**
Roundtrip Airfare (Each)	0.0	$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)	187.0	$ 109.00	=	$ 20,383.00	7 UXO x 27 days, 1 PM x 5 days
Lodging (Days)	187.0	$ 170.00	=	$ 31,790.00	7 UXO x 27 days, 1 PM x 5 days
Rental Truck (Days)	83.0	$ 65.00	=	$ 5,395.00	3-trucks for 27 days, 1-truck for 5 days
Fuel (Per Day)	83.0	$ 25.00	=	$ 2,075.00	
Mileage (Per Mile)	3910.0	$ 0.55	=	$ 2,150.50	3-trucks for 27 days, 1-truck for 5 days
			TOTAL:	***$ 61,793.50***	**Alt 3**

TOTAL TRAVEL: $ 97,085.00

ALTERNATIVE 3-SURFACE REMOVAL (SOUTHERN IMPACT REGION MRS)-WAIKANE FS COST ESTIMATE

Project Name: FS - Former Waikane Training Area

Location: Oahu, HI (Southern Impact Region MRS)

Task	DESCRIPTION	Total*	
Alt 3	**Alt 3 - Surface MEC Removal: TPP**		
	Contractor Cost (Labor, Supplies, and Travel)	$	58,160.00
	Government Cost (30% of Contractor Cost)	$	17,450.00
	Subtotal	$	75,610.00
	Contingency (20% of Subtotal)	$	15,130.00
	Total	**$**	**90,740.00**
Alt 3	**Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support**		
	Contractor Cost (Labor, Supplies, and Travel)	$	109,950.00
	Government Cost (30% of Contractor Cost)	$	32,990.00
	Subtotal	$	142,940.00
	Contingency (20% of Subtotal)	$	28,590.00
	Total	**$**	**171,530.00**
Alt 3	**Alt 3 - Surface MEC Removal: Work Plan**		
	Contractor Cost (Labor, Supplies, and Travel)	$	48,800.00
	Government Cost (30% of Contractor Cost)	$	14,640.00
	Subtotal	$	63,440.00
	Contingency (20% of Subtotal)	$	12,690.00
	Total	**$**	**76,130.00**
Alt 3	**Alt 3 - Surface MEC Removal Mobilization/Demobilization**		
	Contractor Cost (Labor, Supplies, and Travel)	$	31,530.00
	Government Cost (5% of Contractor Cost)	$	1,580.00
	Subtotal	$	33,110.00
	Contingency (20% of Subtotal)	$	6,630.00
	Total	**$**	**39,740.00**
Alt 3	**Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)**		
	Contractor Cost (Labor, Supplies, and Travel)	$	1,250,360.00
	Government Cost (30% of Contractor Cost)	$	375,110.00
	Subtotal	$	1,625,470.00
	Contingency (20% of Subtotal)	$	325,100.00
	Total	**$**	**1,950,570.00**
Alt 3	**Alt 3 - Surface MEC Removal: Site Specific Final Report**		
	Contractor Cost (Labor, Supplies, and Travel)	$	105,130.00
	Government Cost (30% of Contractor Cost)	$	31,540.00
	Subtotal	$	136,670.00
	Contingency (20% of Subtotal)	$	27,340.00
	Total	**$**	**164,010.00**
	GRAND TOTAL:	**$**	**2,492,720.00**

Cost Assumptions:

* See individual cost sheets for detailed cost breakdown.

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: TPP			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	90	$ 11,700.00
SUXOS	Hour	$ 70.00	12	$ 840.00
Scientist II	Hour	$ 80.00	56	$ 4,480.00
Administrative (Home Office)	Hour	$ 70.00	60	$ 4,200.00
Corp Quality Manager	Hour	$ 140.00	1	$ 140.00
Senior Geophysicist	Hour	$ 130.00	8	$ 1,040.00
Geographic Information Systems Man	Hour	$ 110.00	6	$ 660.00
Engineer III	Hour	$ 130.00	20	$ 2,600.00
Subtotal Labor:			*253*	*$ 25,660.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Meeting Room Rental, Facilitation, Parking	$ 9,950.00		1	$ 9,950.00
Data Validator	$ 4,610.00		1	$ 4,610.00
				$ -
Subtotal Subcontractor Costs:				*$ 14,560.00*
G&A:			*15.96%*	*$ 2,323.78*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 16,883.78*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		250	$ 25.00
11 x 17 Drawings Copies	$ 0.66		50	$ 33.00
Color Copies	$ 1.25		50	$ 62.50
Notebooks/Binders	$ 9.00		0	$ -
Shipping	$ 30.00		2	$ 60.00
Subtotal Miscellaneous ODCs:				$ 180.50
G&A:			*15.96%*	*$ 28.81*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 209.31

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 7,342.50	1		$ 7,342.50
G&A:			*15.96%*	*$ 1,171.86*
TOTAL TRAVEL COSTS + G&A:				*$ 8,514.36*

Labor Total:		$ 25,660.00
Subcontractor(s) Total:		$ 16,883.78
Miscellaneous ODCs Total:		$ 209.31
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,275.31
Travel Total:		$ 8,514.36
Subtotal - Estimated Cost:		$ 55,542.76
Applicable State Taxes:	4.71%	$ 2,617.17
Alt 3 - Surface MEC Removal: TPP	*Alt 3* *Grand Total:*	*$ 58,160.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	180	$ 23,400.00
Program Quality Control Manager	Hour	$ 92.27	3	$ 276.81
Scientist II	Hour	$ 77.97	204	$ 15,905.88
Administrative (Home Office)	Hour	$ 64.13	24	$ 1,539.12
Administrative (Home Office)	Hour	$ 64.13	88	$ 5,643.44
Subtotal Labor:			*499*	*$ 46,765.25*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	RATE	QTY 1	QTY 2	COSTS
Community relations support labor	$ 2,120.00		3	$ 6,360.00
Materials (Newspaper notice, meeting room rental, meeting facilitation, stenography)	$ 7,440.00		3	$ 22,320.00
				$ -
Subtotal Subcontractor Costs:				*$ 28,680.00*
G&A:			*15.96%*	*$ 4,577.33*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 33,257.33*

MISCELLANEOUS ODCs	RATE	QTY 1	QTY 2	COSTS
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		750	$ 75.00
11 x 17 Drawings Copies	$ 0.66			$ -
Color Copies	$ 1.25		84	$ 105.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
Subtotal Miscellaneous ODCs:				$ 1,104.00
G&A:			*15.96%*	*$ 176.20*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,280.20

TRAVEL / PER DIEM / RENTAL CAR	RATE	QTY 1	QTY 2	COSTS
Travel Cost - See Attached Worksheet	$ 13,425.00	1		$ 13,425.00
G&A:			*15.96%*	*$ 2,142.63*
TOTAL TRAVEL COSTS + G&A:				*$ 15,567.63*

Labor Total:		$ 46,765.25
Subcontractor(s) Total:		$ 33,257.33
Miscellaneous ODCs Total:		$ 1,280.20
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 8,130.28
Travel Total:		$ 15,567.63
Subtotal - Estimated Cost:		$ 105,000.68
Applicable State Taxes:	4.71%	$ 4,947.63
Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support	*Alt 3*	*Grand Total:* *$ 109,950.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: Work Plan			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	68	$ 8,840.00
Corp Quality Manager	Hour	$ 140.00	12	$ 1,680.00
Scientist II	Hour	$ 80.00	83	$ 6,640.00
SUXOS	Hour	$ 70.00	28	$ 1,960.00
Administrative (Home Office)	Hour	$ 70.00	100	$ 7,000.00
Engineer I	Hour	$ 80.00	52	$ 4,160.00
Engineer III	Hour	$ 130.00	13	$ 1,690.00
Senior Geophysicist	Hour	$ 130.00	16	$ 2,080.00
Subtotal Labor:			*372*	*$ 34,050.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	RATE	QTY 1	QTY 2	COSTS
Laboratory Data Validator (UFP-QAPP)	$ 4,020.00		1	$ 4,020.00
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ 4,020.00*
G&A:			*15.96%*	*$ 641.59*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 4,661.59*

MISCELLANEOUS ODCs	RATE	QTY 1	QTY 2	COSTS
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		12700	$ 1,270.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		500	$ 625.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
Subtotal Miscellaneous ODCs:				$ 3,149.00
G&A:			*15.96%*	*$ 502.58*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 3,651.58

TRAVEL / PER DIEM / RENTAL CAR	RATE	QTY 1	QTY 2	COSTS
Travel Cost - See Attached Worksheet	$ -	1		$ -
G&A:			*15.96%*	*$ -*
TOTAL TRAVEL COSTS + G&A:				*$ -*

Labor Total:		$ 34,050.00
Subcontractor(s) Total:		$ 4,661.59
Miscellaneous ODCs Total:		$ 3,651.58
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,236.32
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 46,599.49
Applicable State Taxes:	4.71%	$ 2,195.77
Alt 3 - Surface MEC Removal: Work Plan	*Alt 3*	*Grand Total:* *$ 48,800.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 3	Alt 3 - Surface MEC Removal Mobilization/Demobilization			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	16	$ 2,080.00
SUXOS	Hour	$ 70.00	16	$ 1,120.00
UXO Safety Officer	Hour	$ 70.00	16	$ 1,120.00
UXO Tech III	Hour	$ 60.00	16	$ 960.00
UXO Tech II	Hour	$ 50.00	64	$ 3,200.00
Administrative (Home Office)	Hour	$ 70.00	32	$ 2,240.00
Subtotal Labor:			*160*	*$ 10,720.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -			$ -
Miscellaneous				$ -
Black & White Copies	$ 0.10		500	$ 50.00
11 x 17 Drawings Copies	$ 0.66		25	$ 16.50
Color Copies	$ 1.25			$ -
Notebooks/Binders	$ 9.00		4	$ 36.00
Shipping	$ 30.00		35	$ 1,050.00
Subtotal Miscellaneous ODCs:				$ 1,152.50
G&A:			*15.96%*	*$ 183.94*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,336.44

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 14,524.00	1		$ 14,524.00
G&A:			*15.96%*	*$ 2,318.03*
TOTAL TRAVEL COSTS + G&A:				*$ 16,842.03*

Labor Total:		$ 10,720.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 1,336.44
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 1,205.64
Travel Total:		$ 16,842.03
Subtotal - Estimated Cost:		$ 30,104.11
Applicable State Taxes:	4.71%	$ 1,418.51
Alt 3 - Surface MEC Removal Mobilization/Demobilization	*Alt 3 Grand Total:*	*$ 31,530.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 3	Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	204	$ 26,520.00
SUXOS	Hour	$ 70.00	304	$ 21,280.00
SUXOS 4%	Hour	$ 70.00	76	$ 5,320.00
UXO Safety Officer 4%	Hour	$ 70.00	304	$ 21,280.00
UXO Safety Officer 4% OT	Hour	$ 90.00	76	$ 6,840.00
UXO Tech III 4%	Hour	$ 70.00	304	$ 21,280.00
UXO Tech III 4% OT	Hour	$ 90.00	76	$ 6,840.00
UXO Tech II 4%	Hour	$ 60.00	1216	$ 72,960.00
UXO Tech II 4% OT	Hour	$ 70.00	304	$ 21,280.00
Administrative (Home Office)	Hour	$ 70.00	100	$ 7,000.00
Subtotal Labor:			*2964*	*$ 210,600.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
MDAS shipment and disposition (100 lbs)	$ 2,500.00		6	$ 15,000.00
Soil Sample Collection (labor and materials)	$ 6,500.00		6	$ 39,000.00
Analytical Laboratory	$ 15,000.00		6	$ 90,000.00
Data Validation	$ 9,600.00		6	$ 57,600.00
Brush Cutting (per acre)	$ 8,900.00		44	$ 391,600.00
Subtotal Subcontractor Costs:				*$ 593,200.00*
G&A:			*15.96%*	*$ 94,674.72*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 687,874.72*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ 31,680.20	1	1	$ 63,360.40
Miscellaneous	$ 8,000.00		1	$ 8,000.00
Black & White Copies	$ 0.10		450	$ 45.00
11 x 17 Drawings Copies	$ 0.66		45	$ 29.70
Color Copies	$ 1.25		75	$ 93.75
Notebooks/Binders	$ 9.00		9	$ 81.00
Shipping	$ 30.00		5	$ 150.00
Subtotal Miscellaneous ODCs:				$ 71,759.85
G&A:			*15.96%*	*$ 11,452.87*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 83,212.72

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 98,511.00	1		$ 98,511.00
G&A:			*15.96%*	*$ 15,722.36*
TOTAL TRAVEL COSTS + G&A:				*$ 114,233.36*

Labor Total:		$ 210,600.00
Subcontractor(s) Total:		$ 687,874.72
Miscellaneous ODCs Total:		$ 83,212.72
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 98,168.74
Travel Total:		$ 114,233.36
Subtotal - Estimated Cost:		$ 1,194,089.54
Applicable State Taxes:	4.71%	$ 56,265.50
Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)	*Alt 3*	*Grand Total:* *$ 1,250,360.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 3	Alt 3 - Surface MEC Removal: Site Specific Final Report			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Program Manager	Hour	$ 140.00	24	$ 3,360.00
Project Manager	Hour	$ 130.00	160	$ 20,800.00
Corp Quality Manager	Hour	$ 140.00	36	$ 5,040.00
Senior Geophysicist	Hour	$ 130.00	64	$ 8,320.00
Site Geophysicist	Hour	$ 90.00	36	$ 3,240.00
Scientist I	Hour	$ 60.00	256	$ 15,360.00
Scientist II	Hour	$ 80.00	180	$ 14,400.00
Geographic Information Systems Manager	Hour	$ 110.00	100	$ 11,000.00
Administrative (Home Office)	Hour	$ 70.00	80	$ 5,600.00
SUXOS	Hour	$ 70.00	40	$ 2,800.00
Subtotal Labor:			*976*	*$ 89,920.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		20000	$ 2,000.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		1500	$ 1,875.00
Notebooks/Binders	$ 9.00		24	$ 216.00
Shipping	$ 30.00		15	$ 450.00
Subtotal Miscellaneous ODCs:				$ 4,871.00
G&A:			*15.96%*	*$ 777.41*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 5,648.41

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1		$ -
G&A:			*15.96%*	*$ -*
TOTAL TRAVEL COSTS + G&A:				*$ -*

Labor Total:		$ 89,920.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 5,648.41
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 9,556.84
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 105,125.25
Applicable State Taxes:	0.00%	$ -
Alt 3 - Surface MEC Removal: Site Specific Final Report	*Alt 3*	*Grand Total:* *$ 105,130.00*

TRAVEL COST

Alt 3	Alt 3 - Surface MEC Removal: TPP				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	3.0	**$ 1,200.00**	=	$ 3,600.00	3 FLIGHTS/AVG
Per Diem (Days)	10.5	**$ 109.00**	=	$ 1,144.50	
Lodging (Days)	9.0	**$ 170.00**	=	$ 1,530.00	
Rental Car (Days)	9.0	$ 65.00	=	$ 585.00	
Other (Parking, Fuel, Tolls, ATM, etc.)	18.0	$ 25.00	=	$ 450.00	
Mileage (Per Mile)	60.0	$ 0.55	=	$ 33.00	
			TOTAL:	***$ 7,342.50***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal: Public Involvement Plan and Community Relations Support				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	6.0	$ 1,200.00	=	$ 7,200.00	3 FLIGHTS/AVG
Per Diem (Days)	21.0	$ 109.00	=	$ 2,289.00	
Lodging (Days)	18.0	$ 170.00	=	$ 3,060.00	
Rental Truck (Days)	9.0	$ 65.00	=	$ 585.00	
Fuel (Per Day)	9.0	$ 25.00	=	$ 225.00	
Mileage (Per Mile)	120.0	$ 0.55	=	$ 66.00	
			TOTAL:	***$ 13,425.00***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal: Work Plan				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)		$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)		$ 109.00	=	$ -	
Lodging (Days)		$ 179.00	=	$ -	
Rental Truck (Days)		$ 65.00	=	$ -	
Fuel (Per Day)		$ 25.00	=	$ -	
Mileage (Per Mile)		$ 0.55	=	$ -	
			TOTAL:	***$ -***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal Mobilization/Demobilization				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	8.0	$ 1,200.00	=	$ 9,600.00	3 FLIGHTS/AVG
Per Diem (Days)	12.0	$ 109.00	=	$ 1,308.00	8 men for 2 days mob/demob @ 0.75 JTR
Lodging (Days)	16.0	$ 170.00	=	$ 2,720.00	8 men x 2 days
Rental Truck (Days)	8.0	$ 65.00	=	$ 520.00	4-trucks for 2 days
Fuel (Per Day)	8.0	$ 25.00	=	$ 200.00	4-trucks for 2 days
Mileage (Per Mile)	320.0	$ 0.55	=	$ 176.00	8-men, 40 miles RT
			TOTAL:	***$ 14,524.00***	**Alt 3**

Alt 3	Alt 3 - Surface MEC Removal Field Work (Surface Removal, Soil Samples)				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE (19 Work Days)**
Roundtrip Airfare (Each)	0.0	$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)	299.0	$ 109.00	=	$ 32,591.00	7 UXO x 42 days, 1 PM x 5 days
Lodging (Days)	299.0	$ 170.00	=	$ 50,830.00	7 UXO x 42 days, 1 PM x 5 days
Rental Truck (Days)	131.0	$ 65.00	=	$ 8,515.00	3-trucks for 42 days, 1-truck for 5 days
Fuel (Per Day)	131.0	$ 25.00	=	$ 3,275.00	
Mileage (Per Mile)	6000.0	$ 0.55	=	$ 3,300.00	3-trucks for 42 days, 1-truck for 5 days
			TOTAL:	***$ 98,511.00***	**Alt 3**

TOTAL TRAVEL: $ 133,802.50

ALTERNATIVE 4-SURFACE AND SUBSURFACE REMOVAL (SOUTHEASTERN REGION MRS)-WAIKANE FS COST ESTIMATE

Project Name: FS - Former Waikane Training Area

Location: Oahu, HI (Southeastern Region MRS)

Task	DESCRIPTION	Total*
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: TPP**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 58,160.00
	Government Cost (30% of Contractor Cost)	$ 17,450.00
	Subtotal	$ 75,610.00
	Contingency (20% of Subtotal)	$ 15,130.00
	Total	**$ 90,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 111,210.00
	Government Cost (30% of Contractor Cost)	$ 33,370.00
	Subtotal	$ 144,580.00
	Contingency (20% of Subtotal)	$ 28,920.00
	Total	**$ 173,500.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Work Plan**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 48,800.00
	Government Cost (30% of Contractor Cost)	$ 14,640.00
	Subtotal	$ 63,440.00
	Contingency (20% of Subtotal)	$ 12,690.00
	Total	**$ 76,130.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 31,530.00
	Government Cost (5% of Contractor Cost)	$ 1,580.00
	Subtotal	$ 33,110.00
	Contingency (20% of Subtotal)	$ 6,630.00
	Total	**$ 39,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)**	
	Contractor Cost (Labor, Supplies, and Travel)	$1,183,700.00
	Government Cost (30% of Contractor Cost)	$ 355,110.00
	Subtotal	$1,538,810.00
	Contingency (20% of Subtotal)	$ 307,770.00
	Total	**$1,846,580.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 54,750.00
	Government Cost (30% of Contractor Cost)	$ 16,430.00
	Subtotal	$ 71,180.00
	Contingency (20% of Subtotal)	$ 14,240.00
	Total	**$ 85,420.00**
	GRAND TOTAL:	**$2,312,110.00**

Cost Assumptions:

* See individual cost sheets for detailed cost breakdown.

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: TPP			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	90	$ 11,700.00
SUXOS	Hour	$ 70.00	12	$ 840.00
Scientist II	Hour	$ 80.00	56	$ 4,480.00
Administrative (Home Office)	Hour	$ 70.00	60	$ 4,200.00
Corp Quality Manager	Hour	$ 140.00	1	$ 140.00
Senior Geophysicist	Hour	$ 130.00	8	$ 1,040.00
Geographic Information Systems Manager	Hour	$ 110.00	6	$ 660.00
Engineer III	Hour	$ 130.00	20	$ 2,600.00
Subtotal Labor:			*253*	*$ 25,660.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Meeting Room Rental, Facilitation, Parking	$ 9,950.00		1	$ 9,950.00
Data Validator	$ 4,610.00		1	$ 4,610.00
				$ -
Subtotal Subcontractor Costs:				*$ 14,560.00*
G&A:			*15.96%*	*$ 2,323.78*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 16,883.78*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		250	$ 25.00
11 x 17 Drawings Copies	$ 0.66		50	$ 33.00
Color Copies	$ 1.25		50	$ 62.50
Notebooks/Binders	$ 9.00		0	$ -
Shipping	$ 30.00		2	$ 60.00
Subtotal Miscellaneous ODCs:				$ 180.50
G&A:			*15.96%*	*$ 28.81*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 209.31

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 7,342.50	1		$ 7,342.50
G&A:			*15.96%*	*$ 1,171.86*
TOTAL TRAVEL COSTS + G&A:				*$ 8,514.36*

Labor Total:		$ 25,660.00
Subcontractor(s) Total:		$ 16,883.78
Miscellaneous ODCs Total:		$ 209.31
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,275.31
Travel Total:		$ 8,514.36
Subtotal - Estimated Cost:		$ 55,542.76
Applicable State Taxes:	4.71%	$ 2,617.17
Alt 4 - Surface and Subsurface MEC Removal: TPP *Alt 4*	*Grand Total:*	*$ 58,160.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support				
Project Manager	Hour	$	130.00	180	$ 23,400.00
Program Quality Control Manager	Hour	$	100.00	3	$ 300.00
Scientist II	Hour	$	80.00	204	$ 16,320.00
Administrative (Home Office)	Hour	$	70.00	24	$ 1,680.00
Administrative (Home Office)	Hour	$	70.00	88	$ 6,160.00
Subtotal Labor:				*499*	*$ 47,860.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	RATE	QTY 1	QTY 2	COSTS
Community relations support labor	$ 2,120.00		3	$ 6,360.00
Materials (Newspaper notice, meeting room rental, meeting facilitation, stenography)	$ 7,440.00		3	$ 22,320.00
				$ -
Subtotal Subcontractor Costs:				*$ 28,680.00*
G&A:			*15.96%*	*$ 4,577.33*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 33,257.33*

MISCELLANEOUS ODCs	RATE	QTY 1	QTY 2	COSTS
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		750	$ 75.00
11 x 17 Drawings Copies	$ 0.66			$ -
Color Copies	$ 1.25		84	$ 105.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
Subtotal Miscellaneous ODCs:				$ 1,104.00
G&A:			*15.96%*	*$ 176.20*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,280.20

TRAVEL / PER DIEM / RENTAL CAR	RATE	QTY 1	QTY 2	COSTS
Travel Cost - See Attached Worksheet	$ 13,425.00	1		$ 13,425.00
G&A:			*15.96%*	*$ 2,142.63*
TOTAL TRAVEL COSTS + G&A:				*$ 15,567.63*

Labor Total:		$ 47,860.00
Subcontractor(s) Total:		$ 33,257.33
Miscellaneous ODCs Total:		$ 1,280.20
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 8,239.75
Travel Total:		$ 15,567.63
Subtotal - Estimated Cost:		$ 106,204.91
Applicable State Taxes:	4.71%	$ 5,004.38
Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support	*Alt 4 Grand Total:*	*$ 111,210.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Work Plan			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	68	$ 8,840.00
Corp Quality Manager	Hour	$ 140.00	12	$ 1,680.00
Scientist II	Hour	$ 80.00	83	$ 6,640.00
SUXOS	Hour	$ 70.00	28	$ 1,960.00
Administrative (Home Office)	Hour	$ 70.00	100	$ 7,000.00
Engineer I	Hour	$ 80.00	52	$ 4,160.00
Engineer III	Hour	$ 130.00	13	$ 1,690.00
Senior Geophysicist	Hour	$ 130.00	16	$ 2,080.00
Subtotal Labor:			*372*	*$ 34,050.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Laboratoty Data Validator (UFP-QAPP)	$ 4,020.00		1	$ 4,020.00
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ 4,020.00*
G&A:			*15.96%*	*$ 641.59*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 4,661.59*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		12700	$ 1,270.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		500	$ 625.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
Subtotal Miscellaneous ODCs:				$ 3,149.00
G&A:			*15.96%*	*$ 502.58*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 3,651.58

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1		$ -
G&A:			*15.96%*	*$ -*
TOTAL TRAVEL COSTS + G&A:				*$ -*

Labor Total:		$ 34,050.00
Subcontractor(s) Total:		$ 4,661.59
Miscellaneous ODCs Total:		$ 3,651.58
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,236.32
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 46,599.49
Applicable State Taxes:	4.71%	$ 2,195.77
Alt 4 - Surface and Subsurface MEC Removal: Work Plan	*Alt 4*	*Grand Total: $ 48,800.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	16	$ 2,080.00
SUXOS	Hour	$ 70.00	16	$ 1,120.00
UXO Safety Officer	Hour	$ 70.00	16	$ 1,120.00
UXO Tech III	Hour	$ 60.00	16	$ 960.00
UXO Tech II	Hour	$ 50.00	64	$ 3,200.00
Administrative (Home Office)	Hour	$ 70.00	32	$ 2,240.00
Subtotal Labor:			*160*	*$ 10,720.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -			$ -
Miscellaneous				$ -
Black & White Copies	$ 0.10		500	$ 50.00
11 x 17 Drawings Copies	$ 0.66		25	$ 16.50
Color Copies	$ 1.25			$ -
Notebooks/Binders	$ 9.00		4	$ 36.00
Shipping	$ 30.00		35	$ 1,050.00
Subtotal Miscellaneous ODCs:				$ 1,152.50
G&A:			*15.96%*	*$ 183.94*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,336.44

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 14,524.00	1		$ 14,524.00
G&A:			*15.96%*	*$ 2,318.03*
TOTAL TRAVEL COSTS + G&A:				*$ 16,842.03*

Labor Total:		$ 10,720.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 1,336.44
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 1,205.64
Travel Total:		$ 16,842.03
Subtotal - Estimated Cost:		$ 30,104.11
Applicable State Taxes:	4.71%	$ 1,418.51
Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization	*Alt 4*	*Grand Total:* *$ 31,530.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	200	$ 26,000.00
SUXOS	Hour	$ 70.00	448	$ 31,360.00
SUXOS 4%	Hour	$ 70.00	112	$ 7,840.00
UXO Safety Officer 4%	Hour	$ 70.00	448	$ 31,360.00
UXO Safety Officer 4% OT	Hour	$ 90.00	112	$ 10,080.00
UXO Tech III 4%	Hour	$ 70.00	448	$ 31,360.00
UXO Tech III 4% OT	Hour	$ 90.00	112	$ 10,080.00
UXO Tech II 4%	Hour	$ 60.00	2688	$ 161,280.00
UXO Tech II 4% OT	Hour	$ 70.00	672	$ 47,040.00
Administrative (Home Office)	Hour	$ 70.00	50	$ 3,500.00
Subtotal Labor:			*5290*	*$ 359,900.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
MDAS shipment and disposition (100 lbs)	$ 2,500.00		3	$ 7,500.00
Soil Sample Collection (labor and materials)	$ 6,500.00		3	$ 19,500.00
Analytical Laboratory	$ 15,000.00		3	$ 45,000.00
Data Validation	$ 9,600.00		3	$ 28,800.00
Brush Cutting (per acre)	$ 8,900.00		22	$ 195,800.00
Subtotal Subcontractor Costs:				*$ 296,600.00*
G&A:			*15.96%*	*$ 47,337.36*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 343,937.36*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ 32,540.66	1	1	$ 65,081.32
Miscellaneous	$ 4,000.00		1	$ 4,000.00
Black & White Copies	$ 0.10		450	$ 45.00
11 x 17 Drawings Copies	$ 0.66		45	$ 29.70
Color Copies	$ 1.25		75	$ 93.75
Notebooks/Binders	$ 9.00		9	$ 81.00
Shipping	$ 30.00		5	$ 150.00
Subtotal Miscellaneous ODCs:				$ 69,480.77
G&A:			*15.96%*	*$ 11,089.13*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 80,569.90

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	##########	1		$ 230,754.05
G&A:			*15.96%*	*$ 36,828.35*
TOTAL TRAVEL COSTS + G&A:				*$ 267,582.40*

Labor Total:		$ 359,900.00
Subcontractor(s) Total:		$ 343,937.36
Miscellaneous ODCs Total:		$ 80,569.90
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 78,440.73
Travel Total:		$ 267,582.40
Subtotal - Estimated Cost:		$ 1,130,430.38
Applicable State Taxes:	4.71%	$ 53,265.88
Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)	*Alt 4*	*Grand Total:* *$ 1,183,700.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southeastern Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Program Manager	Hour	$ 140.00	12	$ 1,680.00
Project Manager	Hour	$ 130.00	80	$ 10,400.00
Corp Quality Manager	Hour	$ 140.00	18	$ 2,520.00
Senior Geophysicist	Hour	$ 130.00	32	$ 4,160.00
Site Geophysicist	Hour	$ 90.00	18	$ 1,620.00
Scientist I	Hour	$ 60.00	128	$ 7,680.00
Scientist II	Hour	$ 80.00	90	$ 7,200.00
Geographic Information Systems Manager	Hour	$ 110.00	50	$ 5,500.00
Administrative (Home Office)	Hour	$ 70.00	40	$ 2,800.00
SUXOS	Hour	$ 70.00	8	$ 560.00
Subtotal Labor:			*476*	*$ 44,120.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
Subtotal Subcontractor Costs:				*$ -*
G&A:			*15.96%*	*$ -*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		20000	$ 2,000.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		1500	$ 1,875.00
Notebooks/Binders	$ 9.00		24	$ 216.00
Shipping	$ 30.00		15	$ 450.00
Subtotal Miscellaneous ODCs:				$ 4,871.00
G&A:			*15.96%*	*$ 777.41*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 5,648.41

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1	0	$ -
G&A:			*15.96%*	*$ -*
TOTAL TRAVEL COSTS + G&A:				*$ -*

Labor Total:		$ 44,120.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 5,648.41
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 4,976.84
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 54,745.25
Applicable State Taxes:	0.00%	$ -
Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report	*Alt 4*	*Grand Total:* *$ 54,750.00*

TRAVEL COST

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: TPP				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	3.0	**$ 1,200.00**	=	$ 3,600.00	3 FLIGHTS/AVG
Per Diem (Days)	10.5	**$ 109.00**	=	$ 1,144.50	
Lodging (Days)	9.0	**$ 170.00**	=	$ 1,530.00	
Rental Car (Days)	9.0	$ 65.00	=	$ 585.00	
Other (Parking, Fuel, Tolls, ATM, etc.)	18.0	$ 25.00	=	$ 450.00	
Mileage (Per Mile)	60.0	$ 0.55	=	$ 33.00	
			TOTAL:	***$ 7,342.50***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	6.0	$ 1,200.00	=	$ 7,200.00	3 FLIGHTS/AVG
Per Diem (Days)	21.0	$ 109.00	=	$ 2,289.00	
Lodging (Days)	18.0	$ 170.00	=	$ 3,060.00	
Rental Truck (Days)	9.0	$ 65.00	=	$ 585.00	
Fuel (Per Day)	9.0	$ 25.00	=	$ 225.00	
Mileage (Per Mile)	120.0	$ 0.55	=	$ 66.00	
			TOTAL:	***$ 13,425.00***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Work Plan				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)		$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)		$ 109.00	=	$ -	
Lodging (Days)		$ 179.00	=	$ -	
Rental Truck (Days)		$ 65.00	=	$ -	
Fuel (Per Day)		$ 25.00	=	$ -	
Mileage (Per Mile)		$ 0.55	=	$ -	
			TOTAL:	***$ -***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	8.0	$ 1,200.00	=	$ 9,600.00	3 FLIGHTS/AVG
Per Diem (Days)	12.0	$ 109.00	=	$ 1,308.00	8 men for 2 days mob/demob @ 0.75 JTR
Lodging (Days)	16.0	$ 170.00	=	$ 2,720.00	8 men x 2 days
Rental Truck (Days)	8.0	$ 65.00	=	$ 520.00	4-trucks for 2 days
Fuel (Per Day)	8.0	$ 25.00	=	$ 200.00	4-trucks for 2 days
Mileage (Per Mile)	320.0	$ 0.55	=	$ 176.00	8-men, 40 miles RT
			TOTAL:	***$ 14,524.00***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE (56 Work Days)**
Roundtrip Airfare (Each)	0.0	$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)	716.0	$ 109.00	=	$ 78,044.00	9 UXO x 79 days, 1 PM x 5 days
Lodging (Days)	716.0	$ 170.00	=	$ 121,720.00	9 UXO x 79 days, 1 PM x 5 days
Rental Truck (Days)	321.0	$ 65.00	=	$ 20,865.00	4-trucks for 79 days, 1-truck for 5 days
Fuel (Per Day)	84.0	$ 25.00	=	$ 2,100.00	
Mileage (Per Mile)	14591.0	$ 0.55	=	$ 8,025.05	4-trucks for 79 days, 1-truck for 5 days
			TOTAL:	***$ 230,754.05***	**Alt 4**

TOTAL TRAVEL: $ 266,045.55

ALTERNATIVE 4-SURFACE AND SUBSURFACE REMOVAL (SOUTHERN IMPACT REGION MRS)-WAIKANE FS COST ESTIMATE

Project Name: FS - Former Waikane Training Area

Location: Oahu, HI (Southern Impact Region MRS)

Task	DESCRIPTION	Total*
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: TPP**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 58,160.00
	Government Cost (30% of Contractor Cost)	$ 17,450.00
	Subtotal	$ 75,610.00
	Contingency (20% of Subtotal)	$ 15,130.00
	Total	**$ 90,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 111,210.00
	Government Cost (30% of Contractor Cost)	$ 33,370.00
	Subtotal	$ 144,580.00
	Contingency (20% of Subtotal)	$ 28,920.00
	Total	**$ 173,500.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Work Plan**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 48,800.00
	Government Cost (30% of Contractor Cost)	$ 14,640.00
	Subtotal	$ 63,440.00
	Contingency (20% of Subtotal)	$ 12,690.00
	Total	**$ 76,130.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 31,530.00
	Government Cost (5% of Contractor Cost)	$ 1,580.00
	Subtotal	$ 33,110.00
	Contingency (20% of Subtotal)	$ 6,630.00
	Total	**$ 39,740.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)**	
	Contractor Cost (Labor, Supplies, and Travel)	$2,327,250.00
	Government Cost (30% of Contractor Cost)	$ 698,180.00
	Subtotal	$3,025,430.00
	Contingency (20% of Subtotal)	$ 605,090.00
	Total	**$3,630,520.00**
Alt 4	**Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report**	
	Contractor Cost (Labor, Supplies, and Travel)	$ 103,280.00
	Government Cost (30% of Contractor Cost)	$ 30,990.00
	Subtotal	$ 134,270.00
	Contingency (20% of Subtotal)	$ 26,860.00
	Total	**$ 161,130.00**
	GRAND TOTAL:	**$4,171,760.00**

Cost Assumptions:

* See individual cost sheets for detailed cost breakdown.

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: TPP			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	90	$ 11,700.00
SUXOS	Hour	$ 70.00	12	$ 840.00
Scientist II	Hour	$ 80.00	56	$ 4,480.00
Administrative (Home Office)	Hour	$ 70.00	60	$ 4,200.00
Corp Quality Manager	Hour	$ 140.00	1	$ 140.00
Senior Geophysicist	Hour	$ 130.00	8	$ 1,040.00
Geographic Information Systems Manager	Hour	$ 110.00	6	$ 660.00
Engineer III	Hour	$ 130.00	20	$ 2,600.00
	Subtotal Labor:		*253*	*$ 25,660.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Meeting Room Rental, Facilitation, Parking	$ 9,950.00		1	$ 9,950.00
Data Validator	$ 4,610.00		1	$ 4,610.00
				$ -
		Subtotal Subcontractor Costs:		*$ 14,560.00*
		G&A:	*15.96%*	*$ 2,323.78*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ 16,883.78*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		250	$ 25.00
11 x 17 Drawings Copies	$ 0.66		50	$ 33.00
Color Copies	$ 1.25		50	$ 62.50
Notebooks/Binders	$ 9.00		0	$ -
Shipping	$ 30.00		2	$ 60.00
		Subtotal Miscellaneous ODCs:		$ 180.50
		G&A:	*15.96%*	*$ 28.81*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 209.31

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 7,342.50	1		$ 7,342.50
		G&A:	*15.96%*	*$ 1,171.86*
		TOTAL TRAVEL COSTS + G&A:		*$ 8,514.36*

Labor Total:			$ 25,660.00
Subcontractor(s) Total:			$ 16,883.78
Miscellaneous ODCs Total:			$ 209.31
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:		10.00%	$ 4,275.31
Travel Total:			$ 8,514.36
Subtotal - Estimated Cost:			$ 55,542.76
Applicable State Taxes:		4.71%	$ 2,617.17
Alt 4 - Surface and Subsurface MEC Removal: TPP	*Alt 4*	*Grand Total:*	*$ 58,160.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support			
Project Manager	Hour	$ 130.00	180	$ 23,400.00
Program Quality Control Manager	Hour	$ 100.00	3	$ 300.00
Scientist II	Hour	$ 80.00	204	$ 16,320.00
Administrative (Home Office)	Hour	$ 70.00	24	$ 1,680.00
Administrative (Home Office)	Hour	$ 70.00	88	$ 6,160.00
Subtotal Labor:			*499*	*$ 47,860.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	RATE	QTY 1	QTY 2	COSTS
Community relations support labor	$ 2,120.00		3	$ 6,360.00
Materials (Newspaper notice, meeting room rental, meeting facilitation, stenography)	$ 7,440.00		3	$ 22,320.00
				$ -
Subtotal Subcontractor Costs:				*$ 28,680.00*
G&A:			*15.96%*	*$ 4,577.33*
TOTAL SUBCONTRACTOR COSTS + G&A:				*$ 33,257.33*

MISCELLANEOUS ODCs	RATE	QTY 1	QTY 2	COSTS
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		750	$ 75.00
11 x 17 Drawings Copies	$ 0.66			$ -
Color Copies	$ 1.25		84	$ 105.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
Subtotal Miscellaneous ODCs:				$ 1,104.00
G&A:			*15.96%*	*$ 176.20*
TOTAL MISCELLANEOUS ODCs + G&A:				$ 1,280.20

TRAVEL / PER DIEM / RENTAL CAR	RATE	QTY 1	QTY 2	COSTS
Travel Cost - See Attached Worksheet	$ 13,425.00	1		$ 13,425.00
G&A:			*15.96%*	*$ 2,142.63*
TOTAL TRAVEL COSTS + G&A:				*$ 15,567.63*

Labor Total:		$ 47,860.00
Subcontractor(s) Total:		$ 33,257.33
Miscellaneous ODCs Total:		$ 1,280.20
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 8,239.75
Travel Total:		$ 15,567.63
Subtotal - Estimated Cost:		$ 106,204.91
Applicable State Taxes:	4.71%	$ 5,004.38
Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations Support	*Alt 4*	*Grand Total:* *$ 111,210.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Work Plan			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	68	$ 8,840.00
Corp Quality Manager	Hour	$ 140.00	12	$ 1,680.00
Scientist II	Hour	$ 80.00	83	$ 6,640.00
SUXOS	Hour	$ 70.00	28	$ 1,960.00
Administrative (Home Office)	Hour	$ 70.00	100	$ 7,000.00
Engineer I	Hour	$ 80.00	52	$ 4,160.00
Engineer III	Hour	$ 130.00	13	$ 1,690.00
Senior Geophysicist	Hour	$ 130.00	16	$ 2,080.00
	Subtotal Labor:		*372*	*$ 34,050.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Laboratoty Data Validator (UFP-QAPP)	$ 4,020.00		1	$ 4,020.00
				$ -
				$ -
		Subtotal Subcontractor Costs:		*$ 4,020.00*
		G&A:	*15.96%*	*$ 641.59*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ 4,661.59*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		12700	$ 1,270.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		500	$ 625.00
Notebooks/Binders	$ 9.00		36	$ 324.00
Shipping	$ 75.00		8	$ 600.00
		Subtotal Miscellaneous ODCs:		$ 3,149.00
		G&A:	*15.96%*	*$ 502.58*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 3,651.58

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1		$ -
		G&A:	*15.96%*	*$ -*
		TOTAL TRAVEL COSTS + G&A:		*$ -*

Labor Total:			$ 34,050.00
Subcontractor(s) Total:			$ 4,661.59
Miscellaneous ODCs Total:			$ 3,651.58
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:		10.00%	$ 4,236.32
Travel Total:			$ -
Subtotal - Estimated Cost:			$ 46,599.49
Applicable State Taxes:		4.71%	$ 2,195.77
Alt 4 - Surface and Subsurface MEC Removal: Work Plan	*Alt 4*	*Grand Total:*	*$ 48,800.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	16	$ 2,080.00
SUXOS	Hour	$ 70.00	16	$ 1,120.00
UXO Safety Officer	Hour	$ 70.00	16	$ 1,120.00
UXO Tech III	Hour	$ 60.00	16	$ 960.00
UXO Tech II	Hour	$ 50.00	64	$ 3,200.00
Administrative (Home Office)	Hour	$ 70.00	32	$ 2,240.00
	Subtotal Labor:		*160*	*$ 10,720.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
				$ -
		Subtotal Subcontractor Costs:		*$ -*
		G&A:	*15.96%*	*$ -*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -			$ -
Miscellaneous				$ -
Black & White Copies	$ 0.10		500	$ 50.00
11 x 17 Drawings Copies	$ 0.66		25	$ 16.50
Color Copies	$ 1.25			$ -
Notebooks/Binders	$ 9.00		4	$ 36.00
Shipping	$ 30.00		35	$ 1,050.00
		Subtotal Miscellaneous ODCs:		$ 1,152.50
		G&A:	*15.96%*	*$ 183.94*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 1,336.44

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 14,524.00	1		$ 14,524.00
		G&A:	*15.96%*	*$ 2,318.03*
		TOTAL TRAVEL COSTS + G&A:		*$ 16,842.03*

Labor Total:		$ 10,720.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 1,336.44
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 1,205.64
Travel Total:		$ 16,842.03
Subtotal - Estimated Cost:		$ 30,104.11
Applicable State Taxes:	4.71%	$ 1,418.51
Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization	*Alt 4* *Grand Total:*	*$ 31,530.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Project Manager	Hour	$ 130.00	400	$ 52,000.00
SUXOS	Hour	$ 70.00	896	$ 62,720.00
SUXOS 4%	Hour	$ 70.00	224	$ 15,680.00
UXO Safety Officer 4%	Hour	$ 70.00	896	$ 62,720.00
UXO Safety Officer 4% OT	Hour	$ 90.00	224	$ 20,160.00
UXO Tech III 4%	Hour	$ 70.00	896	$ 62,720.00
UXO Tech III 4% OT	Hour	$ 90.00	224	$ 20,160.00
UXO Tech II 4%	Hour	$ 60.00	5376	$ 322,560.00
UXO Tech II 4% OT	Hour	$ 70.00	1344	$ 94,080.00
Administrative (Home Office)	Hour	$ 70.00	100	$ 7,000.00
	Subtotal Labor:		*10580*	*$ 719,800.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
MDAS shipment and disposition (100 lbs)	$ 2,500.00		6	$ 15,000.00
Soil Sample Collection (labor and materials)	$ 6,500.00		6	$ 39,000.00
Analytical Laboratory	$ 15,000.00		6	$ 90,000.00
Data Validation	$ 9,600.00		6	$ 57,600.00
Brush Cutting (per acre)	$ 8,900.00		44	$ 391,600.00
		Subtotal Subcontractor Costs:		*$ 593,200.00*
		G&A:	*15.96%*	*$ 94,674.72*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ 687,874.72*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ 63,839.46	1	1	$ 127,678.91
Miscellaneous	$ 4,000.00		1	$ 4,000.00
Black & White Copies	$ 0.10		450	$ 45.00
11 x 17 Drawings Copies	$ 0.66		45	$ 29.70
Color Copies	$ 1.25		75	$ 93.75
Notebooks/Binders	$ 9.00		9	$ 81.00
Shipping	$ 30.00		5	$ 150.00
		Subtotal Miscellaneous ODCs:		$ 132,078.36
		G&A:	*15.96%*	*$ 21,079.71*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 153,158.07

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ 436,016.25	1		$ 436,016.25
		G&A:	*15.96%*	*$ 69,588.19*
		TOTAL TRAVEL COSTS + G&A:		*$ 505,604.44*

Labor Total:		$ 719,800.00
Subcontractor(s) Total:		$ 687,874.72
Miscellaneous ODCs Total:		$ 153,158.07
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 156,083.28
Travel Total:		$ 505,604.44
Subtotal - Estimated Cost:		$ 2,222,520.51
Applicable State Taxes:	4.71%	$ 104,725.17
Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)	*Alt 4*	*Grand Total:* *$ 2,327,250.00*

COST PROPOSAL	
Project Name:	FS - Former Waikane Training Area
Location:	Oahu, HI (Southern Impact Region MRS)

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report			
LABOR	**UNIT**	**OPT YR2**	**HRS-YR2**	**COSTS**
Program Manager	Hour	$ 140.00	24	$ 3,360.00
Project Manager	Hour	$ 130.00	160	$ 20,800.00
Corp Quality Manager	Hour	$ 140.00	36	$ 5,040.00
Senior Geophysicist	Hour	$ 130.00	64	$ 8,320.00
Site Geophysicist	Hour	$ 90.00	36	$ 3,240.00
Scientist I	Hour	$ 60.00	256	$ 15,360.00
Scientist II	Hour	$ 80.00	180	$ 14,400.00
Geographic Information Systems Manager	Hour	$ 110.00	100	$ 11,000.00
Administrative (Home Office)	Hour	$ 70.00	80	$ 5,600.00
SUXOS	Hour	$ 70.00	16	$ 1,120.00
	Subtotal Labor:		*952*	*$ 88,240.00*

SUBCONTRACTOR COSTS (INCLUDING SUB PROFIT)	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
				$ -
				$ -
				$ -
		Subtotal Subcontractor Costs:		*$ -*
		G&A:	*15.96%*	*$ -*
		TOTAL SUBCONTRACTOR COSTS + G&A:		*$ -*

MISCELLANEOUS ODCs	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Field Equipment - See Attached Worksheet	$ -	1		$ -
Miscellaneous	$ -			$ -
Black & White Copies	$ 0.10		20000	$ 2,000.00
11 x 17 Drawings Copies	$ 0.66		500	$ 330.00
Color Copies	$ 1.25		1500	$ 1,875.00
Notebooks/Binders	$ 9.00		24	$ 216.00
Shipping	$ 30.00		15	$ 450.00
		Subtotal Miscellaneous ODCs:		$ 4,871.00
		G&A:	*15.96%*	*$ 777.41*
		TOTAL MISCELLANEOUS ODCs + G&A:		$ 5,648.41

TRAVEL / PER DIEM / RENTAL CAR	**RATE**	**QTY 1**	**QTY 2**	**COSTS**
Travel Cost - See Attached Worksheet	$ -	1	0	$ -
		G&A:	*15.96%*	*$ -*
		TOTAL TRAVEL COSTS + G&A:		*$ -*

Labor Total:		$ 88,240.00
Subcontractor(s) Total:		$ -
Miscellaneous ODCs Total:		$ 5,648.41
Profit on Labor, Subcontractor(s) & Miscellaneous ODCs:	10.00%	$ 9,388.84
Travel Total:		$ -
Subtotal - Estimated Cost:		$ 103,277.25
Applicable State Taxes:	0.00%	$ -
Alt 4 - Surface and Subsurface MEC Removal: Site Specific Final Report	*Alt 4*	*Grand Total:* *$ 103,280.00*

APPENDIX D
INSTITUTIONAL ANALYSIS AND INSTITUTIONAL ANALYSIS REPORT

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INSTITUTIONAL ANALYSIS AND REPORT

1.0 INTRODUCTION

This Institutional Analysis identifies the agencies that have jurisdiction over the Waikane Training Area Munitions Response Area (WTA MRA), and assesses their capability and willingness to assert control that would protect the public from munitions and explosives of concern (MEC) hazards.

2.0 METHODOLOGY

2.1 RESPONSE STRATEGIES

There are three general categories of response strategies to MEC-related risk remaining on formerly used defense sites:

1. Removal;
2. Access Control; and
3. Behavior Modification.

The last two strategies are institutional controls response strategies. These strategies require local cooperation, responsible land-use control, or police powers for enforcement. These strategies are inherently non-federal and require a high level of community involvement. Institutions, defined as local and state governmental agencies and other organizations that can assist, are the vital element needed to implement any of the recommended institutional controls.

Institutional Controls are not effective if one does not have complete participation from all parties. Like all response plans, institutional controls must start with data collection, including obtaining the following information:

- What institutions hold control over the site?
- What authority do they have?
- Do they have specific responsibility in land-use control and/or public safety?
- What capabilities do they have?
- What resources do they have?
- Are they willing to play a role?

2.2 ANALYSIS METHODOLOGY

The methodology used to evaluate potential institutional controls focuses on reducing the MEC-related risk at the WTA MRA and included the review of the government institutions and non-government entities that have some form of jurisdiction or ownership of the properties within the site. Once jurisdictions and ownership were determined, representatives of these entities were contacted and interviewed. The procedure is defined below:

- Based on knowledge of the area and discussions with the U.S. Army Corps of Engineers, Honolulu District (CEPOH), a list of landowners and institutions was prepared.

- Questionnaires were sent and telephone interviews were conducted with landowners and representatives of the primary institutions that could potentially have jurisdiction over the MRS. Basic data were collected including the capability and willingness to assert control over the land containing potential MEC hazards.

- An Institutional Summary was produced for each landowner and responding institution.

3.0 SCOPE OF EFFORT

This Institutional Analysis report was prepared in accordance with guidance developed by the U.S. Army Engineering and Support Center, Huntsville (USAESCH). This analysis supports the development of strategies that require the cooperation of private, local and state authorities. Representatives of private, local and state agencies with jurisdiction over the former WTA MRA have been sent questionnaires to document their concern, capability, and willingness to exercise institutional controls over the property. This study includes outlines of these interviews, discussion of potential control strategies, and recommendations for specific control strategies.

4.0 SELECTION CRITERIA

A list of agencies, individuals and organizations were selected based on relevance to the institutional control process. A set of criteria was used in the selection of agencies. These organizations and agencies should:

- Have jurisdiction as a public agency.
- Have primary concern for ordnance hazards because of ownership or use.
- Have technical capability for access control or behavior modification strategies.
- Provide a variety of sources (i.e., print, and visual) that would provide complete coverage/contact with users.
- Repeat the same or different strategy later.
- Have authority to assist in implementation of institutional controls.
- Have responsibility for land-use control or public safety.
- Have capacity to conduct public information and education activities.
- Expressed an ability and willingness to assist.

The results from the agency reviews are contained in the subsequent section. The respective forms were populated with publicly available information including the internet websites cited in each respective analysis. The reviews were conducted in February 2013.

5.0 LANDOWNERS

5.1 TMK: 48006001 & 48014005

Origin of Institution: Non-Applicable

Basis of Authority: The Constitution of the State of Hawaii contains authoritative information for all public and private Landowners.

Sunset Provisions: None

Geographic Jurisdiction: Landowners have jurisdiction within their deeded property boundaries.

Public Safety Function: None

Land Use Control Function: Educate site visitorswho may conduct intrusive activities on affected property and provide informational and safety fact sheets/notices.

Financial Capability: None

Desire to participate: The Landowner does not want the responsibility of installing and maintaining signs, therefore this LUC will not be included for this property. The Landowner is also opposed to zoning restrictions and land use permitting, but is accepting of the alternatives for providing education LUCs and the reproduction of safety fact sheets/notices for construction permits and site workers conducting intrusive activities.

Constraints on institutional effectiveness: Effectiveness is limited to authorized guests and site visitors.

5.2 TMK: 48006008

Origin of Institution: Non-Applicable

Basis of Authority: The Constitution of the State of Hawaii contains authoritative information for all public and private Landowners.

Sunset Provisions: None

Geographic Jurisdiction: Landowners have jurisdiction within their deeded property boundaries.

Public Safety Function: None

Land Use Control Function: Signage and/or educate site visitors who may conduct intrusive activities on affected property and provide informational and safety fact sheets/notices.

Financial Capability: None

Desire to participate: No response from Landowner.

Constraints on institutional effectiveness: Not effective

5.3 TMK: 46048006009

Origin of Institution: Non-Applicable

Basis of Authority: The Constitution of the State of Hawaii contains authoritative information for all public and private Landowners.

Sunset Provisions: None

Geographic Jurisdiction: Landowners have jurisdiction within their deeded property boundaries.

Public Safety Function: None

Land Use Control Function: Signage and/or educate site workers who may conduct intrusive activities on affected property and provide informational and safety fact sheets/notices.

Financial Capability: None

Desire to participate: No response from Landowner.

Constraints on institutional effectiveness: Not effective

6.0 INSTITUTIONS

6.1 U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT

Origin of Institution: The U.S. Army Corps of Engineers, Honolulu District (CEPOH) was established in 1905 by an Act of Congress in April 1904 that appropriated funds for procuring land in Hawaii to be used as sites for coastal fortifications.

Basis of Authority: Defense Environmental Restoration Program (DERP) [10 USC Section 2701 et seq.], Executive Order 12580 - Implementing response actions for releases of hazardous substances from each facility that is, or was, under the jurisdiction of the U.S. Department of Defense (DoD) in accordance with DERP and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

Sunset Provisions: None

Geographic Jurisdiction: The Honolulu District's area of responsibility crosses five time zones, the international dateline, and approximately 12 million square miles of the Pacific Ocean, and includes the territories of Guam, American Samoa, and CNMI as well as the Freely Associated States including the Republic of Palau, Federated States of Micronesia, and the Republic of the Marshall Islands.

Public Safety Function: Responsible for following CERCLA in the execution of the DERP-FUDS program in its area of responsibility. Implements response actions for releases of hazardous substances from Formerly Used Defense Sites were under the jurisdiction of the DoD in accordance with DERP and CERCLA. CEPOH is not responsible for emergency response to suspected UXO in areas where it does not have an active field operation. Emergency response is the purview of the City and County of Honolulu. Public UXO safety education may be a part of DERP-FUDS response actions.

Land Use Control Function: None

Financial Capability: Primary restoration response funding source.

Desire to participate: CEPOH is willing to reproduce copies of the informational and safety fact sheets/notices and pre-prepared informational and safety fact sheets/notices with construction permits in affected areas. CEPOH is willing to contribute 100% of the associated costs for reproduction of materials, within reason.

U.S Army Corps of Engineers – Honolulu District
Attn: Kevin Pien – Project Manager
Building 252
Fort Shafter, HI 96858-5440

Constraints on institutional effectiveness: CEPOH has minimal control relative to implementing, maintaining, monitoring, or enforcing institutional controls on privately owned property.

6.2 HAZARD EVALUATION AND EMERGENCY RESPONSE OFFICE - DEPARTMENT OF HEALTH, STATE OF HAWAII

Origin of Institution: State of Hawaii.

Basis of Authority: The Office of Hazard Evaluation and Emergency Response (HEER) is part of the Department of Health, State of Hawaii (HDOH) and enforces the state's environmental protection laws.

Sunset Provisions: None

Geographic Jurisdiction: HDOH has jurisdiction within the State of Hawaii.

Public Safety Function: The mission of the HDOH is to protect human health and the environment.

Land Use Control Function: Only within the applicable regulatory framework.

Financial Capability: None.

Desire to participate: Yes. Representative from HEER Office has participated in the project TPP and serve on the project Restoration Advisory Board. HEER has provided review of the all project documents.

Constraints on institutional effectiveness: HEER is limited to working within the existing regulatory framework including enforcement of environmental regulations.

6.3 DEPARTMENT OF PLANNING AND PERMITTING, CITY AND COUNTY OF HONOLULU

Origin of Institution: The County of Oahu began operating on July 1, 1905, and two years later was renamed the City and County of Honolulu. The legislature granted home rule in 1959 and a city charter was adopted, giving Honolulu a mayor-council type of government in which there is a separation between legislative and executive functions.

Basis of Authority: The Constitution of the State of Hawaii contains authoritative information for all public and private Landowners.

Sunset Provisions: None

Geographic Jurisdiction: The City and County of Honolulu has jurisdiction over the island of Oahu.

Public Safety Function: The purposes of the City and County government as stated in the charter are to serve and advance the general welfare, health, happiness, safety and aspirations of its residents, present and future, and to encourage their full participation in the process of governance.

Land Use Control Function: The Department of Planning and Permitting (DPP) provides services and information on building permits, development projects, planning activities, and the administration of the Land Use Ordinance and zoning for the City and County of Honolulu. Attach MEC information and fact sheets/brochures with approved building permits for the applicable parcels.

Financial Capability: The City and County of Honolulu has the ability to levy certain taxes with voter approval. The City and County of Honolulu also has the ability to levy various fines, fees and charges for various programs.

Desire to participate: The City and County of Honolulu is willing to participate by attaching notices concerning historical MEC use with approved building permits for the applicable parcels. A formal request must be submitted by mail from CEPOH to the DPP with the following information: tax map key (effected parcels); why this information is important to the public; and what information should be provided with approved building permits. This information must be mailed to the following address:

Department of Permitting and Planning
Attn: Acting Director, Jiro Sumada
650 South Kings
Honolulu, HI 96813

Constraints on institutional effectiveness: The City and County of Honolulu has minimal control relative to implementing, maintaining, monitoring, or enforcing institutional controls on privately owned property. The Department of Planning and Permitting has approval authority to issue site and building permits.

6.4 HONOLULU POLICE DEPARTMENT, CITY AND COUNTY OF HONOLULU

Origin of Institution: The Honolulu Police Department was established in 1932.

Basis of Authority: Law enforcement in the United States is one of three major components of the criminal justice system of the United States.

Sunset Provisions: None

Geographic Jurisdiction: The jurisdiction is the Honolulu Police Department (HPD) encompassing the entire island of Oahu. Oahu has a circumference of about 137 miles and an area of approximately 596 square miles.

Public Safety Function: The men and women of the Honolulu Police Department are dedicated to providing excellent service through partnerships that build trust, reduce crime, create a safe environment, and enhance the quality of life in our community. HPD is responsible for emergency response to suspected UXO finds including identification and disposal. HPD may involve military explosive ordnance disposal (EOD) units as they deem necessary.

Land Use Control Function: None

Financial Capability: None

Desire to participate: The HPD is interested in receiving the training that is being proposed with regard to MEC recognition and safety awareness, especially in District 4 Uniformed Patrol Division, where the Waikane Valley is located should they have to respond to an incident or call for service at that location. The HPD is also interested in receiving updates as to the progress of this proposed project.

Honolulu Police Department
Attn: Gordon Gomes - Captain
801 South Beretania Street
Honolulu, HI 96813

Constraints on institutional effectiveness: Willing to receive MEC recognition training. This is not a core mission of the Honolulu Police Department.

6.5 HONOLULU FIRE DEPARTMENT, CITY AND COUNTY OF HONOLULU

Origin of Institution: On December 27, 1850, King Kamehameha III signed an ordinance which established the Honolulu Fire Department (HFD) as the first fire department in the Hawaiian Islands.

Basis of Authority: The Revised Ordinances of Honolulu 1990 (ROH) is compiled by the Office of Council Services, the official Revisor of Ordinances (Chapter 20, Fire Code of the City and County of Honolulu).

Sunset Provisions: None

Geographic Jurisdiction: The Department protects the City and County of Honolulu (entire island of Oahu) with a force of over 1,100 fire fighters.

Public Safety Function: The mission of the Honolulu Fire Department is to respond to fires, emergency medical incidents, hazardous materials incidents, and rescues on land and sea to save lives, property, and the environment.

Land Use Control Function: None

Financial Capability: None

Desire to participate: None

Constraints on institutional effectiveness: This is not a core mission of the Honolulu Fire Department.

6.6 DEPARTMENT OF EMERGENCY MANAGEMENT, CITY AND COUNTY OF HONOLULU

Origin of Institution: Unknown

Basis of Authority: The Honolulu Local Emergency Planning Committee (LEPC)LEPC serves as a focal point for information and discussion about planning for emergencies involving hazardous substances as required under Public Law 99-499, the Superfund Amendment and Reauthorization Act (SARA) of 1986 (SARA Title III), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA).

Sunset Provisions: None

Geographic Jurisdiction: City and County of Honolulu.

Public Safety Function: The role of the Honolulu LEPC is to form partnerships with: local government, communities, academia and industries as a resource for enhancing hazardous materials (HAZMAT) preparedness.

Land Use Control Function: MEC Awareness and Fact Sheets

Financial Capability: None

Desire to participate: The Department of Emergency Management, City and County of Honolulu, is willing to reproduce copies of the informational and safety facts sheets/notices.

Department of Emergency Management
Attn: Robert H-H Harter – Hazardous Materials Officer
FASI Municipal Building
650 South King Street
Honolulu, HI 96813

Constraints on institutional effectiveness: Willing to reproduce informational and safety facts sheets/notices.

6.7 BOARD OF WATER SUPPLY, CITY AND COUNTY OF HONOLULU

Origin of Institution: In 1913, the Department of Public Works, which was under the Mayor and Board of Supervisors, took charge of water distribution. In 1917, the department appointed a Commission of five men (the Honolulu Water Commission) to investigate and report upon the present and future water system of Honolulu.

Basis of Authority: The State Water Code was adopted by the Hawaii Legislature, which set in place various layers of protection for all waters in the Hawaiian Islands. The State Commission on Water Resource Management -- also known as the Water Commission -- sets policies and approves water allocations for all water users, including the Board of Water Supply (BWS).

Sunset Provisions: None

Geographic Jurisdiction: The Board of Water Supply (BWS) manages Oahu's municipal water resources and distribution system.

Public Safety Function: The BWS provides residents with safe and dependable water service at reasonable cost.

Land Use Control Function: None

Financial Capability: None

Desire to participate: None

Constraints on institutional effectiveness: Jurisdiction limited to water resources and activities that affect water resources.

7.0 DESIRE TO PARTICIPATE IN THE INSTITUTIONAL CONTROL PROGRAM

Relationships with the WTA MRA stakeholders have been established and maintained through Restoration Advisory Board (RAB) meetings and during RI field efforts. Private and public landowners own the property within the WTA MRA. Institutional controls recommended in the FS will provide a mechanism to reduce the risk of exposure to MEC. Institutional controls require landowner support to be effective. Responses were not received from all landowners for the Institutional Analysis so their acceptance, willingness, and capability of implementation may not be definitively known.

8.0 TECHNICAL CAPABILITY

Private landowners have the ability to limit access and provide awareness to their families, visitors, and employees that work within the boundaries of the WTA MRA. These controls require limited technical capability.

9.0 ABILITY TO PARTNER WITH OTHER AGENCIES

A review of government agencies and private entities that exercise jurisdiction of the site indicated that all of the WTA MRA is under the control of landowners. The entities most likely to be involved in implementation of institutional controls include: CEPOH, HDOH, City and County of Honolulu (Department of Planning and Permitting), and landowners. Intergovernmental relationships exist between the CEPOH, HDOH, and City and County of Honolulu.

The CEPOH is responsible for providing DERP-FUDS program management and execution, which includes funding and technical direction, for FUDS response actions within their district, which includes WTA MRA.

The HDOH is the state environmental regulator for the site. To date they have participated in the RAB process and review of project documents.

The City County of Honolulu (Department of Planning and Permitting) provides services and information on building permits, development projects, planning activities, and zoning for the City and County of Honolulu.

WTA MRA is currently owned by public and private landowners. The majority of the area consists of inaccessible terrain that limits development options. The current land use consists of hunting, hiking, recreational vehicle use, single family residence and agriculture. Future land use plans consist of restoration/preserving the native forest, expanding agriculture, building of a single-family residence, and development of a nature park. Access to most areas within WTA MRA is unrestricted; however is limited due to extreme terrain. Some landowners have participated in the RAB meetings and have expressed willingness to participate in institutional controls.

10.0 STABILITY

CEPOH, HDOH, and City and County of Honolulu and are government entities and, hence, are expected to be the most stable type of organizations. Landowners are also considered stable; and it is unlikely that there would be any change in their ability to participate; however, there is potential for instability to occur in their willingness to participate.

11.0 FUNDING SOURCES

The Defense Environmental Restoration Account (DERA) funds the FUDS program and will provide funding to the CEPOH. The funding is programmed annually and additionally funded with congressional appropriations.

12.0 RESIDUAL RISK

12.1 EDUCATIONAL CONTROLS

12.1.1 The use of educational controls is usually a good strategy to manage and reduce residual risk from public exposure to MEC. An education program may take on many forms and may be easily tailored to meet the specific needs of a site and the surrounding community. Examples of education programs include formal education seminars and public notices (EP 1110-1-24).

12.1.2 Generally, if people are aware of and understand the hazards associated with an MEC contaminated site, they will take the necessary precautions to avoid exposure. Education programs can be tailored to meet the specific needs of a particular audience (e.g., local homeowners, school children, regulators, developers, etc.) and can be performed as often as necessary to educate those that are at greatest risk for exposure to MEC. Educational efforts constitute a stand-along institutional control, but can also improve the effectiveness of other controls that are part of the overall program (EP 1110-1-24).

12.1.3 Based on the results of the questionnaires returned during the CEPOH and landowners are willing to participate in an institutional control program which include educating site workers who may conduct intrusive activities on affected property and provide informational and safety fact sheets/notices.

12.2 PERMIT PROGRAMS

12.2.1 Permit programs have also been developed to help ensure that site developers are aware of and comply with special procedures that are required in the development of a parcel (for example, requiring a builder to replace the existing soil on a parcel because of its poor structural characteristics). Historically, permit programs have been developed in areas where special requirements are necessary to protect human health and the environment because of residual contamination that remains on a property. In the particular case of an MEC-contaminated site, a permit program can be established that would require a developer to contact a MEC contractor approved by USAESCH to clear an area of MEC prior to excavation for footings or foundations. Permitting programs provide an avenue by which both local authorities and USAESCH may become aware of land use activities that may not be compatible with the presence of MEC. In order to maintain a successful permit program, a system to verify compliance with the permit program and the authority to bring violators back into compliance is required (EP 1110-1-24).

12.2.2 Based on the results of the questionnaires returned during the institutional analysis, CEPOH and landowners are accepting of a permit program that would disseminate information upon issuance of building permits. The City and County of Honolulu (Department of Permitting and Planning) is willing to participate in disseminating informational and safety fact sheets/notices upon issuance of building permits.

12.2.3 Table 1 lists the roles, responsibilities and authorities for implementation of institutional controls. Table 2 is a summary of the institution and landowner willingness and capability to implement institutional controls.

13.0 REFERENCES

13.1 SOURCE OF INFORMATION:

Engineer Pamphlet (EP) 1110-1-24. U.S. Army Corps of Engineers. 15 December 2000.
http://hawaii.gov/lrb/con/
http://hawaii.gov/lrb/con/
http://hawaii.gov/health
http://www.poh.usace.army.mil/
http://dlnr.hawaii.gov/
http://www1.honolulu.gov/cchnl.htm
http://www.honolulupd.org/index.php
http://www1.honolulu.gov/hfd/
http://www1.honolulu.gov/dem/
http://www.hbws.org
http://eha-web.doh.hawaii.gov/eha-cma/Org/HEER/
http://www.honoluludpp.org/

TABLE 1 ROLES, RESPONSIBILITIES, AND AUTHORITIES FOR IMPLEMENTATION OF INSTITUTIONAL CONTROLS

Agency/ Institution	Role	Responsibility	Authority
HDOH (HEER)	HEER represents the state government agency conducting regulatory oversight of munitions response actions at WTA MRA	• To protect human health and the environment. • Responds to releases, threats of releases, or discoveries of hazardous substances that present a substantial endangerment to public health or the environment. • Enforcement of environmental laws.	• Applicable Hawaii Administrative Rules (HAR).
CEPOH	Represents federal government in execution, oversight, and procurement of munitions response actions at the WTA MRA.	• Implement the Decision Document. • Report new discoveries of MEC to HDOH. • Disseminate informational and safety fact sheets/notices to landowners and DPP.	• DERP and CERCLA
City and County of Honolulu (DPP)	DPP represents the city and county government agency to provide information with issuance of site and building permits and zoning.	• Disseminate information upon issuance of building permits. • Enforce regulations pertaining to land use, zoning, building code standards and infrastructure requirements.	• Constitution of the State of Hawaii.
Landowners	Institute and enforce controls on site visitors.	• Educate site workers who may conduct intrusive activities on affected property and provide sheets/notices.	• Ownership

TABLE 2 WILLINGNESS AND CAPABILITY TO IMPLEMENT INSTITUTIONAL CONTROLS

Institutional Control	Willingness				Capability			
	CEPOH	**HDOH**	**City and County of Honolulu**	**Landowners***	**CEPOH**	**HDOH**	**City and County of Honolulu**	**Landowners***
Issue Pamphlets, Fact Sheets, Brochures	√	X	√	√	√	X	√	√

Note: * - Reflects the willingness and capability of the landowner who responded to the Institutional Analysis questionnaire.

APPENDIX E
TECHNICAL MEMORANDUM
CONFIRMATION SUBSURFACE SOIL SAMPLE RESULTS

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TECHNICAL MEMORANDUM

To: Ms. Rebecca Terry (US Army Engineering and Support Center-Huntsville) and Mr. Kevin Pien (US Army Corps of Engineers-Honolulu District)

From: Mr. David S. Wolf, PE (Zapata Incorporated)

Date: 10/25/2012

Re: **Draft Waikane Training Area - Confirmation Discrete Subsurface Soil Sample Results**

1.0 BACKGROUND

A Remedial Investigation (RI) was conducted in 2011, at the Waikane Training Area Munitions Response Area (WTA MRA). The WTA MRA consists of three Munitions Response Sites (MRSs): Western/Mountainous Region MRS, Southern Impact Region MRS and the Southeastern Region MRS. The RI included the collection of soil (surface and discrete subsurface) and sediment samples throughout the MRSs. These samples were collected in areas of high munitions debris (MD) densities as determined by the results of analog-and-dig activities conducted during the RI and collected in the vicinity of where munitions and explosives of concern (MEC)/MD items were recovered during the concurrent non-time critical removal action (NTCRA) within Southern Impact Region MRS and Southeastern Region MRS (Area of Concern [AOC] #1 and AOC #2, respectively).

Lead concentrations above the State of Hawaii Department of Health (HDOH) Environmental Action Level (EAL) of 200 mg/kg were detected in two discrete subsurface soil samples collected in the Southeastern Region MRS: WTA-SE-ZSB-016 (1,830 mg/kg) and WTA-SE-ZSB-028 (223 mg/kg). The lead concentration measured in sample WTA-SE-ZSB-028 was not considered to be a significant exceedance (defined as an order of magnitude) above the HDOH EAL. The highest lead concentration was measured at sample location WTA-SE-ZSB-016 which was collected from an area where MEC items were identified and disposed by intentional detonation during the concurrent NTCRA at AOC #2.

The HDOH requested that confirmation samples be collected from WTA-SE-ZSB-016 where the highest lead concentration was detected.

The purpose of this Technical Memorandum is to present the results from confirmation samples collected from WTA-SE-ZSB-016. The extent of variability between paired results is considered low if the relative percent difference (RPD) is less than 50 percent or if the absolute difference in results is less than five times the value of the reporting limit.

2.0 CONFIRMATION SUBSURFACE SOIL SAMPLING

2.1 Sample Location

Two primary discrete subsurface soil samples were collected from within the Southeastern Region MRS (Figure 1). Discrete subsurface confirmation soil samples were collected a location as close as possible to that of the original sample (WTA-SE-ZSB-016) from a depth of 12 inches below ground surface (bgs). Figure 1 presents the location of the original sample and confirmation samples. A global positioning system (GPS) instrument, the Trimble® GeoExplorer® 6000 series GeoXT™ handheld, was used to navigate to the original location of WTA-SE-ZSB-016.

The post-processed coordinates for original sample location and confirmation sample locations are as follows (UTM Zone 4N meters):

- WTA-SE-ZSB-016 (original) N: 2377099.329 E: 617536.902
- WTA221B (confirmation) N: 2377101.907 E: 617534.786
- WTA221C (confirmation) N: 2377101.907 E: 617534.786

A Daily Quality Control Report (DQCR) was prepared on the day of sampling (August 24, 2012). The confirmation sample location was recorded on the DQCR at the time of collection and is slightly different than that listed above due to post-processing.

2.2 Sampling Procedures

Soil samples were collected using a hand auger from a depth of 12 inches bgs. Soil samples were removed from the hand auger, homogenized, and immediately placed in the appropriate sample containers and then sent to the laboratory for lead analysis by SW-846 3050B/EPA Method 6010C. Accutest Laboratories (Orlando, Florida) provided the bulk jars for each of these samples. Site conditions were photographed using a digital camera. Sampling was conducted in accordance with U.S. Army Corps of Engineers (USACE) guidance, HDOH guidelines, and Former Waikane Training Area RI/FS Work Plan (March 2011).

2.3. Quality Control and Quality Assurance Samples

One discrete subsurface soil sample (WTA221C) was split in triplicate (one primary sample [WTA221C] and two replicates [WTA221D and WTA221E]). The primary and one replicate sample were sent to the primary laboratory (Accutest). The remaining replicate sample was sent to the Quality Assurance (QA) laboratory (TestAmerica).

2.3.1 Quality Control Duplicate Samples

The sampling team collected a Quality Control (QC) sample for analysis by the primary laboratory (Accutest). The QC duplicate sample (WTA221D) was generated from a field split collected from WTA221C.

The identity of the QC sample was not provided to the analysts or laboratory personnel. A log was maintained that identified the QC sample to its primary soil sample. This procedure ensured that the laboratory did not know which QC sample matched the primary sample.

The purpose of QC samples is to provide site-specific, field-originated checks of the quality of the data generated by the laboratory.

2.3.2 Quality Assurance Duplicate Samples

The sampling team also collected a QA sample for analysis by the contract QA laboratory (TestAmerica). The QA duplicate sample (WTA221E) was generated from a field split collected from the same primary sample as the QC duplicate sample (WTA221C). The QA sample was collected in the same manner as the QC sample, except that the sample was shipped directly to TestAmerica.

3.0 FIELD EQUIPMENT AND SUPPLIES

Execution of confirmation sampling work required the use of sampling equipment. This section presents the measures employed to assure that equipment conditions did not impact data quality. Field decontamination was not necessary because two pre-cleaned hand auger buckets were used during the sample collection event. The laboratory supplied sample containers. Sample personnel donned new, laboratory-quality disposable gloves prior to collection of each sample.

4.0 FIELD DOCUMENTATION

Sample collection, storage, packing, and shipment were properly documented to ensure chemical data integrity. Field documentation was entered using indelible ink into a bound field book or equivalent. Any corrections were made by drawing a single line through the error, then initialing and dating the line. Each page was dated, initialed, and sequentially numbered.

A QC Report was prepared for the single day of sampling, dated, signed by the field team leader.

5.0 SAMPLE IDENTIFICATION

A unique identification number was assigned to each sample. The sample location identification number contained an alphanumeric sequence, which references the sample by matrix, site, and relative position in the sampling sequence. Information pertaining to a particular sample is referenced by its chain-of-custody identification number, which is recorded on the sample bottle, in the field logbook, and on the chain-of-custody form.

Soil samples collected for laboratory analysis were designated using the chain-of-custody identification number (COC ID#) to correlate with the original sample location identification number (Sample Location ID). Samples were identified as follows:

COC ID#	Sample Location ID
WTA221B	WTA-SE-ZSB-016
WTA221C	WTA-SE-ZSB-016

The Quality Control duplicate soil sample was identified by replacing the ‘ZSB’ with ‘ZQCS-DUP’ (Quality Control Soil Duplicate Sample) or ‘ZQAS-DUP’ (Quality Assurance Soil Duplicate Sample) preceded by the site identification acronym and followed by an

ascending number for each duplicate sample collected. A log identifying each QC duplicate sample to its duplicate field sample was maintained.

6.0 CHAIN-OF-CUSTODY DOCUMENTATION

After sample collection, all sample containers were labeled with an identification number that uniquely identified the sample. The sample identification number was logged in the field logbook and on the Chain-of-Custody Record with the following information:

- sampling location (including state and city),
- sampling personnel,
- date and time of collection,
- field sample location and depth (if appropriate),
- observations of ambient (weather) conditions,
- type of sampling (composite or grab),
- method of sampling,
- sampling matrix or source,
- intended analyses and type of container,
- preservation method, and
- observations of physical characteristics of the sample.

7.0 SAMPLE PACKING

Samples were packed for shipping in waterproof ice chests and/or coolers. Sample containers were individually sealed in plastic bags, prior to packing in the cooler. Samples were packed to prevent breakage during shipment. Wet ice sealed in Ziploc or other plastic bags (to inhibit cross-contamination of samples by melt-water) was placed with the samples in the cooler to maintain the samples at a temperature of approximately 4°C during temporary on-site storage and shipping.

The chain-of-custody forms were signed and samples relinquished by the principal sampler. The forms were sealed in a waterproof plastic bag and placed inside the coolers by taping the bags to the inside lids of the coolers.

Following packing, the cooler lids were sealed with strapping or duct tape. Two custody seals were signed, dated, and affixed on/around two corners of each cooler, across the seal of the lid, and covered with clear tape. The tape was placed on either end of the custody seal, thereby requiring the seal be broken during any attempt to open the cooler.

8.0 SAMPLE SHIPPING

The sample coolers were shipped on August 27, 2012, arriving at Accutest on August 29 and TestAmerica on August 28, 2012. A copy of the bill of lading has been retained as part of the sample custody documentation. The samples arrived at Accutest at temperature of 3.8°C and at TestAmerica at 3.0°C.

9.0 RESULTS

Two primary samples were collected from the original location of WTA-SE-ZSB-016 and analyzed for lead. In addition, a QC duplicate sample (WTA221D) was collected from one of the primary samples (WTA221C) and a QA duplicate sample (WTA221E) was collected

for a laboratory check. Table 1 presents the sample results. The original sample (WTA221) collected during the RI, on August 30, 2011, is shown in Table 1 for comparison.

Table 1: Analytical Results

Location ID	COC ID	Collection Date	SW 846 6010C	
			Lead	
			Cas No. 7439921	
			mg/kg	RPD
WTA-SE-ZSB-016	WTA221	8/30/2011	1,830	NA
WTA-SE-ZSB-016	WTA221B	8/24/2012	29.9	194%
WTA-SE-ZSB-016	WTA221C	8/24/2012	109	178%
WTA-SE-ZQCS-DUP	WTA221D	8/24/2012	112	NC
WTA-SE-ZQAS-DUP	WTA221E	8/24/2012	92 J	NC

RPD – Relative Percent Difference
NA – Not Applicable
J – Estimated: The analyte was positively identified; the quantitation is an estimation.
NC – Not Calculated for duplicate samples

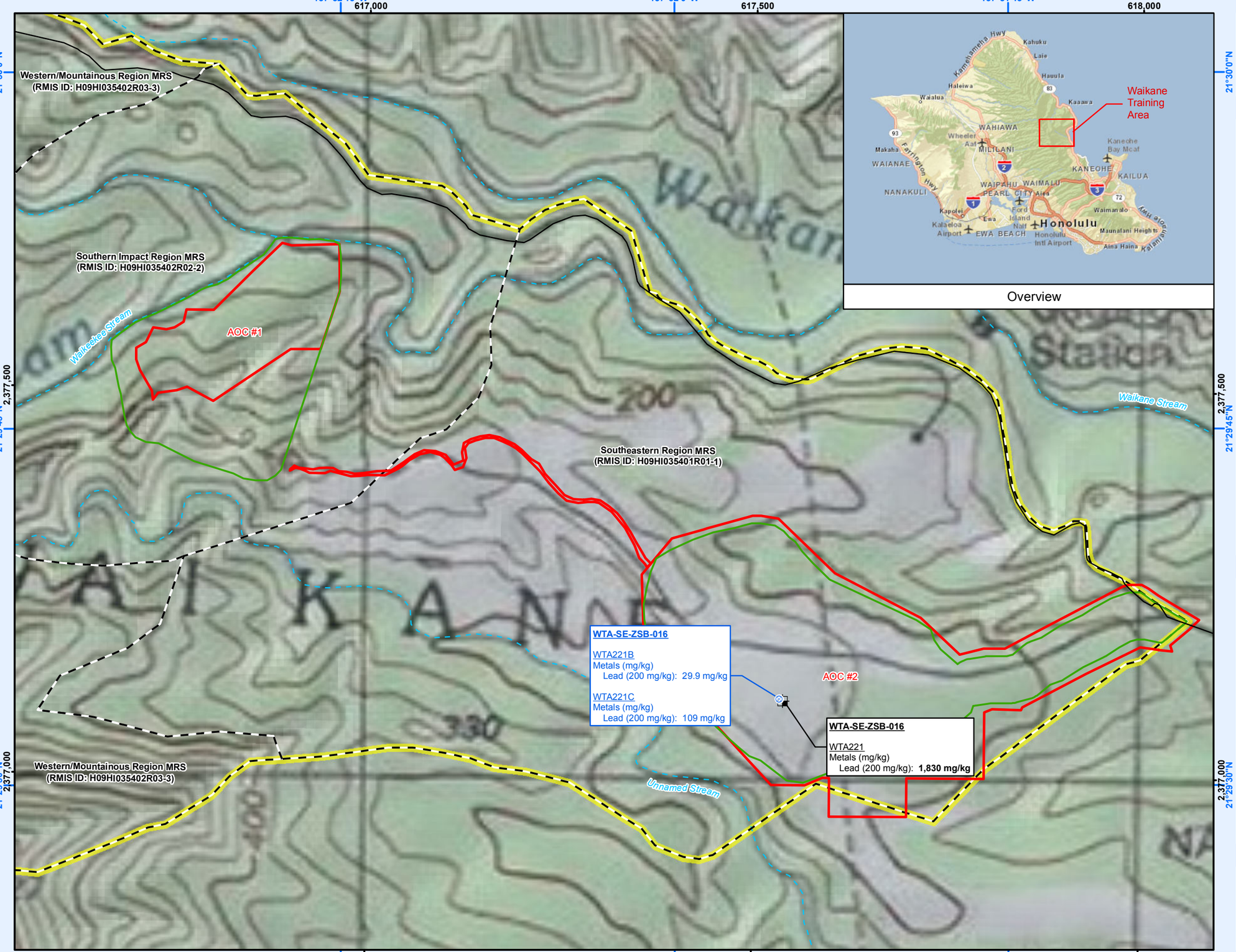
The two primary samples (WTA221B and WTA221C) had lead concentrations of 29.9 and 109 mg/kg, respectively. These concentrations are below the HDOH EAL of 200 mg/kg. The QC duplicate sample (WTA221D) had a lead concentration of 112 mg/kg. The QA duplicate sample (WTA221E) had a lead concentration of 92 mg/kg. The locations of the original sample and confirmation samples are shown on Figure 1.

10.0 CONCLUSIONS

The HDOH requested that confirmation subsurface soil samples be collected from WTA-SE-ZSB-016, the location where the highest lead concentration was detected during the RI. Two subsurface confirmation samples were collected post-RI; lead concentrations were below the HDOH EAL. The extent of variability between the original (WTA221) and confirmation sample results is considered high (RPD greater than 50%). Further, the lead concentration of 1,830 mg/kg falls outside of the 99th percentile value (1,300 mg/kg) of the original data set collected during the RI for subsurface soil concentrations in the Southeastern Region MRS. For these reasons, there is evidence to suggest that widespread lead contamination in soil is unlikely and that the original elevated lead concentration may have been caused by a sample irregularity.

END OF MEMORANDUM

Attachments: Figure 1
Daily Quality Control Report
Analytical Results (electronically)



Confirmation Subsurface Soil Sample Location/Results
Southeastern Region MRS
Former Waikane Training Area
Oahu, HI

Project Number	Date	Figure
00008	OCT 2012	1

KEY

- Discrete Soil Sample Location (RI, 2011)
- Confirmation Subsurface Soil Sample Location (2012)
- Roads
- Action Memo Removal Action Area[1]
- Removal Action Area[2]
- MRS Boundary
- Stream
- WTA MRA

GN
0° 25'
9° 46'
MN

0 200 400 Feet

Source(s)
ZAPATA, USAESCH, USGS, NOAA

Projection
WGS 1984 UTM Zone 4N
Note: Main Data Frame Rotated to True North

Note(s)
Engineering scale may only be accurate on a map size of 11 x 17

Magnetic Declination Date: 5/23/2011
Magnetic Declination Shifting by 0º 2' W per year

ND = Non-detection
J = Indicates an estimated value
-Bold values denotes concentrations above HDOH EAL Soil/Sediment
-HDOH EAL is in parenthesis

[1] NTCRA Action Memorandum (UASCE-POH, 2009)
[2] Removal Action was conducted buer a separate contract (Environet 2011)

Checked By	Engineering Scale	Drawn By
DSW	1 " = 400 '	EAA

U.S. Army Corps of Engineers
Engineering and
Support Center Huntsville
4820 University Square
Huntsville, AL 35816

DAILY QUALITY CONTROL REPORT

JOB NUMBER: 00008-012 DATE: 24 Aug 11 REPORT: 9

PROJECT & LOCATION: RI/FS at Waikane Training Area – Oahu, Hawaii

WEATHER: Cloudy, no winds WIND: 0-5 mph gusts

TIME ON SITE: 0700-1425 (Ex. 0700–1900) TEMPERATURE RANGE (°F): 85°F, humid

SUBCONTRACTOR(S): Wil Chee – Planning, Inc. (WCP)

LEVEL OF HEALTH & SAFETY PROTECTION: Level D

EXPOSURE HOURS (ZAPATA):

EXPOSURE HOURS (SUBCONTRACTORS): ~7 hours

EXPOSURE MONITORING[1]: NOISE: None CHEMICAL: None.

EXPOSURE MILEAGE[2]: ZAPATA: MILES SUBCONTRACTOR(S): ~42 MILES

INSTRUMENTATION USED: None.

CALIBRATION(S) PERFORMED: None.

INSTRUMENT PROBLEMS/REMEDIES: None

PERSONNEL ONSITE: Jim Froneberger, Clayton Sugimoto

SUMMARY OF SITE ACTIVITIES: Collected 2 confirmation subsurface soil samples, 1 field duplicate subsurface soil sample, and 1 QA subsurface soil sample (6-12" bgs) from the Southeastern Region MRS. The GPS coordinates for the sample location was N: 2377101.45 and E: 617534.24 (UTM Zone 4).

SAMPLE COLLECTION METHOD(S): Grab, field duplicate, QA.

SAMPLES COLLECTED[3]: Two grab subsurface soil samples (WTA221B, WTA221C).

QUALITY CONTROL SAMPLES[3]: One field duplicate subsurface soil sample (WTA221D), one QA subsurface soil samples (WTA221E).

SIGNATURE: Clayton Sugimoto (WCP) TITLE: Field Manager

[1] Indicate the low and high readings from monitoring equipment. Attach tabulated readings.
[2] Estimate vehicle mileage traveled during working hours.
[3] Indicate 1) Sample Media: Groundwater, Surface Water, Soil or Sediment, 2) Sample Type: Composite, Grab, Duplicate, Rinsate, and 3) Sample ID Numbers.

Photo 1: General location of soil samples. Parked project vehicle in background. View facing northeast.

Photo 2: Sample location of first primary subsurface soil sample. View facing down.

Photo 3: Sample location of second primary subsurface soil sample, which included field duplicate, and QA sample. Note Ziplock bag used for homogenization of soil. View facing down.

TRAVEL COST

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: TPP				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	3.0	**$ 1,200.00**	=	$ 3,600.00	3 FLIGHTS/AVG
Per Diem (Days)	10.5	**$ 109.00**	=	$ 1,144.50	
Lodging (Days)	9.0	**$ 170.00**	=	$ 1,530.00	
Rental Car (Days)	9.0	$ 65.00	=	$ 585.00	
Other (Parking, Fuel, Tolls, ATM, etc.)	18.0	$ 25.00	=	$ 450.00	
Mileage (Per Mile)	60.0	$ 0.55	=	$ 33.00	
			TOTAL:	***$ 7,342.50***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Public Involvement Plan and Community Relations				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	6.0	$ 1,200.00	=	$ 7,200.00	3 FLIGHTS/AVG
Per Diem (Days)	21.0	$ 109.00	=	$ 2,289.00	
Lodging (Days)	18.0	$ 170.00	=	$ 3,060.00	
Rental Truck (Days)	9.0	$ 65.00	=	$ 585.00	
Fuel (Per Day)	9.0	$ 25.00	=	$ 225.00	
Mileage (Per Mile)	120.0	$ 0.55	=	$ 66.00	
			TOTAL:	***$ 13,425.00***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal: Work Plan				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)		$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)		$ 109.00	=	$ -	
Lodging (Days)		$ 179.00	=	$ -	
Rental Truck (Days)		$ 65.00	=	$ -	
Fuel (Per Day)		$ 25.00	=	$ -	
Mileage (Per Mile)		$ 0.55	=	$ -	
			TOTAL:	***$ -***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Mobilization/Demobilization				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE**
Roundtrip Airfare (Each)	8.0	$ 1,200.00	=	$ 9,600.00	3 FLIGHTS/AVG
Per Diem (Days)	12.0	$ 109.00	=	$ 1,308.00	8 men for 2 days mob/demob @ 0.75 JTR
Lodging (Days)	16.0	$ 170.00	=	$ 2,720.00	8 men x 2 days
Rental Truck (Days)	8.0	$ 65.00	=	$ 520.00	4-trucks for 2 days
Fuel (Per Day)	8.0	$ 25.00	=	$ 200.00	4-trucks for 2 days
Mileage (Per Mile)	320.0	$ 0.55	=	$ 176.00	8-men, 40 miles RT
			TOTAL:	***$ 14,524.00***	**Alt 4**

Alt 4	Alt 4 - Surface and Subsurface MEC Removal Field Work (Brush Cutting, Removal, Soil Samples)				
DESCRIPTION (QTY: 0-TRIPS)	**QTY**	**FROM: Charlotte, NC**	**TO**	**TO: Honolulu, HI**	**NOTE (56 Work Days)**
Roundtrip Airfare (Each)	0.0	$ 1,200.00	=	$ -	3 FLIGHTS/AVG
Per Diem (Days)	1320.0	$ 109.00	=	$ 143,880.00	9 UXO x 146 days, 1 PM x 5 days
Lodging (Days)	1320.0	$ 170.00	=	$ 224,400.00	9 UXO x 146 days, 1 PM x 5 days
Rental Truck (Days)	589.0	$ 65.00	=	$ 38,285.00	4-trucks for 146 days, 1-truck for 5 days
Fuel (Per Day)	589.0	$ 25.00	=	$ 14,725.00	
Mileage (Per Mile)	26775.0	$ 0.55	=	$ 14,726.25	4-trucks for 146 days, 1-truck for 5 days
			TOTAL:	***$ 436,016.25***	**Alt 4**

TOTAL TRAVEL: $ 471,307.75